

**ABSTRACT**

Balancing the Protein Content within a Bird's Diet.

In this paper I will discuss the need for protein in the diet of wild birds. I will also look at the protein content of a few diets that have been formulated by carers or aviculturists.

The need for high protein in the diet of birds is often overemphasised. If levels of this important food component are raised beyond what is the optimum level, it can affect the development of a growing chick or the health of the recuperating adult.

Protein is available in vegetable sources, animal sources and insect sources. The body also manufactures some protein. Proteins are made up of amino acids all of which are required for the break down of food and metabolism of those foods, thus allowing the body to use the protein, fat or carbohydrates available in the food consumed.

Often the levels of protein are simply raised as it is thought that "more is better". I will explore the end stage results of increased protein levels in diets that may actually be to the detriment of the birds.

**PRESENTATION**

Diets are made up of many components. Carbohydrates, fat, minerals, vitamins, and protein are a few of the important ones. Each component needs to be looked at separately until you can say that within your diet you have met all the requirements and balanced each and every one. Some of these components have an impact on another one so changing one may unbalance another. Calcium and Phosphorus, Sodium and Potassium are examples. It is very important to make sure that all are individually measured, considered and are within the accepted guidelines for that type of bird. It is not acceptable that we just invent a new diet out of our head because it might seem to be a good idea at the time. There is now a wealth of information available and more responsibility must be taken by those who see themselves as at the cutting edge of rehabilitation. The invention of new and infallible diets by rehab "experts" is simply not necessary and may result in a negative impact. Passing them around before proper analysis and balancing is even more irresponsible. I do not think we should stop trying to improve, but if we are to improve lets do it the right way.

I would like to look at only one component of a diet today, Protein, and show you how to evaluate a diet for that aspect.

**Protein** is recognised as one of the essential components of a balanced diet; however, how we balance the protein within any given diet is important.

To understand how to balance the diet for protein, we must look at how protein is used within the body, what makes up protein and where birds get that protein from and what level it needs to be at.

Proteins are formed from *amino acids*. These amino acids are important for many functions within the bird. **Amino acids** can be obtained from the eaten food or

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metabolised within the body. Those obtained from the diet are known as essential. Others made by the body are called non-essential. It is important that we recognise that the essential amino acids are only available from diet and are involved in all facets of the body's metabolism.

The essential amino acids recognised as important for birds are as follows,

- Arginine
- Histidine
- Leucine
- Isoleucine
- Lysine
- Methionine
- Phenylalanine
- Threonine
- Tryptophane
- Valine
- Glutamic acid
- Glycine
- Proline

Proteins are used in biological functions, metabolic functions and in almost all the chemical processes within the body. They are components within muscle, skin, feathers, organs, and cell membranes. They form the fibrous support network of bone. So just from that list alone it is easy to see how important protein is in the survival of birds. Proteins also are metabolised to form hormones and immune antibodies. Chemically they assist in oxygen transportation, water regulation, blood clotting, healing and growth.

Protein is required for:

- Normal growth of muscle, skin, organs and bone.
- Tissue repair
- Wound healing
- Blood formation
- Feather growth
- Immune system, hormone production
- Energy

If protein levels are too high:

- Damage to kidneys
- Affects bowel efficiency \*
- Growth rates affected
- Bone abnormalities
- Poor cold resistance

\* It is important to recognise and understand that many birds coming into care have a disease component and the bowels are often implicated in this disease process. Add to this high protein levels and we have a cocktail for disaster.

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If protein levels are too low:

- Poor growth
- Poor healing
- Poor feather development (sometimes seen as growth bars)
- Weight loss
- General lethargy

Proteins from a dietary point of view are ranked by how well they can be used; or how easily they can be broken down into the amino acids, absorbed by the body, then reused to produce new proteins. This factor is referred to as **biological availability**.

This term also translates to the **biological value** of a food in relation to protein. *Biological value is defined as the percentage of digested and absorbed nitrogen of protein that is retained in the body for productive functions.*

	<i>Biological Value</i>	
Eggs	100	This means that almost all the available protein is completely utilized.
Meat	72 – 79	
Cereals	50 – 65	Cereal protein is usually deficient in the essential amino acids, Lysine, Methionine, and Tryptophan

If a protein has a low biological value much more of it needs to be consumed to meet daily requirements, and if it is cereal based, it will not provide all the essential amino acids. So if we look at the protein levels of the foods listed, egg has a protein level of 13% and Canary seed has a protein level of 13.6%, the egg will be more efficiently used as it has a biological value of 100 and the cereal is only 50 – 65, plus some essential amino acids are missing. By rough estimate, only half the protein in the canary seed will be used by the body. Dry seed is also deficient in Vitamin A, B5, Biotin, D3, Calcium and trace elements.

Any animal/ insect protein added to the diet will be far more effective in supplying the essential amino acids (proteins) but will also be far more efficiently used by the body and will be processed with less effort.

It is often not recognised by enough wildlife carers that ALL land birds are highly insectivorous at breeding time, and will always eat insects given the opportunity all year around. It is well documented that birds fed a seed only diet are amino acid deficient.

Diets have been developed within the avicultural world for commercial sale for some birds kept in captivity. These grain eating birds and lorikeets/ honeyeaters are kept in peak condition for long periods of time – usually years. As the pet food companies have vested interests, no expense has been spared for the development of the diets. They are balanced - nutritionally and energy wise. It is therefore quite ridiculous to start playing with these diets by adding in things and run the risk of unbalancing what was a good diet. To add high protein cereal to a lorikeet and honeyeater mix does not help the bird at all.

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It unbalances the phosphorus/ calcium ratio, adds protein that is difficult to metabolise and is lacking in some amino acids, bulks up the bowel (potentially leading to diarrhoea or irritated bowel as these birds eat very little roughage), and wastes the energy of the bird by forcing it to digest the added protein. If protein is required for one of these birds, it would make far more sense to add pollen(available from health food shops), their natural source of protein, or add insects to the diet, as they eat a variety of small crawling insects found around the flowers they feed on. I would suggest aphids, usually easy to find. You just need to look somewhere other than the supermarket shelf.

It seems to have become common to add in powdered milk lately thinking that it will add protein. The dry milk powders have a protein content of only 3.3 % (skim) & 3.4 % (full) so adding this product will not enhance the formula much. Birds do not have the enzyme lactase required to digest milk sugar lactose. When lactose reaches 10% to 30 % of the diet on a dry weight basis, diarrhoea will occur. Dried skim milk has a lactose level of 50%. It is well known that Australian Native Animals are lactose intolerant so I do wonder why bird carers seem to have discounted the fact that birds constitute a very large proportion of the native animals of Australia.

**Adding into a diet the cereal based protein foods easily available in the supermarket will not balance the diet for essential amino acids, will not give it the correct balance of easily digestible food with maximum use of the proteins. The practise of adding protein just for the sake of hoping that it will add to the birds' rate of repair is not a reasonable excuse for "willy nilly" adding high protein based cereals. It would be far better to grow some crickets, woodcockroaches or feed the bird rats and mice than to add cereal to its diet.**

**I do not promote any particular brand of food but have used readily available analysis charts that are available on the net. They also happen to be the same as in the diet I analysed**

## **Grain eating bird diet sent to me for comment.**

### Granivore Birds

- 1 Tablespoon of Wombaroo Protein Powder
- 3 Tablespoons of Wombaroo Granivore
- 4 Tablespoons of Farex – High Protein Cereal – Wholegrain
- 2 Teaspoons of Wombaroo Honeyeater & Lorikeet Nectar Mix

I would like to look at the ingredients in relation to protein.

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**Other Uses: High Protein Supplement** can be substituted for the High Protein Cereal used in the many food recipes for animals and birds. You only need to use half the quantity of **High Protein Supplement** because of its superior protein quality and higher concentration.

Item 1

**GRANIVORE REARING MIX**

Store in a cool, dry place.

**Guaranteed Analysis:**

Min Crude Protein	22%	Min Vitamin A	6mg/kg.
Min Crude Fat	8%	Min Vitamin D3	100ug/kg.

Item 2

Item 3 High Protein Cereal has 2.8% protein

**LORIKEET & HONEYEATER FOOD**

Store below 30°C

**Guaranteed Analysis**

Min Crude Protein	13%	Max Fibre	2%
Min Crude Fat	5%	Max Salt	0.8%

Item 4

This diet without adding the protein content of the High Protein Supplement is already 37.8% Protein. Growing grain eating chicks need 20% protein. A diet of 35% will result in growth inhibition and behavioural abnormalities. (The chicks screamed when touched, bit excessively, strike out at feeders and had growth depression.)

**Insect eating bird diet**

I have long contended that rats and mice plus insects should be the basis of the diet used for rehabilitating insectivorous birds. Looking at some of the diets around they will never take the place of a well balanced and stable diet that mirrors the diet of the bird in the wild. It is not out of the question these days to expect that carers commit to having a ready supply of live or at least just dead balanced food comprising wood cockroaches, crickets, rats and mice plus a small amount of supplement. In NSW raptor carers have had to do this prior to receiving endorsement as a raptor carer for ten years. Why are other birds any less important? I feel that it is far better to rehabilitate fewer birds well and properly, than to attempt to rehabilitate lots of birds only half properly without being responsible for the bird long after it has flown away. Nutritional problems are with the bird for life in most cases if it is a fledgling and for many months if it is an adult.

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# **INSECTIVORE REARING MIX**

## **FEEDING INSECTS**

Birds that eat mature insects, such as flies, moths and beetles, should not be fed large numbers of immature insects like caterpillars, grubs and pupae. On a dry weight basis the composition of mature insects is about 65% protein, 10% fat and 20% carbohydrate. The protein contains all essential amino acids and the fat is highly unsaturated. Captive birds are commonly fed the larval stage of insects such as mealworms and fly pupae. These are not good food substitutes for birds that eat mature insects. Larval stage insects can contain up to 40% fat which can significantly dilute the ratio of nutrients to energy in the diet.

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The same process should be duplicated for a diet of each type of bird and for each component within the proposed diet. It is not just a case of chucking a few “good” products together because you happen to think they will be good for the animal. It is the responsibility of each carer who decides that they are expert enough in the field of chemical analysis or dietary requirements of their birds to analyse each diet they want to make, share and say is terrific. Until that is done properly I do feel that carers would be better served by doing proper research on the components of their diets.

After 20 years of looking after wild birds, I still find it hard to believe that carers can not see that a natural diet is essential for the birds they wish to keep in prime condition whilst they are in care. I also can not understand why carers think that a diet of some concocted ingredients will educate a young bird to its natural diet when it is presented in a plate, D feeder or forced down the throat.

Until we as carers take responsibility for the methods and content of what we feed, the birds we release will not have had that all important second chance at life, but rather will be returning to the wild trying to make up for the time they had in our care by having to compensate for the dietary deficiencies.

Thank You

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Dry Weight Composition of some Insects	Mealworm	Blowfly Lava	Blowfly	Cricket	Aphid
Protein/100gms	46.3	51.3	61.2	59.3	59.4
Fat	35.2	31.9	12.2	16.1	6.2
Carbohydrates	12.3	11.6	17.2	14.8	25.7
Energy	26.7	26.6	21.7	22.3	

Dry Weight Composition of some green food	Broccoli	Common Cabbage	Parsley	Silverbeet	Spinach	Watercress	Lettuce
Protein/100gms	3.6	1.5	4.5	2.6	2.5	2.2	0.9
Fat	0.3	0.2	0.8	0.4	0.3	0.3	0.9
Carbohydrates	6.3	5.4	10	4.8	3.7	3.2	2.9
Energy	147	109	230	117	96	88	?

Dry Weight Composition of some food	Mealworms	Liver	Chick Day old	Egg	Bread	Honey	Mouse
Protein/100gms	22.3	20	15.3	13	8.2	0.2	19.8
Fat	14.9	3.2	4.4	11.5	3.3	0	8.8
Carbohydrates							
Energy	27.4	13.6	10.4	16.2	27.6	30.6	20.7

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Dry Composition of some food	Weight						
	Dog Food	Cat Food	Skim Milk	Full Cream Milk	Cereal- High Protein	Diploma Powdered Skim Milk	Nestle Sunshine Powdered Full
Protein/100gms	7	7			2.8	3.3	3.4
Fat	3.5	6					
Carbohydrates					6	5.4	5
Energy					190	151	269

Dry Composition of some food	Weight						
	Golden Circle apple Pear & Apricot	Heinz Beef, Brown Rice & Vegs	Farex	Heinz Protein Multigrain Mix	Farex Baby Rice	Heinz apples	Nan
Protein/100gms	0.3	3.5	2.4	2.8	0.9	0.4	1.6
Fat							
Carbohydrates	12.4	8.8	15.4	6	9.3	11.6	7.1
Energy	238	275	380	190	175	220	274

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Dry Composition of some Seeds	Weight						
	Millet	Canary	Wheat	Milo	Sunflower	Sesame	Peanut
Protein/100gms	14.5	13.6	11.8	12.1	15.2	21.1	27.9
Fat	5.5	3.5	2.1	3.6	28.2	46.8	35.7
Carbohydrates							
Energy							

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