WOMBAROO

FEEDING GUIDELINES
for native birds

1st Edition 2018

Wombaroo Food Products
10 Oborn Road Mount Barker SA 5251 • Ph 08 8391 1713
www.wombaroo.com.au • email info@wombaroo.com.au

TABLE OF CONTENTS

Introduction	**1**
Nutritional Categories	1
Species Identification	2
Captive Diets	2
Feed Quantity	2
Water Requirements	3
Growth Charts	3
Age Determination	4
Insectivores	**5**
Honeyeaters	**16**
Pardalotes	**21**
Frugivores	**22**
Lorikeets	**24**
Parrots & Cockatoos	**27**
Quail	**33**
Finches	**34**
Pigeons & Doves	**36**
Ducks, Geese & Swans	**42**
Waterbirds	**46**
Seabirds	**52**
Raptors	**56**
Owls	**59**

APPENDICES

Appendix 1 Insectivore Rearing Mix	62
Appendix 2 Insects & Invertebrates	64
Appendix 3 Lorikeet & Honeyeater Food	65
Appendix 4 Frugivore Diets	66
Appendix 5 Parrot Soft Food	67
Appendix 6 Seed Mixes	68
Appendix 7 Duck Feeding Guidelines	70
Appendix 8 Tube-feeding Diet	72
Appendix 9 Fish for Seabirds	73
Appendix 10 Whole Prey for Raptors	74
Appendix 11 Body Measurements	75
References	**76**
Index of Species	**77**

Cover images (clockwise): Rainbow Lorikeet, Magpie nestling, Blue-faced Honeyeater, Wood Duck duckling.

Introduction

This booklet provides feeding guidelines for Australian native birds in captivity. It may be useful for wildlife carers, veterinarians, zoos and other institutions that rehabilitate native birds. It covers the short to medium-term dietary requirements of rescued birds that are destined for release back to the wild. It is not necessarily intended for use with pet birds or long-term captives, which may have other specific nutritional requirements.

Nutritional Categories

The type of food consumed by birds varies greatly depending on species. Broad nutritional categories describing the natural diet of birds are listed below. These relate to the main foods normally eaten, however most species do not strictly fall into one particular category. For example, nectar-eating birds such as honeyeaters also include a large proportion of insects in their diet. Diets often vary seasonally, and juvenile birds may have different diets compared to adults.

Nutritional Category[a]	Natural Diet	Main Energy Source	Examples
Insectivore	Insects and other invertebrates such as spiders, earthworms, snails.	Protein	Swallows, Magpie, Frogmouth, Masked Lapwing.
Piscivore	Fish and aquatic invertebrates such as crustaceans, squid, molluscs.	Protein	Gulls, herons, cormorants, penguins.
Carnivore	Vertebrate prey such as mammals, birds, reptiles.	Protein	Raptors, owls.
Frugivore	Native fruits.	Carbohydrate (sugars)	Fruit-Doves, Figbird, Koel, bowerbirds.
Nectarivore	Nectar & pollen from flowering plants.	Carbohydrate (sugars)	Lorikeets, honeyeaters.
Granivore	Seeds & grain.	Carbohydrate (starch)	Parrots, cockatoos, pigeons, finches.
Herbivore	Plant material, grasses, leaves, shoots, aquatic vegetation.	Carbohydrate (plant cell contents)	Wood Duck, Black Swan, Swamphen.

a. The colour scheme in this table is used throughout the booklet to provide a quick reference guide to a species' nutritional category.

From a nutritional point of view, birds can be defined by the main energy source in their diet – either protein or carbohydrate. Insectivores, piscivores and carnivores all have a high requirement for protein from whole animal prey. By contrast, granivores, frugivores, nectarivores and herbivores obtain their energy from carbohydrate, which generally comes from plants. Carbohydrates are further categorised as either simple sugars, which are readily digested (frugivores, nectarivores) or more resistant starches and plant cell contents that require a grinding gizzard and digestive enzymes (granivores, herbivores)[29]. Carbohydrate-dependent birds still require a maintenance level of protein, and often consume insects and invertebrates, to meet this need.

Species Identification

Correct species identification is essential in determining a bird's diet. For example, small insectivorous birds are often mistakenly labelled as "finches" by members of public, which could lead them to being fed an inappropriate seed diet.

A good quality bird guide is useful for species identification of adult or immature birds. However, identification of chicks and nestlings is more difficult, and initially may only be recognised down to the family group. A useful printed resource is Chicks, Nestling & Fledglings of Australian Birds by Norma Henderson. Wombaroo also has experts who are happy to assist with bird identification (send enquiries with good quality images to info@wombaroo.com.au).

Captive Diets

In captivity it is often impractical to provide the variety of foods that is consumed by birds in the wild. Artificial diets are therefore widely used in rehabilitation. Diets in this booklet have been scientifically-formulated to match the nutrient profile of a bird's natural diet. For example, **Insectivore Egg Mix** (Appendix 1) replicates the protein and fat composition of a mixed insect/invertebrate diet. These diets also contain a complete range of vitamins and minerals in line with recommended levels for avian nutrition[29]. Do not add concentrated vitamin, mineral or other food supplements as this may significantly alter the balance of nutrients. The use of home-made recipes or human foods should be done with caution. For example, the practice of adding baby cereal, bran or breadcrumbs into meat mixes is not nutritionally appropriate for birds that are largely dependent on animal protein in their diet.

While it is tempting to rely heavily on artificial diets, it is important to provide as much natural food as possible. Depending on species, this may include live invertebrates, seeding grasses, flowering plants or native fruits. Natural foods are essential in providing nutritional variety, environmental enrichment and stimulation of normal foraging behaviour. Young birds in particular need to be educated to feed on natural foods if they are going to be successfully released back into the wild.

Feed Quantity

Feed quantities are calculated based on the energy requirements of birds and the calorific value of the food being fed. Energy requirements vary between species with passerines (e.g. honeyeaters, magpies) having higher metabolic demands than non-passerines (e.g. waterbirds, raptors)[29]. Different food types also have vastly different energy concentrations. Foods with high moisture content have a lower energy value (e.g. fruit compared to dry seed). Foods with high fat levels are more energy-dense. For example, sunflower seed is higher in energy than millet, and mealworms are higher in fat than crickets. Food quantities therefore need to be adjusted to account for these differences in calorific values.

Maintenance Feed Quantity: This is based on the food requirements of adult birds, assuming low activity levels and mild ambient temperatures (>20°C). This approximates the typical conditions of a rehabilitated bird in captivity. More active birds have higher energy requirements, as do outdoor birds housed in cold temperatures. The best indicator of adequate energy intake in adult birds is maintenance of a healthy weight and good body condition.

Growth or Sickness: Growing, malnourished, moulting or sick birds have increased energy requirements. As a general rule, feed up to 50% more than the maintenance requirement.

Birds should be weighed regularly to ensure food intake is adequate.

Amount of food provided should also be weighed and recorded.

Water Requirements

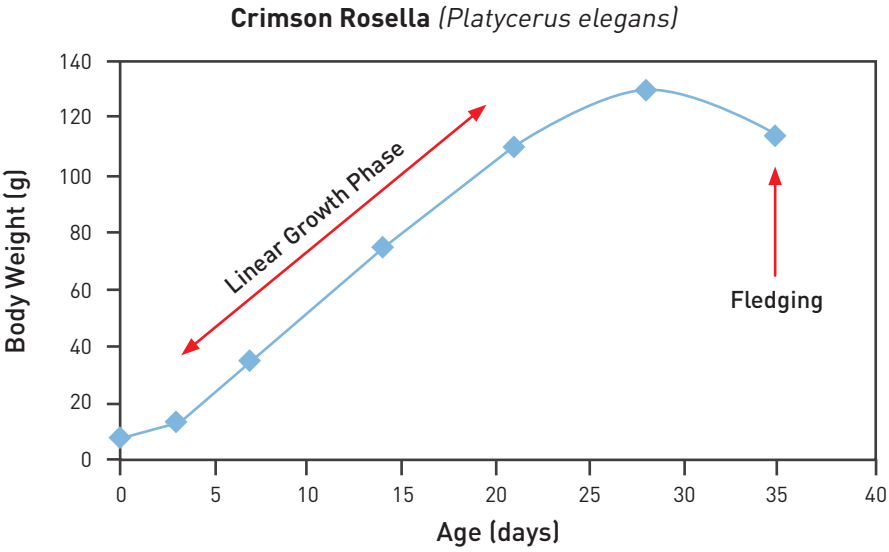
Birds should always have free access to fresh water. When birds first enter care they should be treated for dehydration prior to being fed. When hand-feeding young chicks it is important to provide extra water, particularly in hot weather. Use a syringe to provide a small amount of water at a time. Take care not to introduce fluid into the airway.

Growth Charts

Growth charts have been compiled from data collected on both parent and hand-reared birds. This provides a guideline for optimum development of young birds in rehabilitation. However, it should be noted that many birds come into care in poor condition and well below their optimum body weight. Body weight is highly influenced by food supply and health status, so is a poor indicator of age.

Body weight should not be used to age young birds.

Growth rates for most species follow a sigmoidal (s-shaped) curve, where initial growth is slow, followed by a linear growth phase, then a flattening out approaching adult weight - see following example for Crimson Rosella[14].



Fledging is the time when a chick makes its first sustained flight. In certain species like parrots and barn owls, this may be preceded by a significant decrease in body weight (up to 15%). Some species leave the nest before they are capable of flight, spending time in or around the nest tree. This is referred to as the **"brancher"** stage and occurs in magpies, frogmouths, raptors and herons.

The **Linear Growth Phase** corresponds to the maximum growth rate and highest energy demand for a young bird. The average daily weight gain during this phase is provided in the footnotes below each species' growth chart. If a young bird is not gaining sufficient weight then feed quantities should be increased. Other aspects of husbandry should also be reviewed including housing, temperature or the possibility of underlying disease. All these factors can affect weight gain and veterinary advice should be sought to assess for health and disease.

Age Determination

Ageing chicks is useful as it gives a timeline for achieving important rehabilitation milestones such as fledging, weaning and release. Body length measurements are a reasonably reliable indicator of age in chicks up until fledging. In particular, skeletal measurements such as head, bill and tarsus length increase consistently with age and are less affected by nutritional status than body weight. Feather growth is also a useful guide, as the development of down, pin feathers and adult feathering all occur at set times in a chicks' life. Feather growth is best indicated by measuring wing and tail lengths, as these must achieve a certain length before a bird is capable of strong flight. A guide to taking body measurements is outlined in Appendix 11.

Using a combination of body measurements along with the descriptions of developmental stage, it is possible to estimate the age of young birds from the growth charts.

Insectivores

Insects and invertebrates (spiders, worms, snails etc.) form the main diet of many small to medium-sized native birds. These include *passerines* ("perching birds") as well as *non-passerines* such as cuckoos, nightjars, kingfishers and waders. Many species are highly insectivorous, but some are omnivorous, including small vertebrates, fruits, seed and nectar in their diet. A purely insectivorous diet contains high levels of protein, but minimal carbohydrate.

Feeding Insectivores

Most insectivores can be maintained on a base diet of **Insectivore Meat** or **Egg Mix** (Appendix 1) supplemented with a range of insects and invertebrates (Appendix 2). Young growing birds are fed a similar diet to adults, but at increased rates to account for their higher energy demands. Extra water should be supplied directly to the bill when hand-feeding birds.

Medium-large Passerines

Species	Adult Weight	Natural Diet (main items in bold)	Captive Diet (primary items in bold)	Feed Guide[a] (per day)
Grey Butcherbird	80-110g	**Insects, invertebrates, small vertebrates**, occasionally fruit & seeds.	**Insectivore Meat Mix**, crickets, mealworms, mice, day-old chicks.	20-25g
Pied Butcherbird	100-150g			22-30g
Pied Currawong	260-400g	**Omnivorous:** Insects, invertebrates, small vertebrates, fruit & seeds.	**Insectivore Meat Mix**, crickets, mealworms, mice. Diced fruit & veg.	45-60g + 10g diced veg mix.
Black-faced Cuckoo-Shrike	90-140g	**Insects, larvae**, fruit & some plant material.	**Insectivore Meat Mix**, crickets, mealworms, fruit.	20-30g
White-winged Chough	290-450g	**Insects, invertebrates**, seeds, fruit, plant tubers.	**Insectivore Meat Mix**, crickets, mealworms.	50-70g
Grey-crowned Babbler	60-85g	**Invertebrates, mainly insects**. Spiders, skinks. Occasional seeds & fruit.	**Insectivore Meat Mix** or **Egg Mix**, crickets, mealworms.	15-20g
Grey Shrike-thrush	60-85g			15-20g
Eastern Whipbird	60-75g			15-20g
Spangled Drongo	70-100g	**Omnivorous:** Insects, small vertebrates, nectar & fruit.	**Insectivore Meat Mix**, crickets, mealworms. Lorikeet & Honeyeater Food (LHF), fruit.	15-20g + 10mL LHF
Noisy Pitta	80-110g	**Snails, Insects**, earthworms, spiders.	**Insectivore Meat Mix**, crickets, mealworms, earthworms, snails (especially for pittas).	20-25g
Bassian Thrush	95-140g	**Invertebrates: especially earthworms**, beetles.		20-30g
Superb Lyrebird	0.7-1.0kg	**Invertebrates:** earthworms, slaters, spiders, insects.		90-120g

a. Maintenance feed quantity based on 75% Insectivore Meat Mix with 25% Insects. Feed up to 50% more for growth or sickness.

Australian Magpie *(Cracticus tibicen)* [7,8]

Adult Weight	220-350g (heavier in the south).
Natural Diet	Insects & larvae, earthworms, spiders.
Secondary Diet	Small vertebrates (reptiles, mammals, birds), carrion, plant material.
Captive Diet	**Insectivore Meat Mix** (Appendix 1). Earthworms, crickets, mealworms, woodies. Occasional whole or chopped mice.
Juvenile Diet	As per adult diet. **Insectivore** may be made up as moist pellets (Appendix 1).

Age = 3 weeks

Growth & Feed Chart[a]

Age (weeks)	Developmental Stage	Bill (mm)	Weight[b] (g)	Feed[c] (g/day)
Hatch	Blind, pink & naked. Egg tooth present.	18	15	9
1	Eyes closed, fine downy feathers on head & back, pin feathers on wings.	22	70	25
2	Eyes open at 10 days. Pin feathers erupting into black & white plumage.	26	135	40
3	Fully-feathered, vocalising loudly.	31	220	50
4	Brancher. Tail <50mm.	40	270	
5	Fledging. Learning to fly. Tail 50-100mm.	48	280	
8	Independent. Self-feeding. Tail >100mm.	50		
Adult	Size varies between individuals.	52	300	
		55	350	55

a. Based on larger birds from south-east Australia. Birds from other regions may have lower weight for age.
b. Weight is not an accurate indicator of age. Average weight gain in first 4 weeks is 7 -12g/day.
c. Feed rate is based on Insectivore Meat Mix, should be adjusted for calorific density of other foods.

Adult Maintenance Diet

300g adult requires 50g/day (450kJ)

- 35g **Insectivore Meat Mix** – (3½ tablespoons).
- 8g Earthworms (approx. 15 x worms).
- 4g Crickets (approx. 12 x crickets).
- 3g Mealworms (approx. 25 x mealworms).

Mice may be substituted for part of the diet.

Magpie-Lark *(Grallina cyanoleuca)* [7,13]

Adult Weight	70-110g (heavier in the south).
Natural Diet	Small insects, larvae & invertebrates.
Secondary Diet	Small vertebrates and seeds.
Captive Diet	**Insectivore Egg Mix** or **Meat Mix** (Appendix 1). Crickets, mealworms, earthworms and other invertebrates.
Juvenile Diet	As per adult diet. **Insectivore** may be made up as moist pellets (Appendix 1).

Julie Marsh

Age = 18 days

Growth & Feed Chart

Age (weeks)	Developmental Stage	Wing (mm)	Tarsus (mm)	Weight[a] (g)	Feed[b] (g/day)
Hatch	Blind, mainly naked, with brown down.	12	10	10	6
1	Eyes opening, pin feathers on wings & tracts.	20	28	35	14
2	Well-feathered, some fluffy down on head & back.	65	38	60	20
3	Fully fledged, typical juvenile plumage, short tail.	100	39	85	22
5	Self-feeding.	150			
8	Independent. Prepare for release. Tail >80mm.	160			
Adult	Size varies between individuals.	165		70	18
		170	40	90	20
		180	41	110	22

a. Weight is not an accurate indicator of age. Average weight gain in first 3 weeks is 3-5g/day.
b. Feed rate is based on Insectivore Egg or Meat Mix, should be adjusted for calorific density of other foods.

Adult Maintenance Diet

90g adult requires 20g/day (190kJ)

- 15g **Insectivore Egg Mix** or **Meat Mix** (1½ tablespoons).
- 3g Crickets (approx. 10 x crickets).
- 2g Mealworms (approx. 15 x mealworms).

Other invertebrates may be substituted for part of the diet.

Ravens & Crows *(Corvus spp.)* [7, 24]

Adult Weight	450-750g, depending on species. (Little Crow 330-480g).
Natural Diet	Insects & invertebrates, small birds, eggs, lizards, carrion, scavenged food.
Secondary Diet	Plant material, seeds, fruit. Particularly Torresian Crow.
Captive Diet	**Insectivore Meat Mix** (Appendix 1). Crickets, mealworms, mice, mixed veg.
Juvenile Diet	As per adult diet. **Insectivore** may be made up as moist pellets (Appendix 1).

Age = 5 weeks

Growth & Feed Chart – Australian Raven[a]

Age (weeks)	Developmental Stage	Tarsus (mm)	Tail (mm)	Weight[b] (g)	Feed[c] (g/day)
Hatch	Blind, pink & mostly naked with sparse down.	10	-	15	7
1	Eyes closed, mostly naked with pins emerging.	20	-	80	25
2	Eyes open. Feathers beginning to erupt.	40	5	200	45
3	Mostly feathered. Primaries approx. 20-50mm.	50	20	350	65
4	Longest primary feather approx. 80-100mm.	55	50	450	75
5	Brancher stage. Primaries approx. 150mm.	56	90	480	75
6	Fledged. Primaries approx. 180mm. Eyes blue.	57	130	500	70
10	Independent. Pink skin at bill base. Eyes brown.	58	190		
Adult	Eyes white (with light blue inner ring). Size varies between individuals.	59	200	550	70
		62	210	600	75
		66	220	650	80

a. Can be used as guideline for other species except Little Crow which fledges at 4-5 weeks and is smaller.
b. Weight is not an accurate indicator of age. Average weight gain from 1-4 weeks is 15-20g/day.
c. Feed rate is based on Insectivore Meat Mix, should be adjusted for calorific density of other foods.

Adult Maintenance Diet

550g adult requires 70g/day (700kJ)

- 60g **Insectivore Meat Mix** (6 tablespoons).
- 6g Crickets (approx. 20 x crickets).
- 4g Mealworms (approx. 30 x mealworms).

Other invertebrates or mice may be substituted for part of the diet.
Mixed veg (e.g. peas & corn) or sprouted seed – approx. 1 tablespoon.

Small Passerines

Small passerines have high metabolic rates and require food available at all times. Ideally young chicks need to be fed every 15 minutes and should be supplied with extra water via a small syringe at each feed to prevent dehydration.

Species	Adult Weight	Natural Diet (main items in bold)	Captive Diet (primary items in bold)	Feed Guide[a] (per day)
Fairy-wren	8-12g	**Small insects:** beetles, bugs, flies, wasps, ants. Spiders and other invertebrates.	**Insectivore Egg Mix**, mealworms, crickets, wild-harvested insects.	3-5g
Grey Fantail	7-10g			3-5g
Willie Wagtail	16-24g			6-8g
Eastern Yellow Robin	17-25g			6-8g
Golden Whistler	22-30g			7-10g
Fairy Martin	9-12g	**Small flying insects:** flies, beetles, wasps, ants, bugs.	**Wild-caught insects.** Mealworms (<1.5cm), pinhead crickets. Insectivore Egg Mix.	3-5g
Tree Martin	14-18g			5-7g
White-breasted Woodswallow	35-45g	**Invertebrates**, mainly insects, nectar.	**Insectivore Egg Mix**, crickets, mealworms, Lorikeet & Honeyeater Food (LHF).	10-12g + 5mL LHF

a. Maintenance feed quantity based on 75% Insectivore Egg Mix with 25% Insects. Feed up to 50% more for growth or sickness.

Non-passerines

This comprises all other species not classified as passerines. This includes cuckoos, kingfishers, nightjars and terrestrial waders like Masked Lapwing and Bush Stone-curlew.

Species	Adult Weight	Natural Diet (main items in bold)	Captive Diet (primary items in bold)	Feed Guide[a] (per day)
Bronze-Cuckoo	17-32g	**Insects & larvae, especially caterpillars.** Beetles, grasshoppers.	**Insectivore Egg Mix**, crickets, mealworms, caterpillars if possible.	6-10g
Brush Cuckoo	30-45g			9-12g
Fan-tailed Cuckoo	45-60g			12-15g
Pallid Cuckoo	70-100g			17-22g
Pheasant Coucal	♂250-380g ♀330-585g	**Large insects**, frogs, lizards, eggs, rodents.	**Insectivore Meat Mix**, crickets, mealworms, mice.	40-80g
Rainbow Bee-eater	20-33g	**Insects, bees, wasps**, dragonflies, beetles.	**Insectivore Egg Mix**, crickets, mealworms, flying insects.	7-10g
Forest Kingfisher	30-44g	**Insects & larvae**, lizards, frogs & small vertebrates.	**Insectivore Meat Mix**, crickets, mealworms, mice.	9-12g
Sacred Kingfisher	30-50g			9-13g
Owlet Nightjar	35-55g	**Insects, beetles, moths,** spiders.	**Insectivore Meat Mix**, crickets, mealworms, flying insects.	10-15g
White-throated Nightjar	100-160g			20-30g

a. Maintenance feed quantity based on 75% Insectivore Meat or Egg Mix with 25% Insects. Feed up to 50% more for growth or sickness.

Welcome Swallow *(Hirundo neoxena)* [7,31]

Adult Weight	13-17g
Natural Diet	Invertebrates, mainly insects, including flies, beetles, wasps, ants & moths.
Captive Diet	Small flying insects. Mealworms (<1.5cm), pinhead crickets. Farmed insects should be raised on **Passwell Insect Booster** (Appendix 2).
Juvenile Diet	**Insectivore Egg Mix** (Appendix 1). Insects as per adult diet. Feed only small insects to young chicks, removing exoskeleton, wings & legs.

Age = 24 days

Growth & Feed Chart

May be used as a guideline for **Tree Martin**.

Age (days)	Developmental Stage	Wing (mm)	Weight[a] (g)	Feed[b] (g/day)
Hatch	Blind, mostly naked with fine down.	7	1.5	1.2
3	Eyes closed. Feather tracts visible.	9	3.5	2.3
7	Eyes open. Wing pins present.	20	10	5.0
10	Primary feathers starting to unsheath.	34	16	7.0
14	Well-feathered. Some tufts of down.	52	17	6.5
17	Feathers on forehead last to unsheath.	66	16	5.3
21	Fledged.	85	15	5.0
30	Flying well and independent.	102		
Adult	Size varies between individuals.	112		

a. Weight is not an accurate indicator of age. Average weight gain in first 10 days is 1-2g/day.
b. Feed rate is based on Insectivore Egg Mix, should be adjusted for calorific density of other foods. Offer extra water between feeds, particularly in hot weather.

Adult Maintenance Diet

15g adult requires 5g/day (50kJ)

- 3g Small Mealworms.
- 2g Small/Pinhead Crickets.

Ad lib flying insects, attracted by insect traps, hanging fruit or compost.

Dollarbird *(Eurystomus orientalis)* [4,32]

Adult Weight	95-180g (average 130g).
Natural Diet	Mainly flying insects, including beetles, wasps, ants, cicadas & grasshoppers.
Captive Diet	**Insectivore Egg Mix** or **Meat Mix** (Appendix 1). Crickets, mealworms (especially beetles) and other invertebrates.
Juvenile Diet	As per adult diet. **Insectivore** may be made up as moist pellets (Appendix 1). Remove exoskeleton, wings & legs from insects for young chicks (<10 days).

Mignon McHendrie

Adult

Growth & Feed Chart

Age (days)	Developmental Stage	Weight[a] (g)	Feed[b] (g/day)
Hatch	Blind & naked.	10	5
3		15	7
7	Wings just in pin.	28	11
10	Eyes just opening. Short pins over body.	55	17
12	Eyes fully open. Long pins over body.	73	21
14	Body feathers unsheathing. Short tail (<15mm).	90	25
17		110	25
21	Well-feathered. Tail growing (>20mm).	125[c]	25
28	Fledged. Teach to catch food on the wing.		
42	Independent. Tail >60mm. Prepare for release.		
Adult	Size varies between individuals.		

a. Weight is not an accurate indicator of age. Average weight gain in first 20 days is 5-10g/day.
b. Feed rate is based on Insectivore Egg or Meat Mix, should be adjusted for calorific density of other foods.
c. Final weight varies between individuals. Weight may decline by up to 15% prior to fledging.

Adult Maintenance Diet

125g adult requires 25g/day (240kJ)

- 15g **Insectivore Egg Mix** or **Meat Mix** (1½ tablespoons).
- 6g Crickets (approx. 20 x crickets).
- 4g Mealworms (approx. 30 x mealworms/beetles).

Ad lib wild caught insects including beetles, wasps, flying ants, cicadas & grasshoppers.

Laughing Kookaburra *(Dacelo novaeguineae)* [4,9]

Adult Weight	310-380g (females heavier). Blue-winged Kookaburra 260-340g.
Natural Diet	Insects, spiders, skinks, small reptiles.
Secondary Diet	Worms, snails, crustaceans, fish, frogs, small mammals & birds.
Captive Diet	**Insectivore Meat Mix** (Appendix 1). Crickets, mealworms, woodies, whole or chopped mice, pinkie rats.
Juvenile Diet	As per adult diet. **Insectivore** may be made up as moist pellets (Appendix 1).

Age = 3 weeks

Growth & Feed Chart

May be used as a guideline for **Blue-winged Kookaburra**.

Age (weeks)	Developmental Stage	Wing (mm)	Weight[a] (g)	Feed[b] (g/day)
Hatch	Blind, pink & naked. Egg tooth present.	15	25	8
1	Eyes closed. Pin feathers emerging along tracts.	21	80	18
2	Eyes open. Spikey pin feathers covering body.	40	160	30
3	Pin feathers unsheathing on body.	80	240	40
4	Fully-feathered, with remnants of sheaths.	120	270	45
5	Fledging - short tail.	160	290	40
10	Independent, self-feeding. Prepare for release.	190	310	40
Adult	Size varies between individuals. Females larger.	210		
		220	380	45

a. Weight is not an accurate indicator of age. Average weight gain from 1-4 weeks is 7-13g/day.
b. Feed rate is based on Insectivore Meat Mix, should be adjusted for calorific density of other foods.

Adult Maintenance Diet

350g adult requires 40g/day (320kJ)

- 30g **Insectivore Meat Mix** (3 tablespoons).
- 6g Crickets (approx. 20 x crickets).
- 4g Mealworms (approx. 30 x mealworms).

Other invertebrates or mice may be substituted for part of the diet.

Tawny Frogmouth *(Podargus strigoides)* [4,10,11]

Adult Weight	Variable depending on location 300-550g (Northern NSW) 260-350g (Southern, western & inland Australia).
Natural Diet	Insects, beetles, moths (up to 78%), spiders & centipedes (up to 18%).
Secondary Diet	Small vertebrates, frogs, lizards, mice (up to 4%).
Captive Diet	**Insectivore Meat Mix** (Appendix 1). Crickets, mealworms beetles, woodies. Whole or chopped mice.
Juvenile Diet	As per adult diet. **Insectivore** may be made up as moist pellets (Appendix 1).

Age = 4 weeks

Growth & Feed Chart[a]

Age (weeks)	Developmental Stage	Weight[b] (g)	Feed[c] (g/day)
Hatch	Blind, thick white down. Egg tooth present.	18	6
1	Whitish-grey down. Eyes opening.	60	15
2	Grey, fluffy down. Pin feathers on wings & tail.	120	25
3	Wing feathers unsheathing.	160	30
4	Brancher. Adult-type feathers emerging.	200	35
5	Fledgling. Learning to fly & hunt.	230	
8	Independent. Prepare for release.	280	
Adult	Size varies between individuals.	300	
		400	40
		500	45

a. Based on larger birds from northern NSW. Birds from other regions may have lower weight for age.
b. Weight is not an accurate indicator of age. Average weight gain in first 4 weeks is 5-10 g/day.
c. Feed rate is based on Insectivore Meat Mix, should be adjusted for calorific density of other foods.

Adult Maintenance Diet

400g adult requires 40g/day (320kJ)

- 30g **Insectivore Meat Mix** (3 tablespoons).
- 6g Crickets (approx. 20 x crickets).
- 4g Mealworms/Beetles (approx. 30 x mealworms).

Other invertebrates or mice may be substituted for part of the diet.

Masked Lapwing *(Vanellus miles)* [2,12]

Adult Weight	230-400g (heavier in the south).
Natural Diet	Molluscs, worms, insects, crustaceans.
Secondary Diet	Seeds, plant material, frogs.
Captive Diet	**Insectivore Egg Mix** or **Meat Mix** (Appendix 1). Crickets, mealworms, earthworms and other invertebrates.
Juvenile Diet	As per adult diet. **Insectivore** may be made up as moist pellets (Appendix 1).

Age = 2 weeks

Growth & Feed Chart

Age (weeks)	Developmental Stage	Bill (mm)	Tarsus (mm)	Weight[a] (g)	Feed[b] (g/day)
Hatch	Covered in brown & white down. Eyes open & self-feeding.	10	25	20	5
1		12	27	35	8
2	Down on back being replaced by juvenile plumage.	15	32	60	12
3	Small bony spur appears on wing.	18	38	90	16
4	Mostly covered in juvenile plumage, still downy on back of neck.	21	45	130	21
5		24	52	170	25
7	Able to fly.	27	58	250	35
Adult	Size varies between individuals.	33	74	300	35
		34	77	350	40
		36	79	400	45

a. Weight is not an accurate indicator of age. Average weight gain from 1-7 weeks is 3-7g/day.
b. Feed rate is based on Insectivore Egg or Meat Mix, should be adjusted for calorific density of other foods.

Adult Maintenance Diet

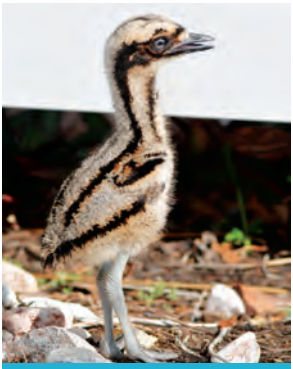
350g adult requires 40g/day (320kJ)

- 30g **Insectivore Egg Mix** or **Meat Mix** (3 tablespoons).
- 5g Earthworms (approx. 10 worms).
- 3g Crickets (approx. 10 x crickets).
- 2g Mealworms (approx. 15 x mealworms).

Other invertebrates may be substituted for part of the diet.

Bush Stone-Curlew *(Burhinus grallarius)* [2,36]

Adult Weight	530-860g
Natural Diet	Insects, spiders, snails, centipedes, crustaceans.
Secondary Diet	Small vertebrates. Some vegetation and seeds.
Captive Diet	**Insectivore Egg Mix** or **Meat Mix** (Appendix 1). Crickets, mealworms, and other invertebrates. Occasional mice.
Juvenile Diet	As per adult diet. Smaller items offered to younger chicks.



Age = 1 week

Growth & Feed Chart

Age (weeks)	Developmental Stage	Weight[a] (g)	Feed[b] (g/day)
Hatch	Thick pale grey down with dark stripes. Chicks mobile.	35	8
1		90	16
2	Wing pin feathers emerging.	170	25
3	Feathers unsheathing on face & wings.	260	35
4	Mostly feathered, but with some down. Half adult size.	350	45
5	3/4 adult size.	425	50
7	Adult size. Able to fly.	530	60
10	Independent. Prepare for release.	600	
Adult	Size varies between individuals. Males heavier.	625	
		675	65
		725	70

a. Weight is not an accurate indicator of age. Average weight gain from 1-7 weeks is 8-13g/day.
b. Feed rate is based on Insectivore Meat Mix, should be adjusted for calorific density of other foods.

Adult Maintenance Diet

625g adult requires 60g/day (500kJ)

- 45g **Insectivore Egg Mix** or **Meat Mix** (4½ tablespoons).
- 10g Crickets (approx. 30 x crickets).
- 5g Mealworms (approx. 40 x mealworms).

Other invertebrates or mice may be substituted for a part of the diet.

Honeyeaters, Silvereyes & Sunbirds

Honeyeaters are specialist nectar feeders (*nectarivores*), with long bills and brush-tipped tongues for extraction of this liquid diet. They also collect plant exudates (manna), insects and their secretions (lerp, honeydew). Their diet is high in sugars, and they have a simple digestive tract and fast throughput of food. Some species also take significant amounts of native fruits and berries. Insects and invertebrates are important protein sources, and are the main diet fed to growing chicks. Although unrelated to honeyeaters, Silvereyes and Sunbirds have similar dietary requirements.

Feeding Adult Honeyeaters

Adult honeyeaters can be maintained on a diet of **Wombaroo Lorikeet & Honeyeater Food** (Appendix 3). Supply a range of native flowering plants, fruit and live insects for enrichment.

Species	Adult Weight	Natural Diet (main items in bold)	Captive Diet (primary diet in bold)	Feed Guide (per day)[a]
Brown Honeyeater	8-12g	**Nectar**, **insects**.	**Lorikeet & Honeyeater Food.** **Native blossom** especially *eucalyptus, banksia, grevillea, callistemon.* Mealworms, crickets, flying insects. Insectivore Egg Mix. Native & commercial fruits e.g. grapes, blueberries especially for the more frugivorous species such as Lewin's, Singing Honeyeaters, & Friarbirds.	6-10mL
Eastern Spinebill	8-14g			6-10mL
White-plumed Honeyeater	15-23g	**Nectar**, **insects**, exudates, fruit.		10-15mL
Singing Honeyeater	20-35g	**Nectar**, **insects**, **fruit**.		15-20mL
Lewin's Honeyeater	27-45g	**Fruit**, **nectar**, insects.		15-25mL
Noisy/ Yellow-throated Miner	50-80g	**Insects**, nectar, fruit.		25-35mL
Noisy/Helmeted Friarbird	85-130g	**Nectar**, **fruit**, insects.		35-50mL
Little Wattlebird	50-85g	**Nectar**, especially *banksia & eucalyptus*, insects.		25-35mL
Yellow Wattlebird	110-210g			45-70mL
Yellow-bellied Sunbird	7-10g	**Nectar**, insects, spiders.		6-8mL

a. Maintenance feed based on Lorikeet & Honeyeater Food made up at 300g/litre. Feed up to 50% more for growth or sickness.

Feeding Honeyeater Chicks

Young chicks require a high protein diet to support their rapid growth and feather development. We recommend a diet of **Insectivore Egg Mix** (Appendix 1) along with small insects. Provide extra water directly to the bill between feeds to prevent dehydration. Chicks should also be offered **Lorikeet & Honeyeater Food** (LHF) via a small (0.3, 0.5 or 1mL) syringe. Once feathers start to grow the volume of LHF is increased and the Insectivore Egg Mix reduced until fledging. At this stage young can be taught to self-feed on LHF from a bowl or sipper tube (Appendix 3).

An alternative rearing diet is a **50/50 mixture of Insectivore & LHF**, made up into a slurry and fed by syringe.

New Holland Honeyeater *(Phylidonyris novaehollandiae)*[5]

Adult Weight	16-26g (males larger).
Natural Diet	Nectar especially from *banksia, eucalyptus, grevillea, callistemon.*
Secondary Diet	Insects, manna, lerp, honeydew.
Captive Diet	**Wombaroo Lorikeet & Honeyeater Food (LHF)**. Native flowers. Insects, **Insectivore Egg Mix** (Appendix 1).
Juvenile Diet	**Insectivore Egg Mix** and **Lorikeet & Honeyeater Food (LHF)**. Mealworms & small crickets. Increasing proportion of LHF from 7 days onwards.

Age = 14 days

Growth & Feed Chart

May be used for other similar sized honeyeaters e.g. **White-plumed Honeyeater**.

Age (days)	Developmental Stage	Weight[a] (g)	Feed[b]	
			Egg Mix (g/day)	LHF (mL/day)
Hatch	Eyes closed. Mostly naked, wisps of down on head & back. Inside of mouth black.	2	1.2	0.6
3		5	2	2
7	Eyes open. Pin feathers on wings and body.	9	2.5	5
10	Mostly feathered. Wings & tail unsheathing.	12	3	7
14	Fledging. Fully-feathered. Short tail <20mm.	15	2	10
21	Self-feeding & flying well.	18	1	13
35	Independent. Prepare for release. Tail >60mm.			
Adult	Size varies between individuals. Males larger.	20	1	14
		22	1	15

a. Weight is not an accurate indicator of age. Average weight gain in first 14 days is 0.7-1.3g/day.
b. Feed rate is based on a combination of Insectivore Egg Mix with Lorikeet & Honeyeater Food (LHF).

Adult Maintenance Diet

22g adult requires 15mL/day (70kJ)

- 15mL **Lorikeet & Honeyeater Food** (1 × 15mL ice cube).
- 1g live insects (moths, flies, mealworms & crickets) or **Insectivore Egg Mix**.

Ad lib flowering *banksia, eucalyptus, grevillea, callistemon.*

Red Wattlebird *(Anthochaera carunculata)*[5]

Adult Weight	90-130g (males heavier).
Natural Diet	Nectar from native plants especially *eucalyptus, banksia, grevillea, callistemon.*
Secondary Diet	Insects, spiders, manna, lerp, honeydew.
Captive Diet	**Wombaroo Lorikeet & Honeyeater Food (LHF)**. Native flowers. Supplemental insects, **Insectivore Egg Mix** (Appendix 1).
Juvenile Diet	**Insectivore Egg Mix** and **Lorikeet & Honeyeater Food (LHF).** Mealworms & small crickets. Increasing proportion of LHF from 7 days onwards.

Age = 18 days

Growth & Feed Chart

May be used as a guideline for other large honeyeaters e.g. **Noisy Friarbird**.

Age (days)	Developmental Stage	Head & Bill (mm)	Wing (mm)	Weight[a] (g)	Feed[b]	
					Egg Mix (g/day)	LHF (mL/day)
Hatch	Eyes closed. Mostly naked, fine grey down on back & head.	18	10	6	3	1.5
3		23	15	13	5	3
7	Eyes just open. Pin feathers on wings.	30	32	27	7	6
10	Wing feathers unsheathing. Tail starting to grow.	35	48	39	8	11
14	Body mostly feathered. Tail approx. 20mm.	41	72	54	9	18
18	Fledged. Tail approx. 40mm.	45	92	64	8	24
21	Self-feeding on LHF. Tail approx. 60mm.	48	105	71	4	30
28	Wattle visible. Tail approx. 90mm.	53	130	85	2	37
42	Independent. Prepare for release. Tail >120mm.	57	138	100	2	40
Adult	Size varies between individuals. Males larger.	59	145	110	2	45
		63	156	130	2	50

a. Weight is not an accurate indicator of age. Average weight gain in first 28 days is 2-4g/day.
b. Feed rate is based on a combination of Insectivore Egg Mix with Lorikeet & Honeyeater Food (LHF).

Adult Maintenance Diet

110g adult requires 45mL/day (210kJ)

- 45mL **Lorikeet & Honeyeater Food** (3 × 15mL ice cubes).
- 2g live insects (moths, flies, mealworms & crickets) or **Insectivore Egg Mix**.

Ad lib flowering *eucalyptus, banksia, grevillea, callistemon.*

Blue-faced Honeyeater *(Entomyzon cyanotis)*[5]

Adult Weight	85-135g (males heavier).
Natural Diet	Insects, invertebrates. Nectar from native plants especially *eucalyptus*, *melaleuca*, *grevillea*.
Secondary Diet	Fruit from native & cultivated plants.
Captive Diet	**Wombaroo Lorikeet & Honeyeater Food (LHF)**. Native flowers. Insects. **Insectivore Egg Mix** (Appendix 1), fruit.
Juvenile Diet	**Insectivore Egg Mix** and **Lorikeet & Honeyeater Food (LHF).** Mealworms & small crickets. Increasing proportion of LHF from 7 days onwards.

Julie Marsh

Age = 10 days

Growth & Feed Chart

Age (days)	Developmental Stage	Weight[a] (g)	Feed[b]	
			Egg Mix (g/day)	LHF (mL/day)
Hatch	Eyes closed. Mostly naked, sparse tufts of light brown down on back.	6	3	1.5
3		14	5	3
7	Eyes just open. Pin feathers on wings and body.	35	9	8
10	Wing feathers unsheathing. Tail starting to grow.	50	10	14
14	Well feathered. Short tail.	65	10	20
21	Fledging. Starting to self-feed on LHF.	80	6	30
28	Self-feeding and flying well.	90	3	35
42	Independent. Prepare for release. Tail >90mm.	100	2	40
Adult	Blue facial skin. Size varies between individuals.	110	2	45
		125	2	50

a. Weight is not an accurate indicator of age. Average weight gain in first 21 days is 2-6g/day.
b. Feed rate is based on a combination of Insectivore Egg Mix with Lorikeet & Honeyeater Food (LHF).

Adult Maintenance Diet

110g adult requires 45mL/day (210kJ)

- 45mL **Lorikeet & Honeyeater Food** (3 × 15mL ice cubes).
- 2g live insects (moths, flies, mealworms & crickets) or **Insectivore Egg Mix**.

Ad lib flowering *eucalyptus*, *melaleuca*, *grevillea*. Fruit hung in aviary.

Silvereye *(Zosterops lateralis)*[7]

Adult Weight	9-14g (WA birds smaller).
Natural Diet	Wide variety of insects, fruit, berries & nectar.
Secondary Diet	Other invertebrates & plant matter.
Captive Diet	**Wombaroo Lorikeet & Honeyeater Food (LHF)**. Native flowers. Native & commercial fruit. Insects, **Insectivore Egg Mix** (Appendix 1).
Juvenile Diet	**Insectivore Egg Mix** and **Lorikeet & Honeyeater Food (LHF)**. Mealworms & small crickets. Increasing proportion of LHF from 7 days onwards.

Age = 14 days

Growth & Feed Chart

May be used as guideline for small honeyeaters e.g. **Brown Honeyeater, Eastern Spinebill.**

Age (days)	Developmental Stage	Wing (mm)	Weight[a] (g)	Feed[b]	
				Egg Mix (g/day)	LHF (mL/day)
Hatch	Blind & mostly naked. Tufts of down on head.	5	1.5	0.8	0.5
4	Pins developing on wings.	12	4	1.7	2
7	Eyes open, wing pins unsheathing. Tail starting.	27	8	2.3	5
11	Fledging. Well-feathered. Bare around eye. Tail approx. 15mm.	43	11	2.0	8
14	White eye-ring starting to come through.	50	12	1.0	9
18	Self-feeding & flying well.	55	13	0.5	10
28	Independent. Prepare for release. Tail >35mm.	58			
Adult	Size varies between individuals.	60	12		

a. Weight is not an accurate indicator of age. Average weight gain in first 11 days is 0.7-1.3g/day.
b. Feed rate is based on a combination of Insectivore Egg Mix with Lorikeet & Honeyeater Food (LHF).

Adult Maintenance Diet

12g adult requires 10mL/day (43kJ)

- 10mL **Lorikeet & Honeyeater Food** (1 × 10mL ice cube).
- 0.5g live insects (moths, flies, mealworms & crickets) or **Insectivore Egg Mix**.

Ad lib flowering plants, native & commercial fruit e.g. grapes, blueberries.

Pardalotes

Small foliage-gleaning birds that specialise in feeding on lerp. This is the carbohydrate-rich secretion of small insects (psyllids) found on *eucalyptus* leaves. This is nutritionally similar to a nectarivore diet. Nestlings can be fed as per honeyeater chicks (page 16). Introduce lerp from a young age. Fledging at 18-25 days, independent about a week later.

Lerp on *eucalyptus* leaf.

Striated Pardalote fledgling.

Species	Weight	Natural Diet (main items in bold)	Captive Diet (primary items in bold)	Feed Guide (per day)
Spotted Pardalote	7-10g	**Lerp, psyllid larvae,** manna, small spiders & insects.	**Lorikeet & Honeyeater Food**, (Appendix 3). **Insectivore Egg Mix** (Appendix 1). **Lerp collected from *eucalyptus*.**	6-9mL LHF 1g Insectivore Egg Mix
Striated Pardalote	9-13g			

Mistletoebird (*Dicaeum hirundinaceum*)

Small specialist feeder on mistletoe fruit (*Amyema* spp). Diet passes rapidly through digestive tract, with simple sugars absorbed. Can be maintained on **Lorikeet & Honeyeater Food** (LHF) and diced fruit, but access to mistletoe berries is highly recommended. Nestlings can be fed mashed fruit with **Insectivore Rearing Mix,** as well as LHF via a small syringe. Increasing proportion of mistletoe berries (skin removed) from 4 days of age. Fledge at 15 days. Independently feeding soon after, but release only when capable of extracting fruit from whole mistletoe.

Fledgling offered mistletoe with the skin split open to encourage extraction of fruit.

Weight	Natural Diet (main items in bold)	Captive Diet (primary items in bold)	Feed Guide (per day)
8-10g	**Mistletoe berries**, other fruits, nectar & insects.	**Mistletoe berries. Lorikeet & Honeyeater Food** (Appendix 3). Diced fleshy fruit (e.g. grapes, blueberries, stone fruit).	5mL LHF 4g fruit

Frugivores

Frugivores eat a range of native fruits such as figs, laurels & lilly-pilly. Fruit contains high levels of carbohydrate including sugars which are readily digested. Frugivores have a simple digestive tract and rapid gut transit time[29]. Fibre, skins and seeds are not absorbed and these are excreted in the faeces. The fruit-doves and pigeons are strictly frugivorous (see page 37). Most other species are partially insectivorous or omnivorous.

Feeding Adult Frugivores

Commercially-grown fruits generally contain high levels of moisture and sugar, but significantly less fibre and protein than native fruits[28]. These have been implicated in producing voluminous watery diarrhoea in captive birds[33]. A more appropriate diet is peas, corn & carrot (frozen veg mix) with **Insectivore Rearing Mix** (Appendix 4). Frugivores should be provided with a daily supply of ripe figs and other natural foods. Commercial fruits that may be offered in small quantities include blueberries, grapes, cherries, plums, banana and paw paw.

Species	Adult Weight	Natural Diet (main items in bold)	Captive Diet (primary diet in bold)	Feed Guide (per day)[a]
Metallic Starling	50-65g	**Fruit**, **especially berries**, insects.	**Peas, corn, carrot with Insectivore Rearing Mix** (Appendix 4). **Native fruits**, especially ripe figs, lilly-pilly, palm fruits etc. Commercial fruits e.g. blueberry, grapes. Crickets, mealworms. **Insectivore Egg** or **Meat Mix**. Occasional whole or chopped mice for bowerbirds & Channel-billed Cuckoo.	35-45g
Yellow Oriole	75-110g	**Fruit**, **insects**, spiders, seeds, nectar, small vertebrates.		50-65g
Olive-backed Oriole	80-120g			
Barred Cuckoo-Shrike	80-120g	**Fruit**, **especially figs**, insects.		
Green Catbird	165-270g	Omnivorous: **fruit**, **especially figs**, flowers, buds, leaves, seeds, nectar, insects, invertebrates, small vertebrates.		90-130g
Satin Bowerbird	160-270g			
Great Bowerbird	165-240g			
Eastern Koel	170-330g	**Fruit**, **especially figs**, insects.		90-140g
Channel-billed Cuckoo	560-935g	**Fruit**, **especially figs**, insects, small vertebrates.		200-300g

a. Maintenance feed quantity based on peas, corn & carrot with Insectivore Rearing Mix (Appendix 4). Feed up to 50% more for growth or sickness.

Feeding Frugivore Chicks

Nestling frugivores are fed a high protein diet which includes a large proportion of insects. To replicate this we recommend a diet of **Insectivore Egg** or **Meat Mix** (Appendix 1) plus supplemental insects (e.g. crickets).
Offer extra water directly to the bill between feeds, especially in hot weather.
Once feather growth begins, young are weaned on to the adult Frugivore Diet (Appendix 4) with as much native fruit as possible.

Figbird *(Specotheres vieilloti)*[7,33]

Adult Weight	100-140g
Natural Diet	Native fruits, especially figs, palm fruits, white cedar etc.
Secondary Diet	Insects, seeds, nectar.
Captive Diet	Peas, corn, carrot (frozen veg mix) with **Insectivore Rearing Mix** (Appendix 4). Native fruits, especially ripe figs. Supplemental commercial fruits e.g. blueberries, grapes (<20% of diet).
Juvenile Diet	**Insectivore Egg Mix** and small crickets. Increasing proportion of peas, corn & carrot (PCC) diet and native fruits from 7 days onwards.

Julie Marsh

Age = 18 days

Growth & Feed Chart

May be used as a guideline for **Orioles**.

Age (days)	Developmental Stage	Wing (mm)	Weight[a] (g)	Feed[b]	
				Egg Mix (g/day)	PCC (g/day)
Hatch	Eyes closed, mostly naked.	12	10	5	–
3	Fine down.	20	22	9	–
7	Pins on wings developing.	40	42	12	4
10	Eyes open, wings unsheathing, tail growing.	60	58	15	10
14	Well-feathered. Short tail (<20mm).	85	80	15	24
17	Fully fledged. Into aviary with access to native fruits.	100	90	10	35
21	Self-feeding & flying well. Tail approx. 50mm.	115	100	5	45
35	Independent. Prepare for release (Tail > 75mm).	135		2	55
Adult	Size varies between individuals.	145	120	2	65
		155	130		

a. Weight is not an accurate indicator of age. Average weight gain in first 21 days is 4-6g/day.
b. Feed rate is based on Insectivore Egg Mix weaning on to peas, corn & carrot (PCC) diet from 1 week.

Adult Maintenance Diet

120g adult requires 65g/day (230kJ)

- 60g peas, corn & carrot (PCC) mix with 3g **Insectivore Rearing Mix**.
- 2g live insects (mealworms & crickets) or **Insectivore Egg Mix** (½ teaspoon).

Ad lib native fruit e.g. figs, cordyline, palm fruits, elderberry, lilly-pilly.

Lorikeets

Lorikeets are nectarivorous parrots. Their natural diet is nectar and pollen from native flowers, particularly *eucalyptus*. Nectar is a liquid solution of simple sugars and provides the majority of their energy intake. Lorikeets have fine brush-like *papillae* on their tongue which help them extract nectar by capillary action. They have a simple digestive tract and lack the grinding gizzard of seed-eating parrots. Pollen and the occasional consumption of insects provides additional protein, vitamins and minerals in the diet. The Swift Parrot (*Lathamus discolor*) has similar dietary requirements to lorikeets.

Brush-like *papillae* for gathering liquid nectar.

Feeding Adult Lorikeets

Adult lorikeets can be maintained on a diet of **Wombaroo Lorikeet & Honeyeater Food** (Appendix 3). This is a complete food which replicates the consistency and composition of nectar, with a protein profile similar to that of pollen.

Species	Adult Weight	Natural Diet (main items in bold)	Captive Diet (primary items in bold)	Feed Guide (per day)[a]
Purple-crowned / Little Lorikeet	35-50g	**Nectar & Pollen** especially from *eucalyptus*. Occasional fruit, berries, seeds, insects & larvae.	**Lorikeet & Honeyeater Food**. **Native Blossom:** *eucalyptus, melaleuca, callistemon, grevillea.*	15-20mL
Varied Lorikeet	50-60g			20-25mL
Musk Lorikeet	60-80g			25-30mL

a. Maintenance feed based on Lorikeet & Honeyeater Food made up at 300g/litre. Feed up to 50% more for growth or sickness.

Feeding Lorikeet Chicks

Young lorikeets have an increased requirement for protein, vitamins and minerals. This can be supplied by using **Passwell Hand Rearing Food** or **Wombaroo Granivore Rearing Mix**. Feed as per the guidelines for hand-rearing other young parrots (page 28). Rearing food is required until most of the body and wing feathers have grown (about 5-6 weeks, depending on species). At this time the chick should be weaned on to **Lorikeet & Honeyeater Food** and native flowering plants. Weaning may occur quite quickly, particularly if young are creched with other self-feeding lorikeets.

Young lorikeets should be offered *eucalyptus* blossom from an early age.

Rainbow Lorikeet *(Trichoglossus moluccanus)* [4,15, 31]

Adult Weight	120-140g
Natural Diet	Nectar & pollen from native flowers (particularly *eucalyptus*).
Secondary Diet	Fruits, seeds, occasional insects.
Captive Diet	**Wombaroo Lorikeet & Honeyeater Food**. Native flowers (*eucalyptus, callistemon, grevillea*). Supplemental fruit & veg.
Juvenile Diet	**Passwell Hand Rearing Food** or **Wombaroo Granivore** weaning on to **Lorikeet & Honeyeater Food**.

Age = 4 weeks

Angela Robertson-Buchanan

Growth & Feed Chart

Age (weeks)	Developmental Stage	Weight (g)[a]	Hand Rearing Mix[d] (per day)			
			Solids (g)	Water (mL)	Total (mL)	Feeds
Hatch	Silvery-white down. Eyes closed.	7	1.5	9	10	10 x 1mL
1		20	3	12	15	6 x 2.5mL
2	Eyes open, mostly covered in grey down.	40	6	18	22	5 x 4.5mL
3	Pin feathers appearing on head & wings.	65	8	24	30	5 x 6mL
4	Head blue, wings and tail starting to unsheath.	90	10	25	32	4 x 8mL
5	Half feathered, still downy around flanks & neck[b].	110	11	28	36	4 x 9mL
6	Mostly feathered, some down still present.	120[c]	8	18	24	3 x 8mL
7	Fully feathered, short tail.		5	12	16	2 x 8mL
8	Fledging. Reduce to 1 x hand rearing feed only.		3	6	8	1 x 8mL
9	Fully weaned. Prepare for release.		Self-feeding on adult diet (see below)			

a. Weight is not an accurate indicator of age. Average weight gain from 1 to 5 weeks is 3-5g/day.
b. Start weaning on to Lorikeet & Honeyeater Food and gradually decrease amount of hand rearing mix.
c. Final weight varies between individuals. Weight may reduce by up to 15% prior to fledging.
d. Based on Passwell Hand Rearing Food or Wombaroo Granivore Rearing Mix.

Adult Maintenance Diet

140g adult requires 45mL/day (220 kJ)

- 45mL **Lorikeet & Honeyeater Food** (3 × 15mL ice cubes).
- 1-2 small pieces of fresh fruit & veg (apple, pear, melon, grapes, corn etc.).

Ad lib native blossom: *eucalyptus, melaleuca, grevillea, callistemon.*

Scaly-breasted Lorikeet *(Trichoglossus chlorolepidotus)* [4,15]

Adult Weight	70-90g
Natural Diet	Nectar & pollen from native flowers (particularly *eucalyptus*).
Secondary Diet	Fruits, seeds, occasional insects.
Captive Diet	**Wombaroo Lorikeet & Honeyeater Food**. Native flowers (*eucalyptus, callistemon, grevillea*). Supplemental fruit & veg.
Juvenile Diet	**Passwell Hand Rearing Food** or **Wombaroo Granivore** weaning on to **Lorikeet & Honeyeater Food**.

Age = 4 weeks

Growth & Feed Chart

May be used as guideline for **Musk Lorikeet** (weights may be slightly lower).

Age (weeks)	Developmental Stage	Weight (g)[a]	Hand Rearing Mix[d] (per day)			
			Solids (g)	Water (mL)	Total (mL)	Feeds
Hatch	Silvery-white down. Eyes closed.	5	1.0	7	8	10 x 0.8mL
1		13	2.2	9	10	6 x 1.7mL
2	Eyes open, mostly covered in grey down.	25	4	12	15	5 x 3mL
3	Pin feathers appearing on head & wings.	45	6	18	22	5 x 4.5mL
4	Head green, wings and tail starting to unsheath.	65	8	20	26	4 x 6.5mL
5	Half feathered, still downy around flanks & neck[b].	75	9	21	28	4 x 7mL
6	Mostly feathered, some down still present.	85[c]	6	15	21	3 x 7mL
7	Fully feathered, short tail.		4	10	14	2 x 7mL
8	Fledging. Reduce to 1 x hand rearing feed only.		2	5	7	1 x 7mL
9	Fully weaned. Prepare for release.		Self-feeding on Adult Diet (see below)			

a. Weight is not an accurate indicator of age. Average weight gain from 1 to 5 weeks is 2-4g/day.
b. Start weaning on to Lorikeet & Honeyeater Food and gradually decrease amount of hand rearing mix.
c. Final weight varies between individuals. Weight may reduce by up to 15% prior to fledging.
d. Based on Passwell Hand Rearing Food or Wombaroo Granivore Rearing Mix.

Adult Maintenance Diet

80g adult requires 30mL/day (150 kJ)

- 30mL **Lorikeet & Honeyeater Food** (2 × 15mL ice cubes).
- 1-2 small pieces of fresh fruit & veg (apple, pear, melon, grapes, corn etc.).

Ad lib native blossom: *eucalyptus, melaleuca, grevillea, callistemon.*

Granivores (Seed-eaters)

Granivores are seed-eating birds including parrots, cockatoos, finches, quail and pigeons. They consume a variety of seeds from grasses, herbs, shrubs and trees. Seeds of most wild plants are small, usually ranging between 0.1 – 10mg in weight[29]. This is the case even when the seed capsule is large and needs considerable force to open (e.g. some *eucalyptus* and *casuarina* nuts consumed by cockatoos). Seeds are the energy-dense nutrient store of plants and contain high levels of carbohydrate in the form of starch. Starch is a long-chained polysaccharide and is considerably more difficult to digest than the simple sugars found in nectar or cultivated fruits[29]. Granivorous birds store seed in their crop which allows hydration of the starch granules for breakdown by gut enzymes. They also have a muscular stomach (gizzard) to facilitate grinding and digestion of their food. Most granivores also supplement their diet with insects and larvae which provide an important source of protein.

Parrots & Cockatoos

Most parrots and cockatoos can be maintained on a diet of natural foods (selected based on species) along with a commercial budgie or small parrot seed mix (Appendix 6). Soaking or sprouting dry seed may enhance the availability of nutrients[37]. A variety of leafy greens and diced vegetables may be offered. A simple and effective supplement is frozen peas & corn mixed with **Parrot Soft Food** (Appendix 5). This provides additional protein, vitamins and minerals beneficial for sickness and feather growth. Many parrots will also accept live food such as mealworms.

Parrot Feeding Guidelines

Species	Adult Weight	Natural Diet (main items in bold)	Captive Diet (primary items in bold)	Feed Guide (per day)
Red-rumped Parrot	55-70g	**Seeds** mainly from grasses & herbs.	**Budgie or Small Parrot Seed Mix**. Peas & corn mixed with Parrot Soft Food (Appendix 5). Mealworms.	8-10g
Australian Ringneck (Twenty-eight Parrot)	120-210g	**Seeds** from grasses & trees. Fruits, flowers, nectar, insects & larvae.		15-20g
Red-winged Parrot	120-210g	**Seeds** from *eucalyptus*, *acacia*. Fruits, flowers, nectar, insects, larvae.		15-20g
King Parrot	200-280g			20-25g
Gang-Gang	230-300g	**Seeds**, **nuts**, **berries:** *eucalyptus*, *acacia*, hawthorn. Insects & larvae.	**As much natural food as possible:** e.g. seeding grasses, milk thistle, gum nuts, wattle. Tree branches for chewing and extraction of insect larvae.	20-30g
Little Corella	350-600g	**Seeds** from grasses & herbs. Shoots, roots, flowers, insects & larvae.		30-40g
Long-billed Corella	500-650g	**Seeds**, **grain**, **bulbs**, **roots** (especially onion grass). Insects & larvae.		35-45g
Red-tailed Black-Cockatoo	600-900g	**Seeds** especially *eucalyptus*, *casuarina*, *acacia*, *banksia*. Fruits, nectar, flowers, insects & larvae.		40-55g
Yellow-tailed Black-Cockatoo	600-900g	**Seeds** especially pine cones, *eucalyptus*, *acacia*, *banksia*, *hakea*. **Wood-boring larvae**.		40-55g

a. Maintenance feed quantity based on dry weight of commercial seed mix. Feed up to 50% more for growth or sickness. 1 tablespoon seed = 10g approx.

Hand-rearing Parrots

Parrot chicks have an increased requirement for protein, vitamins and minerals. Use a well-formulated hand rearing food such as **Passwell Hand Rearing Food** or **Wombaroo Granivore Rearing Mix**. Young chicks can dehydrate easily and should initially be rehydrated using an electrolyte solution. Newly hatched chicks need a dilute formula which is gradually thickened-up by reducing the ratio of water to powder as per the following table. As the chick develops, the number of feeds per day is also reduced[15].

Developmental Stage	Hand Rearing Powder (g)	Water (mL)	Solids	Feeds per day
Newly hatched.	1	7	13%	10
Mostly naked or sparse down, eyes closed.	1	4	20%	6
Eyes open, small pin feathers.	1	3	25%	5
Downy (parrots) or spikey pins (cockatoos), wing feathers unsheathing.	1	2.5	29%	4
Body half-feathered, tail feathers growing.	1	2	33%	3
Fully-feathered with short tail.	1	2	33%	2

Feed volumes depend on the age and body weight of the chick, which varies greatly depending on species. As a general rule, feed up to 10% of body weight per feed[15]. Typically the crop is filled or nearly so at these rates. Use the species-specific feed charts for more accurate feeding guidelines. Let the crop empty completely at least once a day by allowing an overnight fasting period of about 6 hours.

Weaning should commence once young are fully-feathered. This is achieved by reducing frequency and volume of hand-rearing food and encouraging the young to take weaning foods. Excellent weaning foods include soaked or sprouted seed (Appendix 6) and frozen peas & corn mixed with **Parrot Soft Food** (Appendix 5). A range of natural foods should also be provided including seeding grass heads, milk thistle and gum nuts. Offer wild type foods even before young parrots appear ready for weaning as this familiarises them with natural food items. Typically body weight may decline by up to 15% before fledging, so it is important to continue to monitor food consumption and body weight to ensure the bird is self-feeding.

Parrot Weaning Food: Corn kernels, greens & soaked seed.

Weaning Eastern Rosella trying new food items.

Eastern Rosella *(Platycercus eximius)* [4,15]

Adult Weight	90-120g (males heavier).
Natural Diet	Seeds of grasses, shrubs & trees.
Secondary Diet	Fruits, buds, flowers, nectar, insects & larvae.
Captive Diet	Budgie or Small Parrot seed. Mixed veg (peas, corn) supplemented with **Parrot Soft Food** (Appendix 5). Seeding grasses, tree branches, gum nuts & mealworms.
Juvenile Diet	**Passwell Hand Rearing Food** or **Wombaroo Granivore Rearing Mix**.

Julie Marsh

Age = 10 days

Growth & Feed Chart

May also be used for **Pale-headed** and **Northern Rosella**.

Age (weeks)	Developmental Stage	Weight (g)[a]	Hand Rearing Mix[c] (per day)			
			Powder (g)	Water (mL)	Total (mL)	Feeds
Hatch	Sparse whitish down. Eyes closed. Yellow bill.	6	1.4	9	10	10 x 1mL
1	Eyes opening, pins emerging on wings & head.	30	5	20	24	6 x 4mL
2	Grey down, wing feathers starting to unsheath.	65	9	28	35	5 x 7mL
3	Half-feathered, tail unsheathing.	88	10	24	32	4 x 8mL
4	Mostly feathered. Introduce weaning food.	105[b]	9	18	24	3 x 8mL
5	Fully fledged: ↓ hand-rearing ↑ weaning foods.		5	10	14	2 x 7mL
6	Reduce to 1 x hand rearing feed only.		2.5	5	7	1 x 7mL
7	Fully weaned. Prepare for release.		Now feeding adult diet (see below)			

a. Weight is not an accurate indicator of age. Average weight gain for first 3 weeks is 3-5g/day.
b. Final weight varies between individuals. Weight may decline by up to 15% prior to fledging.
c. Based on Passwell Hand Rearing Food or Wombaroo Granivore Rearing Mix.

Adult Maintenance Diet

100g adult requires 18g/day (130kJ)

- 10g Budgie or Small Parrot Seed Mix (1 tablespoon).
- 5g Peas & Corn (1 teaspoon) mixed with 2.5g **Parrot Soft Food** (½ teaspoon).
- 0.5g Mealworms (approx. 4 mealworms).

Ad lib seeding grasses, milk thistle, gum nuts & other vegetation.

Crimson Rosella *(Platycercus elegans)* [4,14,15]

Adult Weight	120-150g (males heavier).
Natural Diet	Seeds of grasses, weeds, shrubs & trees.
Secondary Diet	Fruits, nuts, buds, flowers, nectar, insects & larvae.
Captive Diet	Budgie or Small Parrot seed. Mixed veg (peas, corn) supplemented with **Parrot Soft Food** (Appendix 5). Seeding grasses, tree branches, gum nuts and mealworms.
Juvenile Diet	**Passwell Hand Rearing Food** or **Wombaroo Granivore Rearing Mix**.

Age = 3.5 weeks

Growth & Feed Chart

May also be used for **Green Rosella**.

Age (weeks)	Developmental Stage	Wing (mm)	Weight (g)[a]	Hand Rearing Mix[c] (per day)			
				Powder (g)	Water (mL)	Total (mL)	Feeds
Hatch	Sparse whitish down. Eyes closed.	10	7	1.5	9	10	10 x 1mL
1	Eyes opening, pins emerging on wings.	20	40	6	20	24	6 x 4mL
2	Grey down, wing feathers starting to unsheath.	40	80	10	28	35	5 x 7mL
3	Half-feathered, tail unsheathing.	75	110	12	28	36	4 x 9mL
4	Mostly feathered. Introduce weaning food.	110	130[b]	11	22	30	3 x 10mL
5	Fully fledged: ↓ hand-rearing ↑ weaning foods.	135		6	12	16	2 x 8mL
6	Reduce to 1 x hand rearing feed only.	150		3	6	8	1 x 8mL
7	Fully weaned. Prepare for release.	160		Now feeding adult diet (see below)			

a. Weight is not an accurate indicator of age. Average weight gain for first 3 weeks is 3-6g/day.
b. Final weight varies between individuals. Weight may decline by up to 15% prior to fledging.
c. Based on Passwell Hand Rearing Food or Wombaroo Granivore Rearing Mix.

Adult Maintenance Diet

130g adult requires 20g/day (160kJ)

- 12g Budgie or Small Parrot Seed Mix (1 heaped tablespoon).
- 5g Peas & Corn (1 teaspoon) mixed with 2.5g **Parrot Soft Food** (½ teaspoon).
- 0.5g Mealworms (approx. 4 mealworms).

Ad lib seeding grasses, milk thistle, gum nuts & other vegetation.

Galah *(Eolophus roseicapillus)* [4,15,30]

Adult Weight	260 -350g (smaller in north).
Natural Diet	Seeds of grasses & plants, including cereal crops.
Secondary Diet	Fruits, nuts, buds, roots, insects & larvae.
Captive Diet	Small Parrot seed. Mixed veg (peas, corn) supplemented with **Parrot Soft Food**. (Appendix 5) Seeding grasses, tree branches & mealworms.
Juvenile Diet	**Passwell Hand Rearing Food** or **Wombaroo Granivore Rearing Mix**.

Julie Blanch

Age = 4 weeks

Growth & Feed Chart

Age (weeks)	Developmental Stage	Wing (mm)	Tail (mm)	Weight (g)[a]	Hand Rearing Mix[c] (per day)			
					Solids (g)	Water (mL)	Total (mL)	Feeds
Hatch	Naked with sparse pink down. Eyes closed.	10	–	7	1.5	9	10	10 x 1mL
1	Feather tracts darkening on scapulars.	16	–	50	6.5	25	30	6 x 5mL
2	Eyes just opening. Pin feathers forming on wings.	25	–	120	15	45	55	5 x 11mL
3	Spikey pin feathers over body. Tail feathers starting.	50	2	180	20	52	68	4 x 17mL
4	Body & crest feathers unsheathing.	80	15	225	24	54	72	3 x 24mL
5	Mostly feathered. Introduce weaning food.	120	30	270	21	42	60	3 x 20mL
7	Fledging: ↓ hand-rearing ↑ weaning foods.	180	70		14	28	40	2 x 20mL
10	Reduce to 1 x hand rearing feed only.	230	90	280[b]	7	14	20	1 x 20mL
12	Fully weaned. Prepare for release.	250	100		Now feeding adult diet (see below)			
Adult		260	135	300				

a. Weight is not an accurate indicator of age. Average weight gain from 1 to 5 weeks 6-12g/day.
b. Final weight varies significantly between individuals. Weight may decline by up to 15% prior to fledging.
c. Based on Passwell Hand Rearing Food or Wombaroo Granivore Rearing Mix.

Adult Maintenance Diet

320g adult requires 33g/day (300kJ)

- 25g Small Parrot Seed Mix (2½ tablespoons).
- 5g Peas & Corn (1 teaspoon) mixed with 2.5g **Parrot Soft Food** (½ teaspoon).
- 0.5g Mealworms (approx. 4 mealworms).

Ad lib seeding grasses, milk thistle, gum nuts, wattle & other vegetation.

Sulphur-crested Cockatoo *(Cacatua galerita)* [4,15]

Adult Weight	800-950g (smaller in north).
Natural Diet	Seeds of grasses & plants, including cereal crops.
Secondary Diet	Fruits, flowers, root bulbs & insect larvae.
Captive Diet	Small Parrot seed. Mixed veg (peas, corn) supplemented with **Parrot Soft Food** (Appendix 5). Seeding grasses, tree branches & mealworms.
Juvenile Diet	**Passwell Hand Rearing Food** or **Wombaroo Granivore Rearing Mix**.

Julie Blanch

Age = 7 weeks

Growth & Feed Chart

Age (weeks)	Developmental Stage	Bill (mm)	Weight (g)[a]	Hand Rearing Mix[c] (per day)			
				Powder (g)	Water (mL)	Total (mL)	Feeds
Hatch	Pale yellow down. Eyes closed.	10	18	3	18	20	10 x 2mL
1		13	70	9	36	42	6 x 7mL
2	Eyes just opening. Small pin feathers appearing.	16	200	20	60	75	5 x 15mL
3	Covered in spikey pin feathers.	20	400	36	90	120	4 x 30mL
4	Body feathers unsheathing.	24	600	50	120	160	4 x 40mL
5	Body & crest feathers well formed, wings growing.	27	710	50	110	150	3 x 50mL
7	Mostly feathered. Introduce weaning food.	32	770	48	96	135	3 x 45mL
10	Fledging: ↓ hand-rearing ↑ weaning foods.	39	780[b]	36	72	100	2 x 50mL
13	Reduce to 1 x hand rearing feed only.	41		18	36	50	1 x 50mL
16	Fully weaned. Prepare for release.	42		Now feeding adult diet (see below)			

a. Weight is not an accurate indicator of age. Average weight gain for first 3 weeks is about 3-6g/day.
b. Final weight varies between individuals. Weight may decline by up to 15% prior to fledging.
c. Based on Passwell Hand Rearing Food or Wombaroo Granivore Rearing Mix.

Adult Maintenance Diet

800g adult requires 66g/day (600kJ)

- 50g Small Parrot Seed Mix (5 tablespoons).
- 10g Peas & Corn (1 heaped Tablespoon) mixed with 5g **Parrot Soft Food**. (1 level teaspoon).
- 1g Mealworms (approx. 8 mealworms).

Ad lib seeding grasses, milk thistle, gum nuts, wattle & other vegetation.

Quail & Button-quail

Quail are primarily granivorous, consuming a range of seeds, plant material and insects. They can be maintained on a commercial budgie seed mix (Appendix 6) along with seeding grasses and chopped greens. Diets can be supplemented with **Insectivore Egg Mix** (Appendix 1) and live insects, especially for growing chicks. True quail are precocial and self-feed from hatching, whereas Button-quail require feeding directly to the bill for the first 7-14 days.

Brown Quail hatchling

Species	Adult Weight	Natural Diet (main items in bold)	Captive Diet (primary items in bold)	Feed Guide[a] (per day)
Brown Quail	70-140g	**Seeds of grasses**, **cereal crops**, herbs, leaves, insects.	**Budgie Seed Mix.** Chopped greens, seeding grasses. Insectivore-Egg Mix, crickets, mealworms. Grit (fine gravel).	10-15g
Stubble Quail	85-125g			10-15g
Little Button-quail	♂ 30-40g ♀ 45-60g	**Seeds of grasses**, young plants, insects.		5-10g
Painted Button-quail	♂ 60-85g ♀ 90-130g	**Seeds**, fruits, leaves & insects.		10-15g

a. Maintenance feed quantity based on dry weight of budgie seed mix. Feed up to 50% more for growth or sickness. 1 teaspoon seed = 5g approx.

Australian Brush-Turkey *(Alectura lathami)* [2]

Brush-Turkeys are omnivorous, taking a wide range of seeds, plant and animal material. Feed a base diet of commercial seed mix supplemented with **Insectivore Meat Mix**, invertebrates, veg & fruit. The highly precocial chicks may benefit from a higher protein intake (up to 50% **Insectivore Meat** or **Egg Mix**), increasing the proportion of seed & vegetable matter as they grow.

Age = 2 weeks.

Age	Weight	Natural Diet (main items in bold)	Captive Diet (primary items in bold)	Feed Guide[a] (per day)
Hatch	110-130g	**Seeds, fruits, grain, insects, earthworms,** skinks, carrion.	**Small Parrot Seed Mix, Insectivore Egg** or **Meat Mix** (Appendix 1), **mealworms, crickets, earthworms.** Peas & Corn Mix (Appendix 5). Native fruits such as figs. Grit (fine gravel).	20-25g
4 weeks	270-370g			35-50g
8 weeks	460-600g			50-70g
12 weeks	850-1100g			75-90g
Adult	1.8-2.8kg			90-140g

a. Based on maintenance diet of 50% seed mix, 25% Insectivore Meat Mix, 25% fruit & veg.

Finches

Finches are small seed-eating (granivorous) birds. They have a stout, conical bill for dehusking small seeds from grasses and herbaceous plants. Like other granivores, they have a crop for storage and hydration of seed and a muscular gizzard for grinding food. Finches can be maintained on a diet of green seeding grasses along with a commercial finch or budgie seed mix (Appendix 6). Soaking or sprouting seed may enhance the availability of nutrients[37]. A variety of leafy greens and garden weeds (e.g. chickweed, milk thistle) should also be offered. Most finches will also accept live food such as small mealworms, termites and fly pupae, and these may be a valuable source of protein.

Species	Adult Weight	Natural Diet (main items in bold)	Captive Diet (primary items in bold)	Feed Guide[a] (per day)
Double-barred Finch	8-11g	**Small seeds** (>90%) of grasses & herbs. Occasional other plant material & small insects.	**Finch/Budgie Seed Mix.**	4-6g
Zebra Finch	10-14g		**Seeding grasses**, milk thistle, chick weed, chopped greens. Occasional small insects.	
Chestnut-breasted Mannikin	12-15g			

a. Maintenance feed quantity based on dry weight of commercial seed mix. Feed up to 50% more for growth or sickness. 1 teaspoon seed = 5g approx.

Hand Rearing Finches

Finches develop rapidly, from hatching blind and naked to fully feathered by two weeks and fledging soon after. To fuel this fast development, nestlings are fed a high protein diet of green (ripening) grass seeds and small insects. To replicate this in care we recommend using a mixture of 75% **Passwell Hand Rearing Food** with 25% **Insectivore Rearing Mix** in the first 2 weeks. This is made up as a slurry and can be fed directly to the beak with a small (0.3, 0.5 or 1mL) syringe. Young finches have a strong begging response and can be fed until the crop is full. A full crop is readily seen as two sac-like pouches either side of the neck. Being small, nestling finches can dehydrate rapidly, so it is important to offer water directly to the beak in between feeds, particularly in hot weather. Once fully feathered, they can be weaned on to solid foods including soaked or sprouted seed (Appendix 6) along with an ample supply of seeding grasses and weeds such as milk thistle and chickweed. Growth and development of most species occur along a similar time frame, so guidelines provided for the Red-browed Finch (page 35) may be used for other native species.

Mignon McHendrie

Chestnut-breasted Mannikin
Age = 18 days

Red-browed Finch *(Neochmia temporalis)* [7]

Adult Weight	8 -12g (smaller in north).
Natural Diet	Small seeds of grasses (>90%).
Secondary Diet	Green plant material & small insects.
Captive Diet	Finch or Budgie seed. Seeding grasses, garden weeds, chickweed & chopped greens. Occasional small insects.
Juvenile Diet	**Passwell Hand Rearing Food** or **Wombaroo Granivore** mixed 75:25 with **Wombaroo Insectivore** to boost protein content.

Age = 21 days

Growth & Feed Chart

May be used as a guideline for other finches.

Age (days)	Developmental Stage	Weight (g)[a]	Hand Rearing Mix[c] (per day)			
			Powder (g)	Water (mL)	Total (mL)	Feeds
Hatch	Blind, mostly naked.	0.8	0.4	2.4	2.7	18 x 0.15mL
4		2.5	1.0	5.0	5.6	16 x 0.35mL
7	Eyes begin to open. Pins on wings & back.	4.5	1.5	5.3	6.3	14 x 0.45mL
10	Eyes completely open. Tail pins emerging.	6.5	2.0	5.7	7.2	12 x 0.6mL
12	Body feathers growing, wings unsheathing.	7.5	2.1	5.4	7.0	10 x 0.7mL
14	Mostly-feathered, tail short (about 10mm).	8.5	2.2	5.5	7.2	8 x 0.9mL
17	Fledging (Tail >15mm). Encourage seed intake.	9.5	2.3	5.2	7.0	7 x 1.0mL
21	Weaning on to seed, flying well[c].	10.5	1.8	3.6	5.0	5 x 1.0mL
30	Fully weaned. (Tail >25mm). Prepare for release.		Now feeding adult diet (see below)			

a. Weight is not an accurate indicator of age. Average weight gain for first 2 weeks is 0.3-0.7g/day.
b. Based on Passwell Hand Rearing Food mixed 75:25 with Insectivore Rearing Mix.
c. Gradually reduce the amount of hand rearing feeds per day. Weight should be monitored during weaning to ensure birds are self-feeding. Soaked seed may be used for weaning.

Adult Maintenance Diet

10g adult requires 4g/day (40kJ)

- 4g Finch or Budgie Seed Mix (1 teaspoon).

Ad lib green seeding grasses, garden weeds, chickweed & chopped greens. Occasional small insects such as mealworms, termites or fly pupae.

Pigeons & Doves

Pigeons and doves can be categorised as granivorous (seed-eating), mixed feeders (eating both seed and fruit) or entirely frugivorous (fruit-eating)[16].

Granivorous Pigeons & Doves

These have a similar digestive strategy to other seed-eating birds like parrots. The main difference is they do not have strong beaks for dehusking seeds, so swallow their food whole. They should therefore be provided with a source of insoluble grit (e.g. fine gravel) to aid digestion. They have a crop for storage of food, and a muscular gizzard for grinding seed. Most pigeons and doves can be maintained on a diet of natural foods (seeding grasses, wattle seeds etc) along with a commercial seed mix. (Appendix 6). Smaller doves do well on budgie seed, but larger pigeons can also be supplemented with small parrot mix. Soaking or sprouting of seed may enhance the availability of nutrients[37]. A variety of leafy greens and diced vegetables may be offered. An excellent supplement is frozen peas & corn with added **Parrot Soft Food** (Appendix 5). This provides additional protein, vitamins and minerals, especially for sickness or feather growth.

Species	Adult Weight	Natural Diet (main items in bold)	Captive Diet (primary items in bold)	Feed Guide (per day)[a]
Brush Bronzewing	150-250g	**Seeds** especially *acacia*, cereal crops. Some leaves & insects.	**Small Parrot Seed Mix.** Peas & corn mixed with Parrot Soft Food (Appendix 5). Seeding grasses, wattle seed, mealworms.	20-25g
Common Bronzewing	250-450g			25-35g
Wonga Pigeon	300-500g	**Seeds**, occasionally fallen fruit, insects.		30-40g

a. Maintenance feed quantity based on dry weight of commercial seed mix. Feed up to 50% more for growth or sickness. 1 tablespoon seed = 10g approx.

Mixed Feeder Pigeons & Doves

A few species include a combination of seed and fruit in their diet. They have muscular gizzards and can readily process seed, so can essentially be fed as granivores. However they may also benefit from the addition of **Fruit-Dove Mix** into their diet (Appendix 4).

Species	Adult Weight	Natural Diet (main items in bold)	Captive Diet (primary items in bold)	Feed Guide (per day)[a]
Emerald Dove	120-190g	**Seeds**, **fallen fruits.** Occasional insects.	**Small Parrot Seed Fruit-Dove Mix** (Appendix 4). Native fruits.	15g seed + 20g fruit/veg
Brown Cuckoo-Dove	210-270g	**Fruit**, **berries & seeds** from rainforest trees, especially laurels, basswood.		20g seed + 25g fruit/veg
White-headed Pigeon	370-500g			30g seed + 40g fruit/veg

a. Maintenance feed quantity based on 75% of diet energy as seed and 25% fruit/veg.

Frugivorous Pigeons & Doves

These are specialised rainforest species that feed exclusively on wild fruits such as laurels, quandong and figs. They do not have the muscular gizzard of granivores, and only digest the fleshy pulp of fruits, excreting the seeds. Since fruit contains high moisture and low energy content, the volume of food throughput is much higher in frugivores compared to granivores.

Fruit-doves and pigeons can be maintained on a diced veg & fruit mix (Fruit-Dove Mix Appendix 4), supplemented with a range of wild-harvested fruit. Native fruits are higher in protein and minerals than commercially grown fruits like apples and pears[28]. For this reason we recommend adding **High Protein Supplement** (HPS) or **Insectivore Rearing Mix** to captive diets to ensure adequate intake of protein, vitamins and minerals.

Species	Adult Weight	Natural Diet (main items in bold)	Captive Diet (primary items in bold)	Feed Guide (per day)[a]
Rose-crowned Fruit-Dove	90-110g	**Fruits of a large variety of rainforest trees, vines & palms:** e.g laurels, quandong, figs. Black-purple fruits preferred.	**Fruit-Dove Mix:** Peas, corn, carrot. Blueberry, grapes, plum, paw-paw, banana. **Native fruits:** figs, lilly-pilly, laurels.	50-60g
Superb Fruit-Dove	110-120g			60-70g
Wompoo Fruit-Dove	350-500g			140-180g
Topknot Pigeon	450-600g			160-200g

a. Maintenance feed quantity based on Fruit-Dove Mix with High Protein Supplement. Feed up to 50% more for growth or sickness.

Hand Rearing Pigeons & Doves

Pigeons and doves are unique amongst birds in that adults provide a "crop milk" to their young. This is not a true milk, but a secretion of cells from the crop wall lining which is high in protein and fat. The highly nutritious crop milk accounts for the fast growth and development of the young. To replicate this we recommend using a mixture of 50% **Passwell Hand Rearing Food** with 50% **Wombaroo High Protein Supplement** for up to 2 weeks after hatching. By this age chicks are mostly feathered and are gradually weaned on to solid foods. Weaning foods include soaked seed (particularly for smaller doves) along with peas & corn mix for larger pigeons. Moist foods can be mixed with **Parrot Soft Food** (Appendix 5) to ensure the young birds gain adequate nutrition through the weaning stage. The same hand-rearing procedure applies to Fruit-Doves, however they are weaned onto Fruit-Dove Mix (Appendix 4) with as much native fruits as possible.

Dreamworld

Wonga Pigeon chick being crop fed.

Peaceful Dove *(Geopelia striata)* [3,16]

Adult Weight	41-66g (smaller in north).
Natural Diet	Small seeds of grasses & sedges (>90%).
Secondary Diet	Leaves, buds occasional insects.
Captive Diet	Budgie seed. Chopped greens, veg mix (peas, corn) with **Parrot Soft Food** (Appendix 5). Seeding grasses, garden weeds. Grit (fine gravel).
Juvenile Diet	**Passwell Hand Rearing Food** or **Wombaroo Granivore Rearing Mix** mixed 50:50 with **Wombaroo High Protein Supplement** to replicate "crop milk".

Age = 16 days

Growth & Feed Chart

Age (days)	Developmental Stage	Wing (mm)	Weight (g)[a]	Hand Rearing Mix[b] (per day)			
				Powder (g)	Water (mL)	Total (mL)	Feeds
Hatch	Silver/grey down. Eyes closed.	11	6	1.2	8	9	10 x 0.9mL
3	Eyes open, feather pins on wings.	20	11	2.5	10	12	8 x 1.5mL
6	Heavily pinned with some feathers unsheathing.	35	17	3.5	10	13	6 x 2.2mL
10	Well feathered above, still pins & downy below.	55	25	5.0	11	15	5 x 3mL
13	Mostly feathered, chestnut wing linings.	80	30	5.5	12	16	4 x 4mL
16	Fledged. Wean onto adult diet[c].	85	34	4.5	9	12	3 x 4mL
30	Weaned. Prepare for release.	95	40	Now feeding adult diet (see below)			
Adult	Size varies between individuals.	100	50				

a. Weight is not an accurate indicator of age. Average weight gain for first 3 weeks is 1-2g/day.
b. Based on Passwell Hand Rearing Food mixed 50:50 with High Protein Supplement in first 2 weeks.
c. Gradually reduce the amount of hand rearing feeds per day. Weight should be monitored during weaning to ensure birds are self-feeding. Soaked seed may be used for weaning.

Adult Maintenance Diet

50g adult requires 10g/day (80kJ)

- 6g Budgie Seed Mix (1 teaspoon).
- 3g Chopped greens (1 heaped teaspoon) mixed with 1g **Parrot Soft Food** (¼ teaspoon).

Ad lib seeding grasses, garden weeds, dandelion, chickweed & other green vegetation.

Bar-shouldered Dove *(Geopelia humeralis)* [3,16]

Adult Weight	110 -150g (smaller in north).
Natural Diet	Seeds & rhizomes of grasses, herbs & sedges.
Secondary Diet	Leaves, buds, occasional insects.
Captive Diet	Budgie seed. Chopped greens, veg mix (peas, corn) with **Parrot Soft Food** (Appendix 5). Seeding grasses, garden weeds. Grit (fine gravel).
Juvenile Diet	**Passwell Hand Rearing Food** or **Wombaroo Granivore Rearing Mix** mixed 50:50 with **Wombaroo High Protein Supplement** to replicate "crop milk".

Mignon McHendrie

Age = 10 days

Growth & Feed Chart

Age (days)	Developmental Stage	Wing (mm)	Weight (g)[a]	Hand Rearing Mix[b] (per day)			
				Solids (g)	Water (mL)	Total (mL)	Feeds
Hatch	Light fawn down, dark skin. Eyes closed.	13	8	1.5	11	12	10 x 1.2mL
4	Eyes open, feather pins in tracts on body & wings.	35	22	4.5	17	20	8 x 2.5mL
7	Heavily pinned with wing feathers unsheathing.	56	34	6.0	20	24	6 x 4mL
10	Mostly feathered above, pins below, tail approx. 30mm.	75	45	7.5	19	25	5 x 5mL
14	Fully feathered, tail approx. 50mm.	97	60	9.0	21	28	4 x 7mL
21	Fledged, tail approx. 85mm – wean onto adult diet[c].	118	80	8.5	17	24	3 x 8mL
30	Weaned. Prepare for release.	128	90	Now feeding adult diet (see below)			
Adult	Size varies between individuals.	140	125				

a. Weight is not an accurate indicator of age. Average weight gain for first 3 weeks is 3-4g/day.
b. Based on Passwell Hand Rearing Food mixed 50:50 with High Protein Supplement in first 2 weeks.
c. Gradually reduce the amount of hand rearing feeds per day. Weight should be monitored during weaning to ensure birds are self-feeding. Soaked seed may be used for weaning.

Adult Maintenance Diet

120g adult requires 17g/day (150 kJ)

- 10g Budgie Seed Mix (1 teaspoon).
- 5g Chopped greens (1 teaspoon) mixed with 2g **Parrot Soft Food** (½ teaspoon).

Ad lib seeding grasses, garden weeds, roots, chickweed & other green vegetation.

Crested Pigeon *(Ocyphaps lophotes)* [3,16]

Adult Weight	150-250g
Natural Diet	Seeds (80%), green plant material (15%).
Secondary Diet	Occasional insects & larvae (5%).
Captive Diet	Budgie or small parrot seed. Chopped greens, veg mix (peas, corn) with **Parrot Soft Food** (Appendix 5). Seeding grasses, garden weeds & occasional mealworms. Grit (fine gravel).
Juvenile Diet	**Passwell Hand Rearing Food** or **Wombaroo Granivore Rearing Mix** mixed 50:50 with **Wombaroo High Protein Supplement** to replicate "crop milk".

Age = 17 days

Growth & Feed Chart

Age (days)	Developmental Stage	Wing (mm)	Weight (g)[a]	Hand Rearing Mix[b] (per day)			
				Powder (g)	Water (mL)	Total (mL)	Feeds
Hatch	Dense fawn/cream down. Eyes closed.	13	10	2	14	15	10 x 1.5mL
3	Eyes open, feather pins on wings, pale tipped bill.	28	20	4	15	18	7 x 2.5mL
7	Heavily pinned with some feathers unsheathing.	50	35	6	20	24	6 x 4mL
10	Crest feathers growing.	67	47	8	20	25	5 x 5mL
14	Fully feathered. Introduce weaning foods.	89	63	10	20	28	4 x 7mL
17	Fledged. Wean onto adult diet[c].	104	75	9	18	24	3 x 8mL
35	Weaned. Prepare for release.	145	115	Now feeding adult diet (see below)			
Adult	Size varies between individuals.	160	200				

a. Weight is not an accurate indicator of age. Average weight gain for first 3 weeks is 3-4g/day.
b. Based on Passwell Hand Rearing Food mixed 50:50 with High Protein Supplement in first 2 weeks.
c. Gradually reduce the amount of hand rearing feeds per day. Weight should be monitored during weaning to ensure birds are self-feeding. Soaked seed may be used for weaning.

Adult Maintenance Diet

200g adult requires 27g/day (215kJ)

- 20g Budgie or Small Parrot Seed Mix (2 tablespoons).
- 5g Peas & Corn (1 teaspoon) mixed with 2g **Parrot Soft Food** (½ teaspoon).

Ad lib seeding grasses, garden weeds, dandelion, clover & other green vegetation. Occasional mealworms.

Torresian Imperial-Pigeon *(Ducula spilorrhoa)* [3,16]

Adult Weight	450-500g
Natural Diet	Fruits of tropical trees & vines. Particularly palms, laurels, figs, nutmeg, native olive, turpentine, walnut & lawyer vine.
Captive Diet	Diced veg & fruit-mix supplemented with **Wombaroo High Protein Supplement** (Appendix 4). Native fruits on branches.
Juvenile Diet	**Passwell Hand Rearing Food** or **Wombaroo Granivore Rearing Mix** mixed 50:50 with **Wombaroo High Protein Supplement** to replicate "crop milk".

Adult & fledgling

Growth & Feed Chart

Age (days)	Developmental Stage	Weight (g)[a]	Hand Rearing Mix[b] (per day)			
			Solids (g)	Water (mL)	Total (mL)	Feeds
Hatch	Yellowish down. Eyes closed.	20	3	18	20	8 x 2.5mL
4	Eyes open, feather pins on wings.	50	8	30	36	6 x 6mL
7	Heavily pinned with some feathers unsheathing.	75	11	32	40	5 x 8mL
12	Mostly feathered, head & neck still in pins[c].	120	15	36	48	4 x 12mL
24	Fledged: ↓ rearing mix ↑ native fruit intake[d].	240	21	43	60	3 x 20mL
42	Weaned. Prepare for release.	340	Now feeding adult diet (see below)			

a. Weight is not an accurate indicator of age. Average weight gain for first 3 weeks is 7-10g/day.
b. Based on Passwell Hand Rearing Food mixed 50:50 with High Protein Supplement in first 2 weeks.
c. Start adding mashed fruit into rearing formula.
d. Gradually reduce the amount of hand-rearing feeds per day and increase native fruit intake. Weight should be monitored during weaning to ensure birds are self-feeding.

Adult Maintenance Diet

450g adult requires 170g/day (390 kJ)

- 160g Diced Veg & Fruit: Peas, corn, carrot mix. Blueberry, grapes, plum, paw-paw, banana mixed with 8g **High Protein Supplement**.

Ad lib native fruits: Carpentaria palm fruits, figs, berries, laurels, etc.

Ducks, Geese & Swans

Ducks, geese and swans are categorised as being mainly herbivorous (grazers, aquatic plants), mixed feeders (plants and invertebrates) or insectivorous (aquatic invertebrates). Protein levels generally increase the higher the proportion of insects and invertebrates in the diet. However, in captivity, excessive protein has been implicated in causing kidney damage, particularly in herbivorous species[17]. We recommend feeding a base diet of **Passwell Crumbles** (which have a moderate protein level of 15%) mixed with chopped greens and **Insectivore Rearing Mix**. The proportions of greens and Insectivore are varied to modify the protein content of the final diet to suit the species (Appendix 7). Growing ducklings have an increased requirement for protein, but levels must be controlled to prevent developmental problems such as "angel wing".

Species	Adult Weight	Natural Diet (main items in bold)	Captive Diet (primary items in bold)	Feed Guide[a] (per day)
Plumed Whistling-Duck	600-950g	**Grass, seeds, aquatic plants.**	**Herbivore Duck Diet 17% Protein** (Appendix 7). Soaked budgie seed, aquatic plants, seeding grasses, clover.	50-70g
Australian Shelduck	1.0-1.8kg	**Grass, clover, seeds, aquatic plants.** Some insects & invertebrates.		70-110g
Magpie Goose	1.5-3.0kg	**Grass seeds, sedge rhizomes, aquatic plants.**		100-160g
Grey Teal	350-650g	**Aquatic seeds & plants. Aquatic insects**, molluscs & crustaceans.	**Mixed Duck Diet 19% Protein** (Appendix 7). Soaked budgie seed, aquatic plants, seeding grasses, clover, mealworms.	35-50g
Hardhead	600-1000g			50-70g
Pink-eared Duck	280-480g	**Filter feed small aquatic invertebrates:** especially insects & larvae. Some plant material.	**Insectivore Duck Diet 22% Protein** (Appendix 7). Aquatic plants.	30-40g
Australasian Shoveler	550-850g			45-65g
Musk Duck	♀1.0-1.8kg ♂1.8-3.1kg	**Aquatic Invertebrates:** beetles, crustaceans, molluscs, small fish. Some plant material.	**Insectivore Duck Diet 22% Protein** (Appendix 7). Mealworms, insects, crustaceans, **Insectivore Meat Mix** (Appendix 1).	70-160g

a. Maintenance feed based on Crumbles/Greens/Insectivore diet (Appendix 7). Feed up to 50% more for growth or sickness.

Using Chick & Turkey Starter

Commercial poultry foods (i.e. "starter" crumbles) are often used as the basis for rehabilitation duck diets, but care needs to be taken when feeding these products. In particular, kidney damage has been reported in grazing species (e.g. Shelduck and Black Swan) fed large amounts of Turkey Starter[17]. Chick Starter typically contains around 20% protein and Turkey Starter 28%. Hence for some species or stages of growth, these levels of protein may be excessive. Since commercial poultry diets are designed for maximal growth of meat-producing birds, the levels of nutrients such as vitamins and minerals may also be excessive for rehabilitation diets.

Pacific Black Duck *(Anas superciliosa)* [1,17]

Adult Weight	800-1300g
Natural Diet	Plant material (70-95%), particularly seeds of aquatic vegetation.
Secondary Diet	Aquatic insects, snails & crustaceans (5-30%).
Captive Diet	**Passwell Crumbles** mixed with chopped greens & **Insectivore Rearing Mix** (Appendix 7). Supplement with aquatic plants, seeding grasses, insects & budgie seed.
Juvenile Diet	As per adult diet, but supplemented with higher levels of **Insectivore Rearing Mix** for growth. Note, this species is susceptible to "angel wing" if fed excessive protein.

Age = 1 week

Growth & Feed Chart

Age (weeks)	Developmental Stage	Weight (g)[a]	Feed (g/day)[a]	Protein (%)[b]
Hatch	Brown & yellowish down. Egg tooth may be present in newly hatched young.	28	10	24
1		70	18	
2	Tail feathers just emerging.	150	30	22
3	Body feathers coming through.	250	45	
4	Scapular feathers present.	400	65	
5	Half grown, primary feathers in pin.	550	80	
6	Body fully feathered, primaries growing.	700	75	
7	Flapping and preening, primaries ¾ grown.	800[c]	70	
8	Able to fly. Prepare for release.		65	19
Adult	Size varies between individuals. Hybrid Mallard may be larger.	800	60	
		1000	70	
		1200	80	

a. Weight is not an accurate indicator of age. Average weight gain from 1-7 weeks is 10-25g/day.
b. Refer to Appendix 7 for diet components at varying protein levels.
c. Final weight varies between individuals. Weight may reduce slightly prior to gaining flight.

Adult Maintenance Diet

1000g adult requires 70g/day (700 kJ)

- 45g **Passwell Crumbles** (¼ cup) – some proportion may be replaced with budgie seed.
- 22g Chopped greens (½ cup) – lettuce, spinach, endive, bok choy, sprouts etc.
- 3g **Insectivore Rearing Mix** (⅓ scoop).

Mix together and add sufficient water to make a moist, crumbly mix.

Ad lib aquatic weeds (duckweed etc.), seeding grasses.

Australian Wood Duck *(Chenonetta jubata)* [1,17]

Adult Weight	700-950g
Natural Diet	Mostly plant material (>99%), particularly grass, clover & other green herbage.
Secondary Diet	Insects (<1% of adult diet).
Captive Diet	**Passwell Crumbles** mixed with chopped greens. Supplement with grass, herbage and aquatic vegetation. Free access to lawn/pasture, clumps of grass.
Juvenile Diet	As per adult diet, but supplemented with low levels of **Insectivore Rearing Mix** for growth. Note, this species may be susceptible to "angel wing" if fed excessive protein.

Age = 1-2 weeks

Growth & Feed Chart

Age (weeks)	Developmental Stage	Bill (mm)	Tarsus (mm)	Weight (g)[a]	Feed (g/day)[b]	Protein (%)[b]
Hatch	Brown & off-white down. Characteristic double face stripe & pinkish bill tip. Egg tooth may be present in newly hatched young.	12	29	28	10	22
1		14	35	65	17	
2		18	45	140	30	19
3	Scapulars & spotted body feathers emerging.	22	54	250	45	
4	Primary pins approx. 50mm, starting to unsheath.	25	59	400	65	
5	Body fully feathered, primary feathers growing.	26	63	540	80	
6	Primaries ½ grown. Preening & flapping.	27		680	70	
7	Primaries mostly grown. Exercising wings often.	28		750[c]	65	
8	Able to fly. Prepare for release.				60	17
Adult	Sizes varies between individuals.			750	60	
				850	65	
				950	70	

a. Weight is not an accurate indicator of age. Average weight gain from 1-7 weeks is 10-25g/day.
b. Refer to Appendix 7 for diet components at varying protein levels.
c. Final weight varies significantly between individuals. Weight may reduce slightly prior to gaining flight.

Adult Maintenance Diet

850g adult requires 65g/day (620 kJ)

- 40g **Passwell Crumbles** (¼ cup) – some proportion may be replaced with budgie seed.
- 25g Chopped greens (⅔ cup) – lettuce, spinach, endive, bok choy, sprouts etc.

Mix together and add sufficient water to make a moist, crumbly mix.

Ad lib aquatic weeds, grazing on grass, clover or other pasture.

Black Swan *(Cygnus atratus)* [1,17,18]

Adult Weight	4500-7000g (males larger).
Natural Diet	Mostly plant material (>99%), particularly leaves & shoots of aquatic plants and pasture.
Secondary Diet	Insects taken incidentally (0.1%).
Captive Diet	**Passwell Crumbles** mixed with chopped greens. Supplement with grass, herbage and aquatic vegetation. Free access to lawn/pasture.
Juvenile Diet	As per adult diet, but supplemented with low levels of **Insectivore Rearing Mix** in early stages of growth. Note, this species is highly susceptible to "angel wing" if fed excessive protein levels.

Age = 1 week

Growth & Feed Chart

Age (weeks)	Developmental Stage	Weight (g)[a]	Feed (g/day)[b]	Protein (%)[b]
Hatch	Light grey down. Egg tooth may be present in first week.	170	35	19
1		240	45	
2		340	55	
4	Tail, neck & body feathers appearing.	550	80	
6	Scapular & flank feathers appearing.	900	110	
8	Primary feathers starting to pin. Colour appearing on bill.	1600	170	
10	Primary feathers erupting (0-5cm).	2500	240	
12	Last down disappearing, primary feathers growing (6-10cm).	3300	290	
16	Fully-feathered, primary feathers growing (11-17cm).	4100	225	17
22	Primary feathers fully grown - prepare for release.	4500[c]	215	
Adult	Size varies between individuals. Males larger.	5000	225	
		6000	260	
		7000	290	

a. Weight is not an accurate indicator of age. Average weight gain from 1-7 weeks is 10-60g/day.
b. Refer to Appendix 7 for diet components at varying protein levels.
c. Final weight varies significantly between individuals. Weight may reduce slightly prior to gaining flight.

Adult Maintenance Diet

6000g adult requires 260g/day (2500 kJ)

- 160g **Passwell Crumbles** (1 cup) – some proportion may be replaced with mixed grains.
- 100g Chopped greens (2½ cup) – lettuce, spinach, endive, bok choy, sprouts etc.

Mix together and add sufficient water to make a moist, crumbly mix.

Ad lib aquatic weeds, grazing on grass or pasture.

Waterbirds

These birds are usually associated with fresh water sources such as rivers, lakes, dams and wetlands. Birds from marine environments are covered under Seabirds (page 52). Waterbirds have diverse dietary strategies, but most consume a high protein diet of insects, aquatic invertebrates and fish. However, some species include a large proportion of plant material in their diet (e.g. Coot, Swamphen, Brolga).

Tube-feeding Diet: Waterbirds that are debilitated or unable to self-fed can be tube-fed with a liquid slurry diet (Appendix 8).

Herons, Ibis, Spoonbills & Storks

These are medium to large wading birds with long legs and bills. They feed on a range of insects, fish, crustaceans, molluscs and small vertebrates. Captive foods should reflect the natural feeding habits, with a good base diet being **Insectivore Meat** or **Fish Mix** (Appendix 1) supplemented with insects and small fish.

Heron and egret chicks may initially require force feeding, but can usually be taught to self-feed from an early age[32]. Young ibis and spoonbill chicks are initially fed a regurgitated liquid diet by their parents. This is replicated by feeding with a liquid slurry (Tube-feeding Diet Appendix 8), until they able to self-feed on solids at around 2-3 weeks of age.

Species	Adult Weight	Natural Diet (main items in bold)	Captive Diet (primary items in bold)	Feed Guide[a] (per day)
White-necked Heron	600-1200g	**Insects, molluscs, crustaceans**, fish, frogs.	**Insectivore Meat** or **Fish Mix** (up to 60% of diet). **Whole food** (40% of diet): whitebait, pilchards, prawns, yabbies, crickets, mealworms, snails, mice.	60-100g
Pied Heron	210-370g	**Insects**, frogs, fish.		30-45g
Great Egret	600-1200g	**Fish, frogs, insects.**		60-100g
Little Egret	250-370g			30-50g
Eastern Reef Egret	330-470g	**Fish**, crustaceans, molluscs.		35-50g
Nankeen Night-Heron	550-900g	**Fish**, frogs, freshwater crayfish, insects.		50-75g
Striated Heron	210-260g	**Fish, crabs, aquatic invertebrates.**		30-45g
Little Bittern	60-120g	**Aquatic invertebrates**, small fish, frogs.		15-25g
Royal /Yellow-billed Spoonbill	1.5-2.0kg	**Small fish**, crustaceans, aquatic insects.		110-150g
Straw-necked Ibis	1.1-1.6kg	**Aquatic invertebrates, insects**, snails, fish, frogs.		90-120g
Glossy Ibis	485-580g			50-60g
Black-necked Stork	4kg approx.	**Fish, crustaceans**, insects, frogs, reptiles.		250-350g

a. Maintenance feed quantity based on 60% Insectivore Meat Mix with 40% whole food. Feed up to 50% more for growth or sickness.

White-faced Heron *(Egretta novaehollandiae)* [1,19]

Adult Weight	450-690g
Natural Diet	Wide range of aquatic prey: crustaceans, small fish, insects, earthworms, snails, spiders, frogs.
Captive Diet	**Insectivore Meat Mix, Egg Mix** or **Fish Mix** (Appendix 1). Crickets, mealworms, earthworms, snails and other invertebrates. Whitebait, occasional mice.
Juvenile Diet	As per adult diet.

Age = 4 weeks

Growth & Feed Chart

Age (weeks)	Developmental Stage	Bill (mm)	Weight[a] (g)	Feed[b] (g/day)
Hatch	Eyes closed, covering of sparse down.	12	25	9
1	Eyes open at 3 days, pin feathers appear at 4 days.	23	80	22
2	Pin feathers unsheathing, actively stretching & preening.	35	190	40
3	Well-feathered. Some down still present on body.	46	300	55
4	Brancher stage.	53	380	60
6	Fully fledged. Wispy down still on head.	62	450[c]	50
9	Independent. Prepare for release.	69		
Adult	Size varies between individuals. Males larger.	72	500	50
		78	600	55
		84	700	60

a. Weight is not an accurate indicator of age. Average weight gain in first 4 weeks is 10-20g/day.
b. Feed rate is based on Insectivore Meat Mix, should be adjusted for calorific density of other foods.
c. Fledging weight varies between individuals.

Adult Maintenance Diet

500g adult requires 50g/day (420kJ)

- 30g **Insectivore Meat Mix, Egg Mix** or **Fish Mix** (3 heaped tablespoons).
- 12g Whitebait (approx. 5 x whitebait).
- 5g Crickets (approx. 15 x crickets).
- 3g Mealworms (approx. 24 x mealworms).

Other invertebrates or mice may be substituted for part of the diet.

Cattle Egret *(Bubulcus coromandus)* [1,19]

Adult Weight	290-420g (males heavier).
Natural Diet	Insects: especially grasshoppers (>50%), cicadas, earthworms, cattle ticks, centipedes, spiders, frogs, skinks & small mammals.
Captive Diet	**Insectivore Meat Mix** or **Egg Mix** (Appendix 1). Crickets, earthworms and other invertebrates, occasional mice.
Juvenile Diet	As per adult diet.

Age = 3 weeks

Growth & Feed Chart

Age (weeks)	Developmental Stage	Tarsus (mm)	Weight[a] (g)	Feed[b] (g/day)
Hatch	Eyes open, skin greenish, covering of sparse down.	19	20	8
1	Pin feathers appear at 4 days, whole body spiny by 8 days.	27	75	21
2	Pin feathers unsheathing, actively stretching & preening.	34	180	40
3	Well-feathered. Some downy feathers present on body.	44	280	45
4	Brancher stage. Legs mostly grey-black.	52	315	50
6	Fledged. Capable of flight.	69	330[c]	40
8	Independent. Prepare for release.	74		
Adult	Size varies between individuals. Males larger.	80	350	40
		90	400	45

a. Weight is not an accurate indicator of age. Average weight gain in first 3 weeks is 10-15g/day.
b. Feed rate is based on Insectivore Meat Mix, should be adjusted for calorific density of other foods.
c. Final weight varies between individuals.

Adult Maintenance Diet

350g adult requires 40g/day (320kJ)

- 25g **Insectivore Meat Mix** or **Egg Mix** (2½ heaped tablespoons).
- 10g Crickets (approx. 30 x crickets).
- 5g Mealworms (approx. 40 x mealworms)

Other invertebrates or mice may be substituted for part of the diet.

White Ibis *(Threskiornis molucca)* [1,20]

Adult Weight	1300-2300g (males heavier).
Natural Diet	Small fish, frogs, crustaceans, insects, molluscs, worms.
Secondary Diet	Carrion; food scraps in urban areas.
Adult Diet	**Insectivore Meat Mix** or **Egg Mix** (Appendix 1). Crickets, earthworms and other invertebrates, mice, whitebait.
Juvenile Diet	Liquid Tube-feeding diet (Appendix 8) for first 2 weeks, weaning on to adult diet by 3 weeks (larger food items chopped up).

Age = 1 week

Growth & Feed Chart

May be used as a guideline for **Straw-necked Ibis** and **Spoonbills**.

Age (weeks)	Developmental Stage	Head - Bill (mm)	Wing (mm)	Weight[a] (g)	Feed[b]	
					Liquid (mL/day)	Solids (g/day)
Hatch	Black down on head, off-white on body. Pink bill.	42	22	50	25	–
1	Pin feathers coming through on wings.	64	57	200	90	–
2	Wing feathers unsheathing. Introduce solid food[c].	88	120	550	180	10
3	Pins over body. Base of bill darkening.	109	195	900	–	130
4	Brancher stage. Wing feathers growing. Self-feeding.	125	250	1250	–	160
7	Fully fledged and independent.	150	325	1500[d]	–	125
Adult	Size varies between individuals. Males have longer bill & are heavier.	200	360	1700	–	125
		240	385	2000	–	140

a. Weight is not an accurate indicator of age. Average weight gain in first 4 weeks is 30-60g/day.
b. Feed rate is based on Tube-feeding Diet for first 2 weeks and then Insectivore Meat Mix thereafter.
c. Earlier weaning on to solids may improve weight gain, but ensure chicks are well hydrated. 1g solid food is equivalent to 2.5ml of liquid slurry.
d. Fledging weight varies greatly between individuals.

Adult Maintenance Diet

1700g adult requires 125g/day (1000kJ)

- 80g **Insectivore Meat Mix** or **Egg Mix** (8 heaped tablespoons).
- 10g Crickets (approx. 30 x crickets).
- 5g Mealworms (approx. 40 x mealworms).
- 30g Whitebait (approx. 12 x whitebait).

Other invertebrates or mice may be substituted for part of the diet.

Grebes

Grebes are highly specialised aquatic feeders taking invertebrates and small fish. They are unlikely to self-feed on an artificial diet so require a large supply of live food (e.g. insects, aquatic invertebrates and small feeder fish)[32]. Grebes have been observed ingesting downy feathers which may help them cast pellets of indigestible matter (i.e. fish bones).

Australasian Grebe hatchling.

Species	Adult Weight	Natural Diet (main items in bold)	Captive Diet (primary items in bold)	Feed Guide (per day)
Australasian Grebe	170-270g	**Small fish**, aquatic invertebrates, snails.	**Aquatic insects:** midge larvae, water beetles. Crickets, mealworms. **Live feeder fish:** (e.g. goldfish fry, guppies, *gambusia*). Whitebait.	30-50g
Hoary-headed Grebe	175-305g	**Aquatic invertebrates**, occasional small fish.		
Great-crested Grebe	600-1200g	**Fish**, aquatic insects.		80-130g

Rails, Crakes & Waders

These are small to medium-sized birds inhabiting shallows and wetland margins, feeding mostly on aquatic insects and invertebrates. A good base diet is **Insectivore Egg Mix** (Appendix 1) with live insects to encourage intake. Recently hatched rails and crakes need to be fed directly to the bill until they learn to self-feed. Most wader chicks (plovers, stilts & dotterels) are precocial and can be encouraged to self-feed from hatching.

Buff-banded Rail. Age = 4 days.

Species	Adult Weight	Natural Diet (main items in bold)	Captive Diet (primary items in bold)	Feed Guide (per day)
Buff-banded Rail	150-210g	**Insects, crustaceans, molluscs, worms, spiders.** Aquatic plant material & seeds.	**Insectivore Egg** or **Meat Mix** (up to 60% of diet). Earthworms, crickets, mealworms, aquatic weeds.	20-30g
Lewin's Rail	75-100g			12-17g
Baillon's Crake	25-35g			5-10g
Spotted Crake	55-70g			10-15g
Spotless Crake	35-55g			7-12g
Pied Stilt	140-220g	**Invertebrates:** molluscs, crustaceans, insects.		20-30g
Black-fronted Dotterel	26-39g			5-10g

Coot, Moorhen, Swamphen & Native-hens

These species are largely herbivorous taking shoots, leaves and seeds from aquatic vegetation and pasture. They also supplement their diet with insects and small vertebrates, especially when rearing young. Feed a base diet of **Passwell Crumbles** mixed with chopped greens and **Insectivore Rearing Mix** (refer to Duck Feeding Guidelines Appendix 7). Feed according to the Mixed Feeder category i.e. 24% protein for newly hatched chicks, reducing this down to 19% protein for adults. Young chicks may also be fed **Insectivore Egg Mix** (Appendix 1) directly to the bill until they start self-feeding (around 10 days of age in Coots and Dusky Moorhen).

Eurasian Coot hatchling.

Species	Adult Weight	Natural Diet (main items in bold)	Captive Diet (primary items in bold)	Feed Guide[a] (per day)
Purple Swamphen	700-1300g	**Aquatic vegetation:** reeds, grasses, sedges, clover. Insects, snails, spiders, crustaceans, small vertebrates.	**Mixed Duck Diet 19% Protein** (Appendix 7). Sprouted seed (Appendix 6), aquatic plants, seeding grasses, clover, crickets, mealworms. Grit (fine gravel).	60-90g
Eurasian Coot	400-650g			40-60g
Dusky Moorhen	400-700g			40-60g
Tasmanian Native-hen	1.1 - 1.4kg	**Seeds, plant material.** Insects.		75-100g

a. Adult maintenance feed quantity. Feed up to 50% more for growth or sickness.

Brolga *(Antigone rubicunda)* [2,35]

Brolgas are omnivorous, taking a range of plant and animal material. Feed a base diet of **Passwell Crumbles** mixed with chopped greens, vegetables and **Insectivore Rearing Mix** (refer to Duck Feeding Guidelines Appendix 7). Feed according to the Mixed Feeder category i.e. 24% protein for recent hatchlings (first 2 weeks), reducing this down to 19% protein for older chicks and adults. Note, this species is prone to developing leg and wing deformities if fed excessive protein levels, particularly in growing chicks.

Age = 4 Weeks.

Adult Weight	Natural Diet (main items in bold)	Captive Diet (primary items in bold)	Feed Guide (per day)
3.6-8.7kg	**Seeds, tubers,** insects, molluscs, crustaceans, small vertebrates.	**Mixed Duck Diet 19% Protein** (Appendix 7). Sprouted Seed (Appendix 6), chopped vegetables, mealworms, crickets, whitebait, mice.	175-350g

Seabirds

Seabirds are mainly marine species, usually found near the coast or on open oceans. Included here are pelicans, cormorants, gulls and terns although some of these species may inhabit freshwater, well inland. Other freshwater birds are covered in Water Birds (page 46). Seabirds are piscivorous with a primary diet of fish and aquatic invertebrates including squid, crustaceans and molluscs. This provides high levels of protein and fat but minimal carbohydrate. Scavenger species such as gulls and skuas generally have a broader diet, taking eggs, chicks, carrion and even small mammals.

Tube-feeding Diet: Seabirds that are debilitated require a readily-digestible diet that can be tube-fed[26] (Appendix 8). This can also be injected into whole fish, and replaces the need to supplement with seabird vitamin tablets.

Feeding Guidelines: The following tables provide guidelines for feeding seabirds based on analysis of their natural diet. Note, different fish have varying energy contents (e.g. pilchards are relatively high in fat). More accurate feed rates for specific food types are outlined in Appendix 9. Seabirds may also be supplemented with **Insectivore Meat** or **Fish Mix** (Appendix 1).

Penguins & Tube-nosed Seabirds *(Procellariiformes)*

Species	Adult Weight	Natural Diet (main items in bold)	Captive Diet (primary items in bold)	Feed Guide[a] (per day)
Little Penguin	850-1200g	**Small Fish** (especially pilchard, anchovy), squid.	**Pilchards**, whitebait, squid.	140-180g
Fiordland Penguin	2.5-4.9kg	**Small fish**, **squid**.		270-450g
Wandering Albatross	6-10kg	**Squid**, fish.	**Squid**, pilchards.	720-1000g
Shy/Black-browed Albatross	3-5kg	**Squid**, **fish**.	**Squid**, pilchards.	430-630g
Giant-Petrels	3-5kg	**Scavenger/Predator**: birds, carrion, squid, fish.	**Pilchards**, **whiting**, **day-old chicks**, squid, rodents.	300-450g
Great-winged Petrel	440-680g	**Squid**, some fish & crustaceans.	**Squid**, **whitebait**.	110-140g
Blue Petrel	155-235g	**Crustaceans**, **fish**, **squid**.		40-65g
Prions	100-170g	**Krill**, small squid & fish.	**Squid**, **whitebait**, brine shrimp.	25-40g
Short-tailed Shearwater	480-720g	**Fish**, **squid**, **krill**.	**Whitebait**, squid.	110-140g
Flesh-footed Shearwater	580-750g	**Fish**, **squid**.		125-150g
Wedge-tailed Shearwater	300-500g			75-110g
White-faced Storm-Petrel	40-70g	**Krill**, small squid & fish.	**Squid**, **whitebait**, brine shrimp.	15-25g

a. Maintenance feed quantity. Feed up to 50% more for growth or sickness.

Pelican, Gannet, Tropicbirds, Cormorants & related birds

Species	Adult Weight	Natural Diet (main items in bold)	Captive Diet (primary items in bold)	Feed Guide[a] (per day)
Australian Pelican	4-7kg	**Fish**, crustaceans, insects, birds.	**Whiting, mackerel**, **mullet**, **pilchards**, day old chicks.	420-630g
Australasian Gannet	2.2-2.5kg	**Fish** (especially pilchard), squid.	**Pilchards**, **whiting**, squid.	230-300g
Brown/Red-footed Booby	900-1500g	**Fish** (especially flying fish), squid.	**Pilchards**, whitebait, squid.	130-200g
Lesser Frigatebird	575-1100g			100-150g
Red-tailed Tropicbird	600-900g			100-140g
White-tailed Tropicbird	220-400g			50-70g
Great Cormorant	1.8-2.5kg	**Fish**, crustaceans.	**Whitebait**, **pilchards**, **whiting**. Insectivore Meat Mix.	230-300g
Little Black Cormorant	575-1100g			100-170g
Pied Cormorant	1.4-2.2kg			200-270g
Little Pied Cormorant	490-830g	**Crustaceans** (especially yabbies), **fish**, insects.	**Whitebait**, **pilchards**, **yabbies**. Insectivore Meat Mix.	110-150g
Black-faced Cormorant	1.0-1.8kg	**Small marine fish**.	**Whitebait**, **pilchards**, **whiting**.	180-275g
Australasian Darter	1.3-2.1kg	**Fish**, some insects.	**Pilchards**, **whiting**, whitebait.	180-250g

a. Maintenance feed quantity. Feed up to 50% more for growth or sickness.

Gulls, Terns & Skuas *(Charadriiformes)*

Species	Adult Weight	Natural Diet (main items in bold)	Captive Diet (primary items in bold)	Feed Guide[a] (per day)
Brown Skua	1.4-2.2kg	**Scavenger/Predator:** Fish, carrion, birds, eggs, molluscs, crustaceans, small mammals.	**Pilchards**, **Whiting**, **Day Old Chicks**, **Rodents**. Insectivore Meat Mix. Whole raw egg.	180-250g
Arctic/Pomarine Jaeger	400-800g			70-120g
Pacific Gull	900-1800g			130-215g
Caspian Tern	400-750g	**Fish,** occasional invertebrates.	**Pilchards**, **whitebait**.	70-120g
Gull-billed Tern	220-290g	**Insects**, **fish**, **small vertebrates**.	**Whitebait**, **small pilchards**, **crickets**, **mealworms**. Insectivore Meat Mix.	60-75g
Whiskered Tern	65-100g	**Insects**, **crustaceans**, **fish**.		24-33g
Little Tern	42-65g	**Small fish**, crustaceans.	**Whitebait**, **small pilchards**.	17-24g

a. Maintenance feed quantity. Feed up to 50% more for growth or sickness.

Silver Gull *(Chroicocephalus novaehollandiae)* [3]

Adult Weight	220-365g
Natural Diet	Scavenger/predator: aquatic invertebrates, insects, small fish, crustaceans, molluscs, bird eggs & chicks.
Secondary Diet	Food scraps, plant material.
Captive Diet	**Insectivore Meat Mix, Egg Mix** or **Fish Mix** (Appendix 1). Crickets, mealworms, whitebait, squid.
Juvenile Diet	As per adult diet. Whitebait chopped up in **Meat Mix**.

Age = 2 weeks

Growth & Feed Chart

Age (weeks)	Developmental Stage	Weight[a] (g)	Feed[b] (g/day)
Hatch	Fawn-coloured down, with dark spots on head & back.	25	10
1	Actively preening from 3 days.	70	20
2	Mostly covered in down, feathers appearing on scapulars.	150	35
3	Primaries emerged, whitish body feathering appearing.	230	45
4	Mostly feathered, short tail, white front, brown speckled back.	280	45
5	Fledged. Flapping and learning to fly.	300[c]	40
7	Independent and flying well. Prepare for release.		
Adult	Size varies between individuals.	250	35
		300	40
		350	45

a. Weight is not an accurate indicator of age. Average weight gain for first 4 weeks is 6-12g/day.
b. Feed rate is based on Insectivore Meat Mix, should be adjusted for calorific density of other foods.
c. Final weight varies between individuals. Weight may reduce slightly prior to gaining flight.

Adult Maintenance Diet

300g adult requires 40g/day (290kJ)

- 25g **Insectivore Meat Mix**, **Egg Mix** or **Fish Mix** (2½ heaped tablespoons).
- 10g Whitebait (approx. 4 x whitebait).
- 3g Crickets (approx. 10 x crickets).
- 2g Mealworms (approx. 15 x mealworms).

Other fish, insects or aquatic invertebrates may be substituted for part of the diet.

Crested Tern *(Thalasseus bergii)* [3,34]

Adult Weight	250-375g
Natural Diet	Mainly small fish.
Secondary Diet	Occasional prawns & squid.
Captive Diet	Small fish (50-150mm length), whitebait, pilchards. Fish may be injected with **Insectivore Slurry** (Appendix 1).
Juvenile Diet	As per adult diet. Smaller fish (<75mm) for younger chicks. **Tube-feeding Diet** may also be used (Appendix 8).

Age = 1 week

Growth & Feed Chart

Age (weeks)	Developmental Stage	Bill (mm)	Wing (mm)	Weight[a] (g)	Feed[b] (g/day)
Hatch	Speckled brown down above and white below. Pale yellow bill. Black webbed feet.	15	5	42	30
1		19	28	75	50
2	Feathers appearing on scapulars.	24	65	125	75
3	Primary wing feathers emerged.	29	109	180	100
4	Body & wing feathers growing, short tail.	34	146	240	
5	Mostly feathered, black & grey speckled back.	39	173	265	80
6	Fledged. Prepare for release.	43	195	280[c]	
Adult	Size varies between individuals.	54	320	250	70
		60	340	300	75
		66	360	350	80

a. Weight is not an accurate indicator of age. Average weight gain for first 5 weeks is 5-10g/day.
b. Feed rate is based on whitebait, should be adjusted for calorific density of other foods.
c. Final weight varies between individuals. Weight may reduce slightly prior to gaining flight.

Adult Maintenance Diet

300g adult requires 75g/day (290kJ)

- 75g Whitebait (or 60g pilchards).

Insectivore Slurry (Appendix 1) or **Tube-feeding Diet** (Appendix 8) can be injected into fish.

Raptors (Birds of Prey)

Raptors consume whole prey such as mammals, birds, reptiles and fish. Many species also take insects and carrion opportunistically. Their carnivorous diet provides high levels of protein but minimal carbohydrate.

Captive Diet

A varied whole prey diet is generally regarded as a complete food for raptors. However, meat-only (i.e. flesh with no bones or internal organs) is deficient in a range of vitamins and minerals. If whole prey items are unavailable then raptors can be fed a short-term diet of **Insectivore Meat Mix** (Appendix 1).

Foods for captive raptors include commercially-farmed rodents (mice & rats), day-old chicks (DOC), quail and rabbit. These are available frozen in a range of sizes which should be selected appropriate to species. Non-native prey species may also be utilised including sparrows, feral pigeons, turtledoves, Indian Mynas or Asian House Geckos. The use of wild-harvested prey should be done with caution to prevent potential transmission of disease or toxins.

Supplements

Nutritional deficiency is rare in raptors, but could arise from:

- Prey items not raised on balanced diets.
- Feeding only neonatal prey items (e.g. day-old chicks, pinkie rodents).
- Freeze/thawing fish which can cause Thiamine (Vitamin B_1) deficiency.

To prevent deficiency food items can be injected with **Insectivore Slurry** (Appendix 1) at the rate of 10mL per 100g of whole prey.

Tube-feeding Diet: Debilitated raptors may require a readily-digestible diet that can be tube-fed (Appendix 8). This can also be injected as a supplement into whole prey.

Feed Guidelines

The following table gives guidelines for feeding raptors based on analysis of their wild-type diet. It is preferable to feed according to a species' natural dietary preference. For example, bird hunters such as Peregrine Falcon and Collared Sparrowhawk should be fed quail & day-old chicks. Rodent specialists like the Black-shouldered Kite should be fed mice. Larger species such as the Wedge-tailed Eagle prefer rabbit. More accurate feed guidelines based on body weight and prey type are outlined in Appendix 10.

Mignon McHendrie

Black Kite nestling offered a pinkie rat.

Raptor Feeding Guidelines

Species	Weight (g)[a]		Natural Diet (Main items in bold, % weight)	Captive Diet (Primary diet in bold)	Feed Guide[b] (per day)
	M	F			
Australian Hobby	200	300	**Small birds** (up to 75%), insects, mammals.	**DOC**, **quail**, crickets, mice.	**40-50g** (1 x DOC or ½ x small quail).
Brown Falcon	450	650	**Generalist:** Rabbits, birds, rodents, reptiles, insects.	**Rodents**, **rabbit**, **DOC**, **quail**, Crickets.	**60-80g** (1 weaner rat or 2 x DOC).
Peregrine Falcon	600	900	**Birds** (up to 100%), some mammals & insects.	**Quail**, **DOC**, rabbit, rodents.	**70-110g** (1 small quail or 2-3 x DOC).
Black-shouldered Kite	250	300	**Rodents** (up to 96%), some insects & small birds.	**Mice**, **rats**, crickets, DOC.	**40-50g** (2 x mice).
Pacific Baza	300	350	**Insects** (especially stick insects), **frogs**, **small birds**, reptiles, fruit.	**Crickets**, **large insects**, **DOC**, Asian House gecko, rodents.	**45-55g** (1 DOC + 25 large crickets).
Black Kite	550	600	**Generalist:** carrion, mammals, birds, reptiles, insects, fish, crustaceans.	**Rodents**, **rabbit**, **DOC**, **quail**, crickets, fish.	**70-110g** (2-3 x DOC or 1 small rat or 1 x rabbit leg or 1 x small quail).
Whistling Kite	700	850			
White-bellied Sea-Eagle	2400	3300	**Generalist:** Birds (up to 60%), fish (up to 52%), mammals (up to 20%), crustaceans, reptiles & carrion.	**Quail**, **DOC**, **rabbit**, **rodents**, **fish**, carrion.	**180-250g** (1 x large quail or 5-6 x DOC or 1 large rat or ⅓ x rabbit).
Spotted Harrier	500	700	**Generalist:** Mammals (up to 80%), birds (up to 62%), insects (up to 8%), aquatic prey (up to 5%).	**Rabbit**, **rodents**, **quail**, **DOC**.	**70-110g** (2-3 x DOC or 1 small rat or 1 x rabbit leg or 1 x small quail).
Swamp Harrier	650	850			
Grey Goshawk	350	700	**Mammals** (up to 88%), **birds** (up to 46%), reptiles, insects.	**Quail**, **DOC**, **rodents**, **rabbit**.	**50-100g** (2 x DOC or 1 x small quail or 1 x small rat or 1 x rabbit leg).
Brown Goshawk	300	550			
Collared Sparrowhawk	125	250	**Small birds** (up to 100%), insects, small mammals.	**DOC**, **quail**, rodents, crickets.	**30-45g** (1 x DOC or ½ x small quail).
Wedge-tailed Eagle	3200	4200	**Rabbit** (up to 92%), sheep (up to 40%) kangaroo (up to 30%), birds (up to 28%), reptiles (up to 5%).	**Rabbit**, **rodents,** quail, DOC, carrion, bones.	**220-350g** (⅓-½ x rabbit or 1-2 x large rats). May not feed every day
Little Eagle	700	1100	**Rabbit** (up to 92%), **birds** (up to 77%), rodents, reptiles.	**Rabbit**, **rodents**, **quail**, **DOC**.	**70-130g** (¼ x rabbit or 1 x medium rat or 1 x small quail or 2-3 x DOC).
Black-breasted Buzzard	1200	1400	**Generalist:** Mammals, birds, eggs, reptiles, carrion.	**Rabbit**, **rodents**, **quail**, **DOC**. Whole egg once a week.	**110-150g** (¼ x rabbit or 1 x medium rat or 1 x medium quail or 2-3 x DOC).
Osprey	1000	1500	**Fish** (97%), occasional seabirds, crustaceans, small mammals.	**Fish** (whiting, mullet, garfish etc), rodents, DOC.	**150-200g** (thawed fish should be supplemented with **Insectivore slurry**).

a. Body weights are adult averages only. There may be significant differences between individuals.
b. Maintenance feed quantity. Feed up to 50% more for growth or sickness.

Nankeen Kestrel *(Falco cenchroides)* [2,21]

Adult Weight	Males 160g, Females 190g.
Natural Diet	Mice (up to 97%), small birds (up to 74%), insects (up to 69%).
Secondary Diet	Small reptiles.
Captive Diet	Mice, day old chicks, crickets.
Juvenile Diet	As per adult diet, chopped into small pieces and hand-fed for first 2 weeks of age. Can be supplemented with **Insectivore Meat Mix** (Appendix 1).

Mignon McHendrie

Age = 6 weeks

Growth & Feed Chart

Age (weeks)	Developmental Stage	Wing (mm)	Tail (mm)	Weight[a] (g)	Feed[b] (g/day)
Hatch	Eyes closed. Sparse white down.	18	-	15	10
1	Eyes open. Thicker whitish down. Wing pin feathers emerge at 8-9 days.	30	-	65	30
2	Wings & tail feathers growing.	70	20	150	40
3	Body feathers emerging. Starting to self-feed.	120	55	190	45
4	Brancher stage, mostly feathered.	170	90	180	40
5	Fledged, last few wisps of down on head & back.	200	125	175	35
6	Fully feathered & flying well.	215	135	170	
9	Independent. Prepare for release.	235	150	160	
Adult	Size varies between individuals. Females larger.	240	155	150	30
		250	160	175	33
		260	170	200	35

a. Weight is not an accurate indicator of age. Average weight gain in first 3 weeks is 6-10g/day. Peak weight occurs at about 3 weeks of age, followed by weight loss of up to 15% around fledging.
b. Feed quantities based on mice or day old chicks.

Adult Maintenance Diet

175g adult requires 33g/day (180kJ)

- 30g Mice (2 x small-medium mice).
- 3g Crickets (approx. 10 medium crickets).

Mice can be substituted for day old chick or sparrow (weight approx. 35g).

Owls

Owls are nocturnal carnivores feeding mainly on small to medium sized mammals, and to a lesser extent birds and insects.

Species	Weight (g)[a]	Natural Diet (Main items in bold, % weight)	Captive Diet (Primary diet in bold)	Feed Guide (per day)[b]
Powerful Owl	1000-2000	**Mammals** (up to 100%) especially possums, birds (up to 41%), large insects (up to 6%).	**Rodents, rabbit**, quail, DOC, crickets.	**100-180g** (1 x rat or ¼ x rabbit)
Rufous Owl	800-1300			**80-120g** (1 x small rat or 1 x rabbit leg)
Barking Owl	400-700	**Mammals** (up to 53%), birds (up to 52%), insects.	**Rodents, rabbit, quail, DOC**, crickets.	**50-80g** (1 x weaner rat, or 2-3 large mice)
Grass Owl	265-480	**Small Mammals** (up to 100%) especially mice, some birds & insects.	**Rodents**, DOC, crickets.	**40-60g** (2 x mice or 1 x weaner rat)
Masked Owl	400-900			**50-90g** (2-3 x mice or 1 x weaner rat)
Sooty Owl	450-1000			

a. Body weights are typical adult range. There may be significant differences between individuals.
b. Maintenance feed quantity. Feed up to 50% more for growth or sickness.

A guide to ageing young Barn Owls

Reproduced with permission from The Barn Owl Trust (UK).

Excellent additional info can be found at: www.barnowltrust.org.au

Barn Owl *(Tyto delicatula)* [4,22]

Adult Weight	260-420g
Natural Diet	Mice (61-99%), rats.
Secondary Diet	Dasyurids, birds, reptiles, amphibians, insects.
Captive Diet	Mice, weaner rats, crickets.
Juvenile Diet	As per adult diet, chopped into small pieces and hand-fed for first 3 weeks of age. Teach to self-feed on mice thereafter. Can be supplemented with **Insectivore Meat Mix** (Appendix 1).

Age = 7 weeks

Growth & Feed Chart

Age (weeks)	Developmental Stage	Wing (mm)	Tail (mm)	Weight[a] (g)	Feed[b] (g/day)
Hatch	Sparse white down, eyes closed.	18	-	15	10
1	Eye slits just opening, down still sparse.	30	-	50	22
2	Eyes open, thicker down growing. Primary feathers in pin.	50	-	150	40
3	Tail feathers in pin. Starting to self-feed.	90	5	240	55
4	Facial disc prominent, rest of body covered in thick down.	130	20	330	70
5	Shoulder coverts & facial disc well-feathered.	170	40	370	75
6	Mobile & exercising wings. Primaries half grown.	200	60	390	80
7	Brancher. Leaving nest box. Breast feathers emerging.	220	80	375	70
8	Fully fledged. Last wisps of down on head & belly.	240	95	360	60
9	Fully- feathered.	250	100	345	55
12	Independent. Prepare for release.	260	105	330	
Adult	Size varies between individuals.	270	110	300	45
		280	115	350	50
		290	120	400	55

a. Weight is not an accurate indicator of age. Average weight gain in first 4 weeks is 10-15g/day. Peak weight occurs at about 6 weeks of age, followed by a typical weight loss of 15-20% around fledging.
b. Feed quantities based on mice.

Adult Maintenance Diet

350g adult requires 50g/day (290kJ)

- 50g Mice (2 x medium-large mice).

Mice can be substituted for weaner rat (weight approx. 50g).
Supplemental crickets for enrichment.

Southern Boobook *(Ninox boobook)* [4,23]

Adult Weight	180-350g, depends on subspecies.
Natural Diet	Small mammals (up to 82%), birds (up to 90%).
Secondary Diet	Insects (up to 22%).
Captive Diet	Mice, day old chicks, crickets.
Juvenile Diet	As per adult diet, chopped into small pieces and hand-fed for first 3 weeks of age. Can be supplemented with **Insectivore Meat Mix** (Appendix 1).

Age = 5 weeks

Growth & Feed Chart

Age (weeks)	Developmental Stage	Wing (mm)	Weight[a] (g)	Feed[b] (g/day)
Hatch	Sparse whitish down, eyes closed.	18	20	12
1	Eyes starting to open.	35	70	27
2	Eyes fully open. Thicker, pale down. Primary feathers in pin.	60	130	38
3	Primary feathers unsheathing. Tail feathers starting to grow.	90	190	50
4	Spots on wings. Feathering coming through on back.	120	230	55
5	Brancher. Leaving nest box.	150	250	60
6	Fledged. Short tail, still downy head & underparts.	180	270	55
9	Fully feathered. Tail & primaries mostly grown.	200	280	45
12	Independent. Prepare for release.			
Adult	Size varies between individuals. Northern, western & inland subspecies smaller.	210	200	35
		230	250	40
		250	300	45

a. Weight is not an accurate indicator of age. Average weight gain in first 4 weeks is 6-10g/day. Some weight loss may occur around fledging.
b. Feed quantities based on mice or day old chicks.

Adult Maintenance Diet

250g adult requires 40g/day (230kJ)

- 40g Mice (2 x medium mice)

Mice can be substituted for day old chick (weight approx. 45g).
Supplemental crickets for enrichment.

Appendix 1: Insectivore Rearing Mix

Insectivore Rearing Mix	Typical Analysis	Powder (dry)	Meat Mix (as fed)
Balanced diet for insectivorous & carnivorous birds including magpies, kookaburras, birds of prey, seabirds, waders, wrens, robins & nestling honeyeaters.	Protein	52%	31%
	Fat	12%	12%
	Carbohydrate	18%	6%
	Calcium	2.0%	0.8%
Pack Size: 250g, 1kg & 5kg.	Energy	16 MJ/kg	10 MJ/kg

Do not add vitamin, mineral or concentrated food supplements to the following diets as this may significantly alter the balance of nutrients. Insectivorous and carnivorous birds require high levels of protein, but low levels of carbohydrate. Avoid supplementing with products containing grains, starches or sugars (e.g. bran, baby cereal, bread etc).

Meat Mix

Mix 10g (1 scoop) of Insectivore powder per 20g of minced meat or fish.

A little extra water may be necessary to moisten the preparation. Meat mix may be rolled into small balls or "worms" to facilitate hand-feeding.

Egg Mix

Mix 20g (2 scoops) of Insectivore powder with one mashed hard-boiled egg (40g).

Egg should be well mashed first using a fork. A little extra water may be necessary to moisten the preparation.

Generally, larger insectivores and carnivores (e.g. magpies, kookaburras etc.) are fed **Meat Mix** and small birds (nestling honeyeaters etc.) and waders (e.g. Masked Lapwings) are fed **Egg Mix**. However, these preparations are nutritionally similar, so can be interchanged.

Feeding:

Dependent chicks or non-feeding adults: using tweezers, feed small pieces directly to the bill of gaping young chicks. Force feed sick or non-feeding adults (e.g. Tawny Frogmouth) by pushing food deep into the eosophagus. Always offer extra drinking water using a syringe, as hand-fed birds are prone to dehydration.

Self-feeding Birds: Offer food in a clean bowl. Live insects or invertebrates (mealworms, crickets , earthworms etc.) should be mixed in with these foods to encourage intake (Appendix 2). Always have fresh water available in a separate bowl.

Presentation of Food:
Insect Tray: Variety of mealworms, beetles, earthworms, crickets & slaters with **Insectivore Egg Mix**.

Insectivore Pellets

Mix 20g (2 scoops) of Insectivore powder with 12mL of warm water.

Slowly add the water and mix to a putty-like consistency. Break small pieces from the prepared mix and roll into pellets for feeding. This is still a relatively "dry" mix, so extra water should be offered by mouth when feeding pellets.

This is a useful method of feeding in emergency cases where there may not be access to meat or hard-boiled eggs to make up **Meat** or **Egg Mix** – all that is required is Insectivore powder and water. It is also a more concentrated diet with higher levels of vitamins and minerals (e.g. calcium) which may be beneficial for young chicks with fast growth rates.

Insectivore Slurry

Add 10g (1 scoop) of powder with 25mL of warm water.

Slowly add water and mix well to make a slurry. Let the mix stand for 2 minutes to absorb all the water. If too thick, add more water and continue mixing. Feed using a spoon or syringe with large bore. Feed at about 35°C. Use as an assist-feeding formula for sick birds or orphaned altricial chicks. Small insects may be dipped into slurry before being fed.

Insectivore Slurry can be injected into the cavities of whole prey at the rate of 10mL per 100g of whole fish or prey item. For suitable tube-feeding formulas refer to Appendix 8.

Storage

Store prepared food refrigerated for a day or frozen for up to 2 weeks. Small quantities can be frozen into ice cube trays (5-10g per cube), and thawed out as required.

Appendix 2: Insects & Invertebrates

Insectivorous birds should be offered a variety of live invertebrate prey. This is essential to provide nutritional variety and enrichment. Prior to release, birds should be eating up to 50% of their diet as insects or invertebrates to ensure they are able to recognise and hunt food in the wild. Farmed insects include mealworms, crickets, woodies (wood roaches), fly pupae and invertebrates such as earthworms. Wild insects can be harvested opportunistically, caught in traps or encouraged to enter aviaries with pieces of hanging fruit or lights.

Where possible, provide live foods that form part of the bird's natural diet. For example, magpies eat significant amounts of earthworms, whereas aerial hunters like dollarbirds and swallows mostly take flying insects. In the wild many species remove the less digestible exoskeleton, wings and legs from insects before feeding them to their young, and this may need to be replicated when hand-rearing young chicks in captivity.

It is important to note that different insects have different nutrient values[25]. It is therefore necessary to feed a range of insects & invertebrates to achieve a balanced diet.

Insect Type	Protein %	Fat %	Calcium (mg/kg)	Ca:P ratio	Energy (kJ/kg)	Ave. Weight (g)	Ave. Qty per gram
Mealworm	19	12	300	0.10	8200	0.13	8
Cricket (adult)	19	6	500	0.19	5400	0.33	3
Woodie	21	11	800	0.42	7900	0.50	2
Earthworm	11	3	2300	1.2	3000	0.50	2

Boosting Insect Nutritional Value

Insects have no skeletal structure and are generally a poor source of calcium (however some invertebrates like earthworms, slaters and millipedes have good calcium levels). Farmed insects such as crickets & mealworms are often maintained on nutrient-poor substrates (e.g. bran), which also reduces their nutritional value. The nutritional quality of insects can be greatly improved by fortifying their diet before being fed to birds[25]. This can be achieved by maintaining the feeder insects on **Passwell Insect Booster** prior to feeding out. This increases the calcium, mineral and vitamin content, as these nutrients are incorporated into the insects' body tissue.

For best results, supply **Insect Booster** to the feeder insects for 7-14 days prior to feeding out to birds. This maximises the uptake of nutrients in the insect. However, supplying **Insect Booster** for as little as 2-3 days before feeding out will still have some nutritional benefit. Moisture should always be available to insects and can be supplied as a piece of wet sponge, fruit or vegetable.

Appendix 3: Lorikeet & Honeyeater Food

Lorikeet & Honeyeater Food	Typical Analysis	Powder (dry)	Liquid (as fed)
Maintenance diet for nectar & pollen feeding species including lorikeets, honeyeaters, wattlebirds, silvereyes & sunbirds. **Pack Size: 300g, 1.5kg, 4.5kg & 9kg**	Protein	12%	3.6%
	Fat	5%	1.5%
	Carbohydrate	76%	23%
	Energy	17 MJ/kg	4950 kJ/litre

Directions

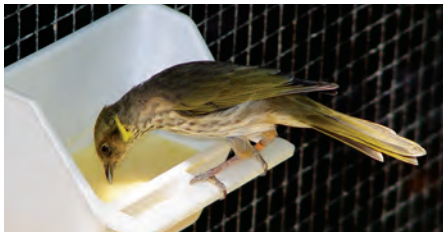
To make 100mL of food mix 30g of powder (3 scoops) with 80mL of warm, pre-boiled water.

Food should made up at the correct dilution, otherwise the feed volumes calculated will not apply. This concentration of solids (300g per litre) is also the optimum nectar concentration for nectar feeding birds, as it minimises spoilage.

Feeding

Provide in a clean bowl or sipper tube. Feed according to body weight of bird as per feed tables.

Rainbow Lorikeet feeding from sipper tube.



Yellow-plumed Honeyeater feeding from plastic bowl.

To keep the food fresh we recommend dividing the daily feed volume into two feeds (morning and afternoon). This replicates the natural feeding times of wild lorikeets and honeyeaters. Also offer a range of native blossom, especially *eucalyptus*.

Storage

Store prepared food refrigerated for a day or frozen for up to 2 weeks. Small quantities can be frozen into ice cube trays (10-15ml per cube), and thawed out as required.

Appendix 4: Frugivore Diets

Native fruits consumed by frugivores generally contain higher protein, fibre and calcium, but less sugar than commercially-grown fruits[28]. Many commercial fruits also contain a large proportion of moisture, making them energetically dilute. There is some suggestion that health problems in Australasian Figbirds may be linked to consumption of these high-sugar, energy-dilute fruits[33]. This leads to high volumes of watery diarrhoea and may result in reduced appetite, dehydration and chronic weight loss. In particular, it is recommended to minimise the use of high-fructose fruits including apple, pear, mango, watermelon, rockmelon and honeydew.

An alternative diet is to feed a mixture of peas, corn and carrot (frozen veg mix), as these vegetables provide a higher energy diet, with low levels of fructose. This should be supplemented with **Insectivore Rearing Mix** to provide sufficient protein, vitamins and minerals.

PCC (Peas, Carrot, Corn) Mix

Mix 5g Insectivore Rearing Mix with 100g Peas, Corn & Carrot.

As much native fruit as possible should be provided especially figs. Suitable supplementary commercial fruits include, blueberries, cherries, grapes, plums, banana and paw paw.

This diet may be fed to most frugivores including Figbird, orioles, bowerbirds, Metallic Starling, Koel and Channel-billed Cuckoo. Birds should also be supplemented with **Insectivore Egg** or **Meat Mix** (Appendix 1), plus a range of live insects.

Fruit-Dove Mix

Mix 5g High Protein Supplement with 100g Peas, Corn & Carrot.

If too dry add a little extra water to moisten the mix.

As much native fruit as possible should be provided including figs, laurels, palm-fruits and lilly-pilly. Suitable supplementary commercial fruits include figs, blueberries, cherries, grapes, plums, banana and paw paw.

Soft fruits are readily consumed, but feed in moderation and avoid when overripe (mushy) as they can stick to the beak and may predispose birds to bacterial or fungal infections.

Appendix 5: Parrot Soft Food

Parrot Soft Food	Typical Analysis	Powder (dry)	Veg Mix (as fed)
Use to boost protein, vitamin & mineral intake in the diet of parrots and other seed-eaters. Excellent weaning or conditioning food for young or sick birds. **Pack Size: 500g, 1kg, 5kg & 20kg.**	Protein	27%	12%
	Fat	12%	5%
	Carbohydrate	47%	27%
	Calcium	0.9%	0.3%
	Energy	16 MJ/kg	7.0 MJ/kg

Veg Mix

Mix 10g Parrot Soft Food with 20g Peas & Corn.

For convenience use frozen peas & corn, which are thawed before mixing. Other diced vegetables, chopped greens, fruit, soaked or sprouted seed can also be used. Add a little extra water to moisten the preparation if necessary. If **Parrot Soft Food** is not available then it may be substituted with **Granivore Rearing Mix.**

Moist Crumble

Mix 20g Parrot Soft Food with 5mL warm water.

Slowly drip the water into the powder while mixing with a fork to form a moist crumbly mix. Do not make into a paste.

This is a simple diet that can be offered if items are not readily available to make up Veg Mix.

Prepare food fresh each day, or store frozen for up to 2 weeks.

Appendix 6: Seed Mixes

Commercial seed mixes are a convenient way to feed most granivorous birds in care such as parrots, finches, quail and doves. In general, use mixes with a range of small seeds (e.g. Budgie or Finch Mix), as these more closely represent the size and nutritional value of most wild seeds. Some commercial seed mixes labelled as "Wild Bird Seed" are of poorer nutritional value. Many birds only eat the sunflower and reject the wheat, sorghum (red seeds) and dried corn kernels in these mixes. This generates a lot of waste and means that the birds are mainly consuming the high-fat sunflower seeds. If parrots become reliant on this they may become unhealthy and overweight in captivity. Instead use a Small Parrot Mix, and dilute it 50/50 with Budgie Mix.

Some typical components of commercial seed mixes are as follows:

Budgie Mix

White French Millet, Panorama, Canary Seed, Japanese Millet, Panicum, Shirohie Millet, Red Panicum and Hulled Oats.

Finch Mix

Panorama, White French Millet, Canary Seed, Japanese Millet, Panicum, Shirohie Millet, Red Panicum and Canola.

Small Parrot Mix (also called Cockatiel or Peachface Mix)

White French Millet, Canary Seed, Grey Stripe Sunflower, Hulled Oats and / or Safflower.

Pigeon Mix

Wheat, Sorghum, Corn, Dun Peas and Safflower. Note, this is specifically designed for racing pigeons, and is not essential for captive feeding of native pigeons, which will take a Budgie or Small Parrot Mix.

Soaked Seed

Dry seed can be soaked in water which helps soften the seed, making it more digestible, particularly for sick or weaning birds. This replicates the moistening process that occurs in the crop of adult granivorous birds.

Preparing Soaked Seed

- Place dry seed in a bowl and cover with a layer of boiling water. This helps sterilise the seed.
- Allow to soak (5-12 hours) so that the seeds swell up and soften.
- Rinse thoroughly with tap water through a sieve and drain well before feeding.

Sprouted Seed

Sprouting causes the seed to germinate, which makes it more nutritionally beneficial than dry seed[37]. Chemical changes in the sprouted seed means there is more available protein, sugars, and vitamins. Since wild birds mainly eat green seed, buds and shoots, this better replicates the nutritional content of their natural diet.

Sprouted seed mix including white millet, canary seed, sunflower, canola, mung beans & faba beans.

Preparing Sprouted Seed

- Prepare soaked seed as previously described on page 68.
- Rinse well with **Multi-clens** disinfectant, and drain.
- Place soaked seed in a thin layer (max 2cm) on a sieve or mesh tray, and allow it to air.
- Store in the dark at a temperature of about 25°C for optimum germination (use a heated room or heat pad in cold climates).
- Wash thoroughly with water and rinse with **Multi-clens** disinfectant every 12–24 hours.
- Continue airing until the seed has sprouted, usually after about 2 days. Feed out when sprouts are fresh and just a few millimetres long.
- Sprouted seed can be stored in the refrigerator for up to two days or frozen for 2 weeks. This slows the growth process and keeps the sprouts fresh.

Preventing Contamination: Sprouting seed can cause bacterial or fungal growth, particularly in warmer climates. Contaminated seed can have an off-smelling odour and appear gluggy or dirty. If in doubt, do not feed it to birds.

To minimise microbial contamination when sprouting seed use **Passwell Multi-clens** to rinse through the seed at the rate of 5mL per 10 litres of water.

Supplements to Seed Diets

For added nutritional value add **Parrot Soft Food** (Appendix 5) or **Granivore Rearing Mix** to soaked or sprouted seed:

Mix 10g Parrot Soft Food with 20g Soaked or Sprouted Seed.

Appendix 7: Duck Feeding Guidelines

Crumbles	Typical Analysis	Crumbles (dry)
Use as a base for duck & waterbird diets, mixed with various amounts of chopped greens & **Insectivore Rearing Mix.**	Protein	15%
	Fat	5%
	Carbohydrate	72%
Pack Size: 300g, 1kg, 5kg & 20kg.	Calcium	0.7%
	Energy	16 MJ/kg

The proportions of chopped greens and **Insectivore** are varied to achieve a protein content to suit the species and growth stage. Herbivores eat mostly plant material (e.g. Wood Duck), insectivores take invertebrates (e.g. Pink-eared Duck) and mixed feeders consume a combination of the two (e.g. Pacific Black Duck).

Passwell Crumbles[a]	Chopped Greens[b]	Insectivore Rearing Mix[c]	Protein (Dry Basis)	Duckling Age		Adults (7+ weeks)
				0 - 2 weeks	2 - 7 weeks	
160g	100g	–	17%			Herbivore
160g	80g	10g	19%		Herbivore	Mixed Feeder
160g	60g	20g	22%	Herbivore	Mixed Feeder	Insectivore
160g	40g	30g	24%	Mixed Feeder	Insectivore	
160g	-	40g	26%	Insectivore		

a. 160g = 1cup. A proportion of crumbles may be substituted with budgie seed mix.
b. 40g = 1 cup approx. May include water weed, endive, spinach, lettuce, asian greens, bean sprouts etc.
c. 10g = 1 scoop. A proportion may be substituted with live insects e.g. mealworms, bloodworm, slaters etc.

Directions

Mix together and add sufficient water to make a moist crumbly mix. Amount of water added can be varied, but always ensure sufficient drinking water is also provided. Feed out 2 to 3 times a day to avoid food becoming contaminated.

All waterfowl should have *ad lib* supply of aquatic vegetation (e.g. duckweed). Grazing species should have free access to lawn or pasture.

Storage

Prepared food can be stored refrigerated for a day or frozen for up to 2 weeks.

Feeding Ducklings

Growing ducklings have an increased requirement for protein, particularly in the first few weeks of life. However, excess protein has been implicated in developmental problems such as "angel wing". In this condition, excessive weight of growing flight feathers causes the wing to turn outwards, which can lead to permanent deformity[17]. This usually occurs in the more herbivorous species around the rapid growth stage (3-7 weeks). Controlled but not excessive growth can be achieved by providing a higher protein diet in the first 2 weeks, then stepping down protein levels until a typical adult diet is fed after 7 weeks. The starting level of protein is dependent on species, with herbivores having lower levels than insectivores. See previous page for diet proportions to achieve specific protein levels.

Feed Quantities for Growing Ducklings and Goslings[a]

Weight (g)	Feed (g/day)	Weight (g)	Feed (g/day)
30	10	500	75
60	15	600	85
100	22	800	105
150	30	1000	120
200	40	1500	165
300	50	2000	200
400	65	2500	240

a. Once young are 75% of their typical adult weight, gradually reduce feed amounts to those for adults.

"Dish up the Dirt"

For newly hatched ducklings (and other ground-dwelling species), it is important to supply soil and dirt, usually dug up with grass roots. Growth rates appear to improve when ducklings have access to dirt from an early age. The benefits may be twofold:

1. The soil contains beneficial micro-organisms that may help the digestive system.
2. Grit in the soil may have a grinding effect in the gizzard, improving digestibility of foodstuffs.

Insectivorous Ducklings

Filter feeders such as Pink-eared Duck and Australasian Shoveler are best fed a slurry diet to avoid impaction. Young Musk Duck are fed directly to the bill by parents, so this should be replicated in care. They could also be fed **Insectivore Meat Mix** (Appendix 1) plus a range of insects and invertebrates.

Pink-eared Duck. Age = 1 week.
Note the broad bill for filter-feeding.

Appendix 8: Tube-feeding Diet

Used for debilitated piscivorous or carnivorous birds that require a readily-digestible, high-protein diet[26]. This may include seabirds, raptors and insectivores. Food is prepared as a liquid slurry which facilitates tube or syringe feeding. Also used as the hatchling diet for young waterbirds that are normally fed regurgitated liquid food at an early age (e.g. ibis, spoonbills).

Hill's a/d™ Diet

- 1 x tin (156g) Hill's a/d Urgent Care*.
- 120mL water.
- 30g Insectivore Rearing Mix.

Directions: Mix thoroughly into a liquid slurry.

*Available from most vets.

Meat / Fish Slurry

- 100g mince meat or fish fillets.
- 200mL water.
- 50g Insectivore Rearing Mix.

Directions: Use a blender to puree ingredients into a liquid slurry.

Additional energy can be achieved by the addition of 1mL **Good Oil for Birds** per 100mL of liquid slurry.

Feeding: Tube or syringe feed at about 35°C. Once the bird is strong enough it can be assist-fed with whole foods.

Feeding Guidelines

Body Weight (g)	Feed (mL/day)		Body Weight (g)	Feed (mL/day)		Body Weight (g)	Feed (mL/day)	
	Maint.	Growth		Maint.	Growth		Maint.	Growth
25	12	20	800	150	230	3000	400	600
50	20	30	900	170	250	3500	450	680
100	35	50	1000	180	270	4000	500	750
200	55	85	1200	210	310	5000	600	900
300	75	115	1400	230	350	6000	670	1000
400	95	140	1600	260	390	7000	750	1130
500	110	165	1800	280	420	8000	830	1250
600	125	190	2000	300	450	9000	900	1350
700	140	210	2500	360	530	10000	980	1450

Supplementing whole food: Inject into food items (10mL per 100g of whole fish or prey) to improve their nutritional content. This replaces the need to supplement fish with seabird vitamin tablets.

Storage: Store prepared food refrigerated for a day or frozen for up to 2 weeks. Small quantities can be frozen into ice cube trays (10-15ml per cube), and thawed out as required.

Appendix 9: Fish for Seabirds

Different types of fish have different calorific values[27]. For example, fatty fish such as pilchards have a higher energy content, so smaller quantities need to be fed to provide the same energy levels as non-fatty fish. Guidelines below are based on whole fish.

Maintenance: Energy requirements are calculated for captive birds assuming low activity levels and mild ambient temperatures (>20°C). More active birds have higher energy requirements, as do outdoor birds kept in cold temperatures. Birds should be weighed regularly to ensure food intake is adequate. Food provided should also be weighed and recorded.

Growth or Sickness: Growing, malnourished, moulting or sick birds have increased requirements – feed up to 50% more food per day, as per growth figures in the below table.

Emaciated or underweight seabirds are best tube-fed an easily-digested pureed diet (Appendix 8).

Body Weight (g)	Pilchards (g/day)		Whiting (g/day)		Whitebait (g/day)		Squid (g/day)	
	Maint.	Growth	Maint.	Growth	Maint.	Growth	Maint.	Growth
50	16	23	17	26	19	29	22	33
100	26	40	29	43	32	48	37	55
200	43	65	48	72	55	82	60	90
300	57	85	65	100	75	110	80	120
400	70	105	80	120	90	135	100	150
500	85	125	95	145	110	165	120	180
600	95	145	105	160	120	180	135	200
700	110	165	120	180	140	210	150	225
800	120	180	130	200	150	225	165	250
900	130	200	140	210	165	250	180	270
1000	140	210	150	225	180	270	200	300
1200	160	240	175	265	200	300	220	330
1400	175	265	200	300	230	350	250	375
1600	200	300	215	325	250	375	275	410
1800	215	325	230	350	275	410	300	450
2000	230	350	250	380	300	450	320	480
2500	270	400	300	450	350	525	380	570
3000	310	465	340	510	400	600	430	650
3500	350	525	380	570	440	660	480	720
4000	380	570	420	630	490	735	530	800
4500	415	625	460	690	530	800	580	870
5000	450	675	500	750	575	860	630	950
6000	515	775	570	850	670	1000	720	1080
7000	575	860	630	950	730	1100	800	1200
8000	630	950	700	1050	800	1200	850	1300
9000	700	1000	750	1100	850	1300	950	1400
10000	750	1100	800	1200	950	1400	1000	1500

Appendix 10: Whole Prey for Raptors

Different prey items for raptors have different calorific values and digestibility. Guidelines below are based on whole prey and include wastage factors to account for parts usually uneaten or egested (e.g. viscera, skin & feathers).

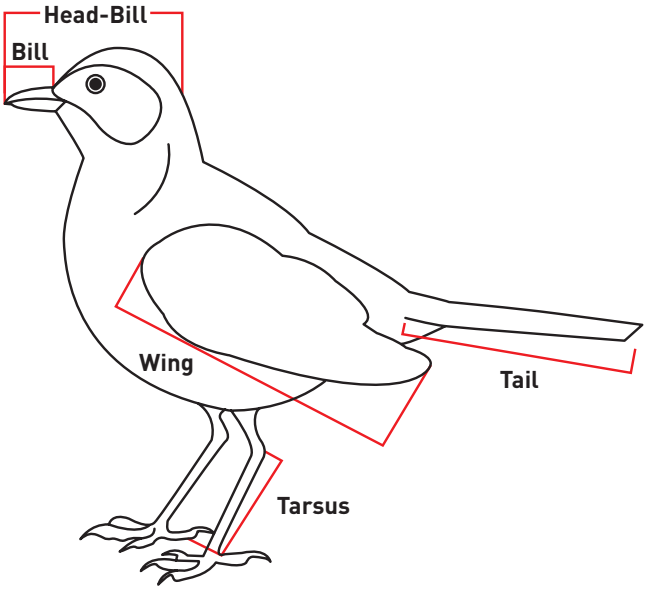
Maintenance: Energy requirements are calculated for captive raptors assuming low activity levels and mild ambient temperatures (>20°C). Free-flying birds have higher energy requirements, as do outdoor birds kept in cold temperatures. Raptors should be weighed regularly to ensure food intake is adequate. Food provided should also be weighed and recorded.

Growth or Sickness: Growing, malnourished, moulting or sick birds have increased requirements – feed up to 50% more food per day, as per growth figures in the below table.

Body Weight (g)	Rodents (g/day)		Rabbit (g/day)		Day Old Chick (g/day)		Quail (g/day)	
	Maint.	Growth	Maint.	Growth	Maint.	Growth	Maint.	Growth
25	n/a	14	n/a	16	n/a	15	n/a	13
50		21		25		23		20
75		26		32		30		25
100	22	33	25	40	24	36	21	32
125	26	40	30	45	28	42	23	35
150	30	45	35	50	32	48	26	40
175	33	50	40	60	35	55	30	45
200	35	55	45	68	40	60	33	50
250	40	60	50	75	45	68	38	57
300	45	68	55	85	50	75	42	63
350	50	75	60	90	55	80	45	68
400	55	80	65	100	60	90	50	75
500	65	100	80	120	70	105	60	90
600	70	105	90	135	80	120	65	100
700	75	115	100	150	90	130	75	115
800	85	130	110	165	95	145	80	120
900	90	140	115	175	105	160	85	130
1000	100	150	125	190	110	170	95	145
1200	110	170	140	210	130	190	105	160
1400	120	180	160	240	140	210	120	180
1600	135	200	170	260	150	230	130	200
1800	150	220	185	280	170	250	140	210
2000	160	240	200	300	180	270	150	221
2500	180	270	230	350	210	315	170	250
3000	210	310	260	390	240	360	190	290
4000	250	375	320	480	290	430	240	360
5000	290	435	370	550	340	500	280	420

Appendix 11: Body Measurements

Standard body measurements in birds are indicated below.



Head-Bill: From tip of bill to back of skull, measured with vernier calipers.

Bill: From tip of bill to forehead junction, measured with vernier calipers.

Tarsus (Tarsometarsus): From bend in leg (tibiotarsal joint) to top of foot joint, measured with vernier calipers.

Wing: From bend of the wing (carpal joint) to tip of longest primary feather, measured with ruler.

Tail: From base of tail (underside of vent) to tip of longest tail feather, measured with ruler.

Wing Measurement – Common Bronzewing fledgling.

Bill Measurement – Wood Duckling.

References

1. Marchant, S & P.J. Higgins (1990). *Handbook of Australian, New Zealand and Antarctic birds. Vol. 1, Ratites to Ducks*. Oxford University Press.
2. Marchant, S. & P.J Higgins (1993). *Handbook of Australian, New Zealand & Antarctic Birds. Vol. 2, Raptors to Lapwings*. Oxford University Press.
3. Higgins, P. J. & S.J.J.F. Davies (1996). *Handbook of Australian, New Zealand & Antarctic Birds. Vol. 3, Snipe to Pigeons*. Oxford University Press.
4. Higgins, P. J. (1999). *Handbook of Australian, New Zealand & Antarctic Birds. Vol. 4, Parrots to Dollarbird*. Oxford University Press.
5. Higgins, P.J., J.M. Peter & W.K. Steele (2001). *Handbook of Australian, New Zealand and Antarctic Birds. Volume 5: Tyrant-flycatchers to Chats*. Oxford University Press.
6. Higgins, P.J. & J.M. Peter (2002). *Handbook of Australian, New Zealand and Antarctic Birds. Volume 6: Pardalotes to Shrike-thrushes*. Oxford University Press.
7. Higgins, P. J., J.M Peter & S.J. Cowling (2006). *Handbook of Australian, New Zealand & Antarctic Birds. Vol. 7, Boatbill to Starlings*. Oxford University Press.
8. Kaplan, G. (2004). *Australian magpie: biology and behaviour of an unusual songbird*. CSIRO publishing.
9. Legge, S. (2004). *Kookaburra: king of the bush*. CSIRO Publishing.
10. Körtner, G. & Geiser, F. (2001). Nesting behaviour and juvenile development of the tawny frogmouth Podargus strigoides. *Emu, 99(3)*, 212-217.
11. Kaplan, G. (2007). Tawny frogmouth. CSIRO Publishing.
12. Moffat, M. (1981). Aspects of the biology of the spur-winged plover. Unpublished MSc thesis, Massey University.
13. Tingay, S. (1981). The Social Behaviour and Vocalisations of Australian Magpie Larks (*Grallina Cyanoleuca*) in South-Western Australia. Unpublished PhD thesis, University of Western Australia.
14. Krebs, E. A. (1999). Last but not least: nestling growth and survival in asynchronously hatching crimson rosellas. Journal of Animal Ecology, 68(2), 266-281.
15. Digney, P. (1998). *A Guide to Incubation & Handraising Parrots*. ABK Publications.
16. Frith, H. J. (1982). *Pigeons and doves of Australia*. Rigby.
17. Brown, D. (1998). *A Guide to Pheasants & Waterfowl*. ABK Publications.
18. Braithwaite, L. W. (1981). Ecological Studies of the Black Swan II*. Colour and Plumage Changes, Growth rates, Sexual Maturation and Timing and Frequency of Breeding. *Wildlife Research*, 8(1), 121-133.
19. McKilligan, N (2005). Herons, Egrets & Bitterns: Their biology and conservation in Australia.
20. Smith, A. C., Heidy Kikillus, K., Ross, G., & Munro, U. H. (2013). Breeding of the Australian white Ibis *Threskiornis molucca* in the urban environment. *Corella* 37(1), 1-6.
21. Olsen, P., & Olsen, J. (1980). Observations on Development, Nesting Chronolgy, and Clutch and Brood Size in the Australian Kestrel, Falco cenchroides (Aves: Falconidae). *Wildlife Research, 7*(2), 247-255.
22. Durant, J. M., & Handrich, Y. (1998). Growth and food requirement flexibility in captive chicks of the European barn owl (Tyto alba). *Journal of Zoology,* 245(2), 137-145.
23. Olsen, J., Judge, D., & Trost, S (2015). Ageing Southern Boobook nestlings and fledglings. *Corella* 39(3), 77.
24. Rowley, I. (1973). The comparative ecology of Australian corvids. IV. Nesting and the rearing of young to independence. *CSIRO Wildlife Research, 18*(1), 91-129.
25. Finke, M., & Winn, D. (2004). Insects and related arthropods: a nutritional primer for rehabilitators. *Journal of Wildlife Rehabilitation, 27*(3/4), 14.
26. Vogelnest, L. (2000). Veterinary management of seabirds. *Marine wildlife, Proceedings, 335*, 199-235.
27. Corse, M., Glick-Bauer, M., Saul, B. & E. Dierenfeld (1999). Nutrient composition of locally obtained native fishes (St. Catherines Island, GA, USA) compared with fish commonly purchased for North American zoo feeding programs. *Proceedings AZA Nutrition Advisory Group, Third Conference*, Columbus, Ohio. Pp 127-137.
28. McDonald, D. (2003). Feeding ecology and nutrition of Australian lorikeets. In *Seminars in Avian and Exotic Pet Medicine* (Vol. 12, No. 4, pp. 195-204). Elsevier.
29. Klasing, K. C. (1998). *Comparative avian nutrition*. Cab International.
30. Rowley, I. (1990). *Behavioural ecology of the Galah, Eolophus roseicapillus, in the wheatbelt of Western Australia*. Surrey Beatty & Sons Pty Limited.
31. Tarburton, M. K. (1993). A comparison of the breeding biology of the Welcome Swallow in Australia and recently colonized New Zealand. *Emu, 93*(1), 34-43.
32. Gage, L. J., & Duerr, R. S. (Eds.). (2008). *Hand-rearing birds*. John Wiley & Sons.
33. Brown, D. http://www.geckodan.com/preliminary-study-into-the-effects-of-diet-variation-in-frugivorous-native-birds/ (accessed 24/04/2018).
34. Langham, N. P. E., & Hulsman, K. (1986). The breeding biology of the Crested Tern Sterna bergii. *Emu, 86*(1), 23-32.
35. Vyret, L. (2008). Brolga (*Grus rubicunda*) Husbandry Guidelines. Territory Wildlife Park, NT, Australia.
36. Andrews, L. (2000). Bush Stone-Curlew (*Burhinus grallarius*) Husbandry Manual. Healesville Sanctuary, Vic, Australia.
37. Mbithi-Mwikya, S., Van Camp, J., Yiru, Y., & Huyghebaert, A. (2000). Nutrient and antinutrient changes in finger millet (Eleusine coracan) during sprouting. *LWT-Food Science and Technology, 33*(1), 9-14.

Index of Species (growth charts highlighted in bold)

Albatross 52
Bee-eater 9
Boobook 61
Bowerbird 22
Brolga 51
Brush-turkey 33
Butcherbird 5
Button-quail 33
Cockatoo 27
Sulphur-crested 32
Corella 27
Coucal, Pheasant 9
Coot 51
Cormorant 53
Crake 50
Crow 8
Cuckoo 9
Channel-billed 22
Cuckoo-Shrike, Barred 22
Black-faced 5
Curlew, Bush Stone 15
Currawong 5
Drongo, Spangled 5
Duck 42
Australian Wood 44
Pacific Black 43
Darter 53
Dollarbird 11
Dotterel 50
Dove 36
Bar-shouldered 39
Peaceful 38
Eagle 57
Egret, Cattle 48
Fairy-wren 9
Falcon 57
Figbird 23
Finch 34
Red-browed 35
Friarbird 16
Frogmouth, Tawny 13
Galah 31
Gannet 53
Grebe 50
Gull, Silver 54
Heron 46
White-faced 47
Honeyeater 16
Blue-faced 19
Brown 20
New Holland 17
White-plumed 17
Ibis, White 49
Kestrel, Nankeen 58
Kingfisher 9
Kite 57
Koel 22
Kookaburra 12
Lapwing, Masked 14
Lorikeet 24
Musk 26
Rainbow 25
Scaly-breasted 26
Mistletoebird 21
Magpie 6
Magpie-Lark 7
Martin 9
Miner 16
Moorhen 51
Nightjar 9
Oriole 23
Owl 59
Barn 60
Boobook 61
Pardalote 21
Parrot 27
Petrel 52
Pelican 53
Penguin 52
Pigeon 36
Crested 40
Torresian Imperial 41
Prion 52
Quail 33
Rail 50
Raven 8
Rosella, Crimson 30
Eastern 29
Shearwater 52
Silvereye 20
Spinebill 20
Spoonbill 46
Starling, Metallic 22
Stilt 50
Stone-curlew, Bush 15
Stork, Black-necked 46
Swallow, Welcome 10
Swamphen 51
Swan, Black 45
Sunbird 16
Tern 53
Crested 55
Wagtail, Willie 9
Wattlebird, Red 18
Woodswallow 9

WOMBAROO

PASSWELL

10 Oborn Road Mount Barker SA 5251 • Ph 08 8391 1713
www.wombaroo.com.au • email info@wombaroo.com.au