

Natural versus Supplemental diets in possums

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When I first started caring for wildlife 20 years ago I started with possums. I made every possible mistake, many of which I attributed to deficient diet and lack of knowledge.

My first advice on what possums ate came from a zoo who told me to feed fruit & vegetables, peppermint gum and bottlebrush. This did not seem logical, however, and I puzzled over why we should feed fruit and vegetables to native animals when such foods were not available to them in the wild or their natural habitat across the country.

I bumbled along offering rose petals, geraniums, oak, willow and liquid amber leaf, none of it remotely native. By this stage the brushtail and ringtail possums in my care had been tried and tested on broccoli, cauliflower, peas, capsicum, apple, pear, watermelon, cantaloupe, sweet potato, beans, cucumber, cooked carrot, pasta, pine nuts, sunflower seeds, pumpkin seeds, peanut butter, button mushroom, banana, assorted stone fruits, peanuts, almonds, pine nuts, cashews, figs, cooked chicken breast, steak/chop bones with meat scraps left on, soft boiled eggs, cooked basmati rice and peanut butter or jam sandwiches. Only the best quality was given, however, the cost to provide so many possums with all of the aforementioned foods was astronomical and just when I thought I had the recipe right gastro intestinal tract (GIT) problems would arise.

After attending a workshop conducted by Dr Anne Fowler in which she asked carers in attendance “why we were not feeding a more natural diet” I decided to take up the challenge; no longer would my ringtails, brushtails and gliders see anything remotely supplemental. All I had to do now was figure out what to give them. I knew they liked peppermint gum so I decided I would try the gum species first, I had already given them bottlebrush & grevillea but had not known what other flowers I could offer. I was unsure just how toxic everything could possibly be, however, I surmised possums must know what they can and can’t eat. So I decided to offer it to them and let them choose. By giving a wide variety of browse each the risk of toxic poisoning was lessened

In order to ensure they had enough to eat each night I would offer a choice of browse I knew they ate and add in a few other choices. With every newly munched bough more knowledge came, some species they loved but only at certain times of the year, some only when they were flowering, some pre or post flowering and some species only epicormic shoots were favored. I soon had a vast array of plants I knew they could eat.

The year 2007 saw an increase in the array of native foods that we discovered possums enjoyed with the arrival of my new foster carer, Alison Bolden, whose work for a bush land regeneration company meant that she could bring in a variety of other species. Alison could also tell me what species they were and where to find them. Species I had not even thought to offer suddenly became obvious and the journey continued.

Body condition was scored in the same way as Koalas, by the shoulder blade muscle groups and hip muscles, GIT problems became almost unheard of – except for the unfortunate few who spent too much time in the hands of members of the public before coming into care. Many of the plant species I have utilized are indigenous to Victoria and specifically the Mornington Peninsula. However I live in suburbia with many native non-indigenous species surrounding me so I have experimented with a few Qld, SA, NSW and WA species.

Throughout Australia a network of indigenous nurseries are available and many offer cheaper prices than you would pay through large commercial nurseries. Animalia Wildlife Shelter has recently applied and been approved to collect and propagate seed for distribution to wildlife shelters so they can start their own coppicing areas. Although the program is in its first phase, Animalia Wildlife Shelter now has a wildlife seed and food bank. However, throughout Australia many species are available and it's simply a matter of getting to know what's in your area.

734 different species of eucalyptus, 150 Hakea species, 25 Callistemon (Bottle brush) species, 660 Acacia species, 230 Grevillea species exist in Australia just to name a few.

Tips for Collection:

- Always offer 5-8 different species of browse and include two flowering species daily.
 - Collection should always be done on the day you plan to feed – do not gather weekly as the quality of browse and nutrient value is compromised after 24hours.
 - Collect away from roadsides where exhaust fumes linger.
 - Use sharp pruning saws, secateurs, long- handled pruners or loppers and never break or tear branches.
 - Disinfect pruning equipment daily and preferably between species.
 - Make use of local tree trimming companies, councils, contractors & storm events. Branches often fall from tree's in storms and may be used for browse within 24 hours
 - Bush land regeneration and Eco weed removal companies often are working within reserves to remove and eradicate species which are viewed as invasive. Most of these companies hand weed and take off site which means you can often get possum/wildlife takeaway quite easily.
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Just because it they eat it doesn't make it right

Many carers across the country effectively use supplemental diets of fruit and vegetable whilst hand rearing possums. However, the benefits to wildlife are few and not really a long term solution for rehabilitation of wildlife intended to return to the wild.

Problems associated with fruit and vegetable diet:

- Animal is less familiar with the natural foods it should be accessing in the wild once released.
- Carers may often wean onto natural diet prior to release, however, the hiatus of this period in their diet can start stress prior to release thus reducing the likely survival of the marsupial.
- Possums are reliant on a highly fibrous leaf diet with the added benefits of insect's, blossoms and in some cases fungi for correct GIT balance and to prevent issues such as bloat & skin conditions. Fruit tends to lack the fibre quality that leaf naturally contains
- How to start possums onto a natural diet has a specific structure and should be taken on the establishment of levels of toxicity. Turpins and tannins affect the GIT and gut flora whilst it is establishing.
- Young should first be started on flowers/blossoms/petals progressing to tea tree leaf and flower then eucalypt leaf with the continued offering of all until release.

As wildlife rehabilitators it makes more sense for us to raise animals on the diet they will have to access when they return to the wild. While hand rearing possums on supplemental diet is successful for many, it is unknown whether these animals thrive in the wild. To raise an animal for months on supplemental foods then, for the last few weeks of care, expect it to embrace native browse, without loss of body mass or evident stress factors is not the best rehabilitation principle for wildlife.

By raising on natural diets we reduce the association with humans at an earlier stage, teach animals to find and accept a greater diet of fresh available food sources and reduce the risk of our wildlife being looked upon by the public as fruit tree raiding vermin.

Natural diet - has evolved since acclimatization in the 1800's which has greatly reduced the number of indigenous species available, However, the huge varieties of native browse including flowering gums, pine needles, oak leaves, tea tree, liquid amber leaves, fresh shoots/leaves from eucalypts, assorted native fruits when available, bottle brush, grevillea, ferns, fungi, moss, grasses, spiders, insects, prunes flower, sap from trees and rose petals available in the average

back yard should be offered to allow the animal the best possible chance to survive, this also allows the animal to contribute as good breeding stock for the wild population continuing the diversity to the local gene pool.

Assorted tree species within your own area should always be sought and includes Acacia, Silver Wattle, gum, Myrtle Beech, Satin Wood, Leatherwood, Mistletoe, Oak, Liquid Amber, Purple Prunus leaves, Mountain Gum, Alpine Ash, Native Plum, Pine Cone nuts/seed, Mountain Pepper, Blackwood, Southern Sassafrass, Bush Cherry (lily pilly), Broad Leafed and Pin Cushion Paper Bark.

Natural diet note

Often it is not always possible to adhere to a natural diet. Inner-city animals are not able to access native browse by inhibiting factors such as tree guards, high predation issues, lack of biolinks and island effects.

It is important to note that we may need to make concessions to get animals to eat. Spraying leaf with a fine mist of diluted honey can help to encourage adults in care to taste browse they may never have sampled, as discovered by Sue Beebe, Homeward Bound Wildlife Shelter, Frankston.

If you must give supplemental diet – always make sure you give the best quality fruit and vegetables that you can buy. Grapes and stone fruits should be kept to a minimum as they have elevated fructose levels. Nuts should also be given sparingly.

I avoid melons altogether as I have found the fructose levels can cause diarrhea and skin problems almost immediately. Do not give rotting fruit as acids that cause the fermentation process in fruits can greatly upset the gut flora of the animal. This occurs during the digestion of fruit as fermentation occurs causing the body temperature to rise which can cause other adverse reactions within the body. i.e. (Unexpected dehydration, skin problems, gut motility, increased heart rate and acidic urine output resulting in urine scalding).

Supplemental food preparation

The key to a healthy possum is a good assortment of food. This means no less than six different ingredients every day. Prepare food fresh, cut it up and serve it, don't leave it lying around for hours. Even in a fridge it will start to ferment.

Make sure that your prep area is clean before you start the preparation of supplemental food; be sure that the slices of fruit and vegetables are cut small enough relative to the size of the animal's hand that is holding it. I am often puzzled by the quarter of an apple put in with a 120 gram ringtail. The size should always be considered, as too big a piece of fruit will often result in the possum refusing to eat it or seeming uninterested in feeding. The jaw structure simply doesn't allow for a flip top head.

A six month old possum should eat about one and a half cups of assorted fruit and vegetables along with 120-180mls of formula per day.

Conclusion

When I first commenced caring for wildlife 20 years ago information was not readily available, These days it is easier to share information about correct diet and differing experiences. After fifteen years as a devoted feeder of fruit and vegetable diet, making the change to a completely natural diet has eradicated problems associated with a fruit and vegetable diet, including associated instances of bloat in ringtails and brushtails. (Possums cope with release & post release, less human interactions when deemed releasable improves the feasibility of survival, showing their complete wild behavior patterns prior to release ensures they do not approach humans for food thus reducing the risk of cruelty by humans.) Possums are more likely to retain preference for natural diets upon release if provided a natural diet whilst in care.

Some Eucalypt species that ringtails like to eat

With all eucalypts you should offer the leaf and flowers until you are certain which your possums like to eat and don't assume they will like it all year round as the flavor and toxicity of the leaf changes with the seasons. This is due to toxins produced by the tree to fight off pest insects.

<i>Eucalyptus bauerana</i>	Blue Box
<i>Eucalyptus cephalocarpa</i>	Silver leaf stringy bark, mealy stringy bark
<i>Eucalyptus dives</i>	Broad-leaved or blue peppermint
<i>Eucalyptus camaldulensis</i>	River Red gum
<i>Eucalyptus ovata</i>	Swamp gum
<i>Eucalyptus oblique</i>	Messmate
<i>Eucalyptus pauciflora</i>	Snow gum
<i>Eucalyptus radiata</i>	Narrow leaved Peppermint
<i>Eucalyptus pryoriana</i>	Gippsland Manna gum
<i>Eucalyptus tessellaris</i>	Moreton bay ash
<i>Eucalyptus viminalis</i>	Ribbon or Manna gum
<i>Eucalyptus woodwardii</i>	Lemon flowered gum

Other flora species favored by Ringtails possums

<i>Banksias serrata</i>	Saw Banksia
<i>Grevillea rosmarinifolia</i>	Rosemary grevillea
<i>Grevillea alpine</i>	Mountain grevillea, cat's claw
<i>Grevillea infecunda</i>	Anglesea grevillea
<i>Grevillea juniperina</i>	Prickly grevillea
<i>Grevillea lanigera</i>	Woolly grevillea
<i>Grevillea victoriae</i>	Royal grevillea
<i>Leptospermum evigatum</i>	Coast tea-tree
	Melaleuca tea-tree
<i>Melaleuca squarrosa</i>	Scented paperbark
<i>Melaleuca lanceolata</i>	Moonah
<i>Melaleuca ericifolia</i>	Swamp paperbark
<i>Chaenomeles sp</i>	Japonica,
<i>Quercus robur</i>	Acorn Oak,
<i>Salix caprea</i>	Pussy Willow
Apricot leaves	
<i>A mucronata</i>	Narrow leaf wattle
<i>Hakea laurina R Br</i>	Pin Cushion Hakea
<i>Hakea sericea</i>	Bushy needlewood
<i>Hakea eriantha</i>	Tree hakea
<i>Hakea ulicina</i>	Furze Hakea
<i>Hakea nodosa</i>	Yellow hakea
<i>Hakea teretifolia</i>	Dagger hakea
<i>Acacia terminalis</i>	Sunshine wattle
<i>Acacia subporosa</i>	Bower wattle
<i>Acacia subtilinervis</i>	Wattle
<i>Acacia boormanii</i>	Snowy river wattle
<i>Orities Lancifolia</i>	Alpine orities
<i>Casuarinas cunninghamiana</i>	River she-oak
<i>Santalum acuminatum</i>	Sweet Quandong



Acacia sophorae

Coast Wattle- Ringtail, Brushtail, Sugar gliders like to eat galls and insects

4m x 4 m

Coastal woodlands

Very adaptable growing in most soils



Acacia sauveolens

Sweet Wattle- Ringtail, Brushtail, Sugar gliders

2m x 2 m

Heath woodlands

Prefers full sun and well drained soils



Acacia stricta

Hop Wattle-Ringtail and brushtail

4m x 2 m

Heath/coast Woodlands

Prefers full sun & grows in most soils



Acacia paradoxa

Hedge Wattle- Ringtail, Brushtail, Sugar gliders

3m x 2 m

Heath/Coast Woodlands

Will grow almost anywhere



Cassinia arcuata

Drooping cassinia- Ringtail, Brushtail

2m x 1 m

Heath Woodland

Very adaptable



Olearia glutinosa

Sticky Daisy Bush-Brushtail

2m x 2m.

Frontline Coast.

Prefers well drained soils -brushtails have been observed eating in the wild.



Solanum laciniatum DO NOT FEED

Kangaroo Apple

2m x 2m

Heath Woodland

A very adaptable plant

Poisonous used commercially to make the pill



Olearia axillaris

Coast Daisy bush- Ringtail, Brushtail

2m x 2m

Frontline coast

Prefers well drained soil, ringtails often hang to access this



Pomaderris paniculosa

Coast Pomaderris- Brushtail

2m x 1m

Coast Woodland

Prefers well drained soils



Indigofera australis

Austral Indigo-Brushtail

2m x 1.5 m

Heath Woodland

Adaptable grows in most soils & aspects



Ozothamnus ferrugineus

Tree Everlasting- Brushtail

3m x 2 m

Heath woodland

Tolerates moist soils, but very adaptable



Leptospermum continentale

Prickly tea tree- Brushtail

3m x 2 m

Heath Woodland

Prefers slightly wetter soils



Acacia mearnsii

Black Wattle- Ringtail, Brushtail, Sugar gliders

7m x 4m

Heathland, woodland,

Prefers well drained conditions



Allocasuarina littoralis

Black She-oak- Ringtail, Brushtail, Sugar gliders

8m x 3m

Heath woodland,

Prefers dry soil



Acacia melanoxylon

Blackwood- Ringtail, Brushtail, Sugar gliders & flying foxes

8m x 4m

Heath woodland,

Can tolerate wet soils, but will grow anywhere.



Acacia implexa

Lightwood- Ringtail, Brushtail, Sugar gliders & Flying foxes

8m x 4m

Heath woodland,

Prefers full sun and grows in all soils



Allocasuarina verticillata

Drooping She-oak- Ringtail, Brushtail, Sugar gliders

8m x 3m

Coastal woodlands

Prefers well drained soil tolerates dry conditions



Myoporum insulare

Common Boobialla- Ringtail, Brushtail

5m x 3m

Coast Woodlands

Grows well in most soils and is very adaptable



Hakea species Ringtail, Brushtail, Sugar gliders

3m x 2m

Heath Woodland

Adaptable to any well drained situation



Melaleuca ericifolia

Swamp Paperbark- Ringtail, Brushtail, Sugar gliders

5m x 2m

Heath/coast woodlands

Prefers wet soils but will grow in most conditions



Banksia marginata

Silver Banksia- Ringtail, Brushtail, Sugar gliders & Flying foxes

5m x 3m Heath woodlands

Prefers well drained soils and very adaptable



Bursaria spinosa

Sweet Bursaria - Ringtail, Brushtail, Sugar gliders

8m x 3m

Heath/Coastal Woodland

Grows in most soils and Aspects



Viminaria juncea

Golden Spray- Ringtails

4m x 2m

Heath Woodland

Prefers slightly moister soils



Leptospermum laevigatum

Coastal Tea-tree, Ringtail, Brushtail, Sugar gliders

6m x 3m

Coast woodland

Grows well in most soils and aspects



Acacia brownie

Heath Wattle, brushtail and Ringtail

1m x 1m

Heath Woodland prefers well drained soils



Aotus ericoides

Common Aotus- Brushtail

1m x 1m

Heath Woodland

Grows just about anywhere in all soil types



Allocasuarina paradoxa

Green She-oak- Ringtail, Brushtail,

1.5m x 1.5m

Heath Woodland

Prefers dry well drained soils in full sun



Acacia ulicifolia

Juniper Wattle- Ringtail, Brushtail,
Sugar gliders,

Flying foxes

1m x 1m

Heath Woodland

Prefers or tolerates moist soils



Atriplex cinerea

Grey Saltbush- mostly accessed by
brushtails in coastal gardens

1m x 2m wide

Frontline coastal dune

Plant prefers dry conditions



Dillwynia species

Parrot Pea- mostly accessed by
brushtails

50 cm x 50 cm

Heath Woodland, Well drained soil and
full sun.



Leucophyta brownii

Cushion Bush mostly accessed by
brushtails in coastal gardens and only
appears to be during wet weather

50cm x 50cm

Coastal dune scrub, Prefers dry well
drained soils and sun



Leptospermum

Myrsinoides Silky Tea-tree

Brushtails Ringtails & sugar gliders like to forage for insects and lick the nectar, pull back bark for sap

1.5m x 1m

Heath Woodland

Grows well in most soils



Bossiaea cinerea

Showy Bossiaea -Brushtails only preflowering

1m x 1m

Heath Woodland to coast

Prefers well drained soil



Correa alba

White Correa-Brushtails

1m x 1m

Front line coastal plant that will adapt to all soil conditions



Rhagodia candolleana

Seaberry Saltbush- brushtail

1m x 2m

Frontline coastal but will grow well in most conditions



Banksia integrifolia

Coastal Banksia Sugar gliders, Brushtails, ringtails

sugar glider like to forage for insects

15m x 5 m Coastal woodlands

Prefers dry conditions once established



Eucalyptus pryoriana

Coast Manna gum-Ringtails Sugar gliders Brushtails

sugar glider like to forage for insects and lick the sap/manna, 15m x 10 m Heath/coast woodland

Prefers dry conditions once established



Eucalyptus ovata

Swamp Gum-flower and leaf- Ringtails & Brushtails, Sugar gliders like the occurring lerp on leaf

20m x 15m Heath woodland adaptable, grows well in most soil types & aspects



Hakea Laurina

Pin cushion hakea – Brushtails will eat flower and nut like casing ringtail will eat leaf and flower, sugar glider like to forage for insects and lick the nectar between pink centre's

Grows in clay, sand or gravel, native to the lower south west of WA. Flowers are borne in the leaf axils in autumn and winter starting cream and becoming bright red. best known hakea because it is so adaptable to most soils and aspects, commonly used as street trees in the eastern states



Eucalyptus camaldulensis

River Red Gum -Ringtail, Brushtail, Sugar gliders

3-m 20 m

Heath Woodland

Adaptable, grows well in most soil types & aspects



Eucalyptus radiata

Narrow leaf Peppermint - Ringtail, Brushtail, Sugar gliders, Flying foxes.

15m x 10 m

Heath Woodland - prefers dry conditions once established



Protea Cynaroides

King protea, huge pink flowers that can be as large as 12-13cm in diameter. Water decently to establish. Do not fertilise with anything except slow release fertiliser. Do not use manure.



Protea Eximia

Brushtail possums will eat the leaf but don't really go for the flower

Foliage consists of grey-green stiff leaves. Prune after flowering. Water decently to establish. Do not fertilise with anything except slow release fertiliser. Do not use manure.



Grevillea banksii Alba

Brushtail ringtails and Sugar gliders, Medium shrub 2-3 metres bright green foliage with red/pink brush type flower heads with deep red styles most of the year. Rapid growing and hardy in a moist well drained soil in full sun. Pruning maintains denseness and encourages flowering.



Hakea Orthorrhyncha

A beautiful tall shrub that attracts birds, brushtail and ringtails, sugar gliders feed on insects. Grows on well drained soils in full sun. Broad linear green leaves with erect cylindrical, flowers in winter. Closely related to H.multilineata and H coriacea 3 distinct species).



Syzygium oleosum Blue lilly pilly

Native berries taste a bit like apple
Flying foxes, R T & B T Possums relish them
Gliders take advantage of the flowers also, they are available for extended periods

Flowers are cream to white with long "fluffy" stamens. & may appear any time from October to March - sometimes later. Fruits follow within a few months and may vary in colour from pink through to purple or blue

You can even bake them in a pie for your family of humans with apple.

Acmena smithii Lilly pilly

Formerly known as *Eugenia smithii*, this species is found in all types of rainforest from southern Victoria to Bundaberg in Queensland, from the seaside (littoral rainforest) to the mountains (montane rainforest)

Appendix: **REFERENCES**

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