



HANDRAISING AN ORPHANED FLYING-FOX

— A BEGINNER'S GUIDE

PO Box 4625 Sunshine Coast MC 4560
admin@batrescue.org.au
www.batrescue.org.au
ABN 83 778 026 631



INTRODUCTION

The purpose of this manual is to give new carers a basic introductory guide to hand raising an orphaned baby flying-fox. It is based on the original training manual produced by Linda Collins, one of several respected bat caring pioneers in the 1980s who advocated the use of dummies and mumma rolls. Milk formulas and equipment have improved over the years, and knowledge about flying-foxes is constantly evolving, however the rearing basics have remained largely unchanged. Following the methods described in this manual enables new carers to raise a healthy well-adjusted orphaned flying-fox so that it will survive successfully in the wild. This is of course the ultimate goal.

New carers are encouraged to obtain 'The Flying-fox Manual' by Dave Pinson. This comprehensive manual is constantly updated and has become an invaluable resource for flying-fox carers around Australia.



This manual has been produced by the Management Committee of Bat Rescue Inc. It is regularly reviewed and updated as new information becomes available.

Review Date

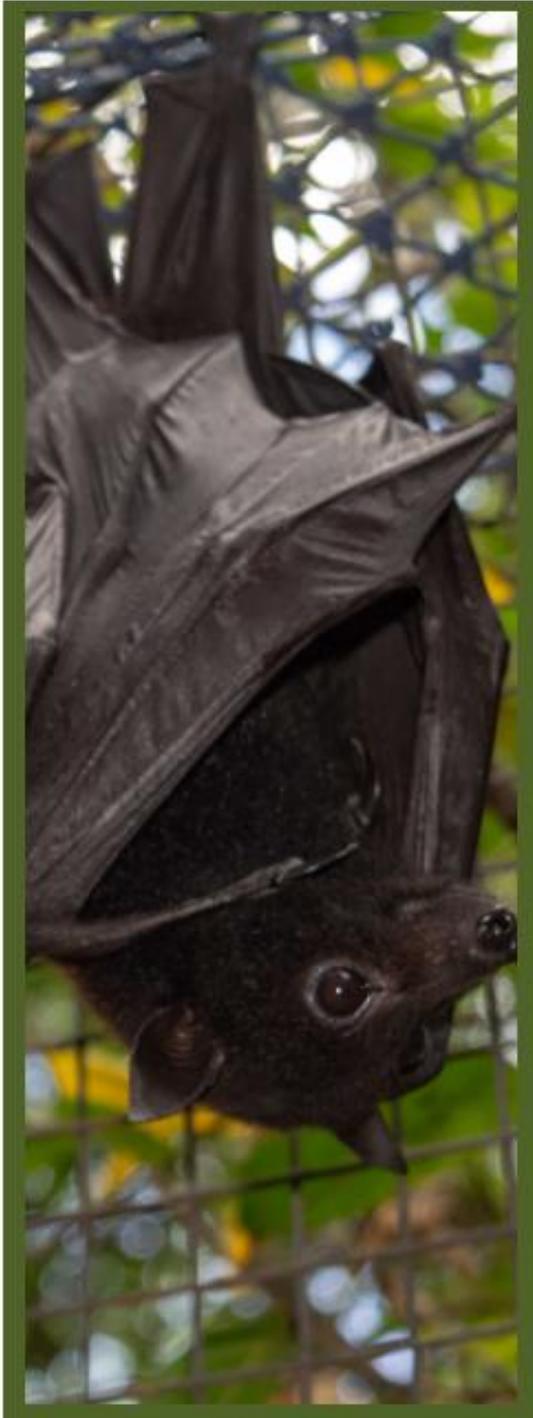
August 2021

Photo Acknowledgments

Sue Morris, Les Hall, © Halley, Gary Bressan, Irene Isaacson, Carmel Givens, Vicki Bressan, Sylvia Hood, Kerrie Fearby

© Bat Rescue Inc. 2021

CONTENTS



THE BASICS

Identification	4
Why baby bats are orphaned	5
Initial assessment	7
Dehydration	8
Equipment Checklist & Guidelines	9
Temperature control	15
Cage Setup (with hammock)	17
Wrapping	18
Feeding	19
Cleaning	22
Daily Sunshine	23
Toileting	24
Hygiene	25
Measuring, Weighing & Recording	26

STAGES OF DEVELOPMENT

1-4 Weeks of Age	28
5-10 Weeks of Age	29
11-14 Weeks of Age	34
Preparation for Creche	38
Weight analysis	41
Trouble shooting	42
Raising Multiple Babies	45
The Public	46
Recommended reading	47

Appendix 1

Basic bat anatomy and physiology	48
Diseases and parasites	49
Symptoms of ABL	52
The importance of sunshine	54
	55

Appendix 2

Ageing guide for flying-foxes	56
Daily record sheet	57
Feeding chart (Biolac)	58
Feeding chart (Wombaroo)	59
	60

Appendix 3

WildMan Online Records System	62
	63

IDENTIFICATION

The species of flying-fox (or 'megabats') you are most likely to encounter in SEQ are:



BLACK FLYING FOX (*Pteropus alecto*)

Weight 500-950 g, forearm 150-190 mm. Fur is generally jet black but with some variation. A ginger patch of fur is often seen on the back of the neck and shoulders and around the eyes and on the face. Some grey frosting all over body fur, particularly on the belly. The legs are hairless from knee to ankle. Birthing season October to December.



GREY-HEADED FLYING FOX (*Pteropus poliocephalus*)

Weight 400-1100 g, forearm 140-190mm. Has distinctive head covered in grey fur and a collar of orange/brown fur which fully encircles the head. The legs are furry to the ankle and the wings are black. This species is federally listed as *Vulnerable*, has a more southern range and is less frequently seen in SEQ than Blacks. Birthing season October to December.



LITTLE RED FLYING FOX (*Pteropus scapulatus*)

Weight 300-600 g, forearm 125-155mm. Usually only seen in SEQ during summer. Wings are semi-transparent brown. Little Reds have a longer face than Blacks and Greys. They are nomadic and follow the flowering of eucalyptus along the coast and inland. They do not visit SEQ every year. Babies are usually born in central and northern Qld and NT. Birthing season April-May.



BLOSSOM BAT (*Syconycteris australis*)

Weight up to 20gms, forearm 38-43mm

Fur is light to reddish brown and is paler on the belly. Nectar and pollen from Banksia and Callistemon is their main diet. Found in SEQ, but comes into care less frequently.



EASTERN TUBE-NOSED BAT (*Nyctimene robinsoni*)

Weight up to 50gms, forearm 65-70mm

Tubular nostrils and bright yellow patches on wings and ears. They eat a variety of fruits, particularly native figs. Found in SEQ, but comes into care less frequently.

COMMON REASONS BABY BATS ARE ORPHANED

In SEQ, orphan Black Flying-foxes and Grey-headed Flying-foxes can start coming into care from late September. Bat Rescue members are at our busiest rescuing orphans during October and November, however late season orphans can also occur in other months. Little Red orphans are sometimes encountered in April/May, but we do not receive an annual influx.

There are many reasons babies can become orphaned, and some are simply found in strange places. Below are the most common circumstances:

FOUND ABANDONED

Occasionally a baby bat is found on a bush or tree or on the ground, calling out or crying for its mother. It has for some reason become separated from its mother. There are sometimes opportunities to reunite the baby with its mother if it was dropped, particularly if there are reports that the mother bat has been heard in the area calling, so discuss with your mentor.

BARBED WIRE

Mothers flying with their young at night often get caught on barbed wire when searching for food. There can be varied outcomes for both mother and baby depending on how long the mother has been caught, and the extent of her injuries.



INJURIES	ACTION
Mother and/or baby injured extensively	Bring mother and baby into care.
Mother and/or baby found dead on arrival	Remove mother and baby from fence. Remove live baby from mother and wrap on mumma roll
Mother and baby alive and uninjured	Still requires assessment. May have dehydration and injuries that are not easily visible
Lactating female found, no baby	Search ground thoroughly and take into care for assessment with the aim to release within 24 hours if uninjured.

POWERLINES

Mothers flying with their babies can come into contact with powerlines and get electrocuted. The mother usually dies, but the baby is often found alive and well depending on how long it has been on its mother. All bats seen on powerlines between the months of October to December are checked for the presence of live babies.



INSPECTION	ACTION
Female, live baby on board	Record details such as street and pole number. Call Energex to arrange immediate rescue. Ensure vaccinated carer available for retrieval when Energex arrives.
Impossible to see if baby on board or not	Blow a whistle loudly, or rattle car keys. A baby will often respond to the noise.
Obvious male	Record details such as street and pole number. Call Energex and report to avoid further calls for the same animal. Energex will remove the body when time permits.

NET CAUGHT

Fruit netting hung loosely over a fruiting tree is a huge trap for bats as they get tangled very quickly. The following actions are similar to barbed wire situations. Injuries from netting can appear up to three weeks post rescue. Contact your coordinator immediately to discuss the treatment protocol.



INSPECTION	ACTION
Mother and/or baby injured	Bring mother and baby into care
Mother and/or baby found dead on arrival	Remove mother and baby from netting. Remove baby from mother if alive and wrap on mumma roll
Mother and baby alive and uninjured	Bring into care for three weeks if at all entangled. Assess for release depending on age of baby and mother's ability to carry.
Lactating female found, no baby	If the bat is within the netting and has not been entangled then the bat may be released.

INITIAL ASSESSMENT



When a rescue is conducted and a baby bat is retrieved, there are a number of steps to take before the baby is placed in care.

After the baby is fully rehydrated, settled into feeding with a bottle, and there are no apparent injuries, the baby will be passed to a new carer.

This phase of assessment and stabilisation will be conducted by a carer who has completed several bat seasons, e.g. your mentor.

Unless otherwise advised by the care-coordinator, all babies must be vet checked.

Overall Appearance

- How does the baby look in terms of responsiveness, vocalisation, movement, signs of injuries?

Dehydration

- Are there signs of dehydration? Is it severe enough to require subcutaneous fluids?
- If the baby is taking fluids by mouth, then fluid replacement should be offered this way. When the baby is severely dehydrated, fluids must be administered subcutaneously by an experienced carer or mentor. The risk of aspiration pneumonia is high if baby is not able to swallow correctly. NOTE: fluids should NOT be offered until the baby has been warmed up first. Never offer fluid to a cold bat.

Stress

- The baby may appear quite stressed with continuous vocalisation. This is due to the stress of being separated from its mother and the baby should be placed on a mumma roll and given a dummy as soon as possible after the rescue. Even babies who have been on a dead mother for days relax immediately when the mumma roll is used.

Behaviour

- The baby may appear extremely drowsy and listless even after rehydration. This is due to extreme exhaustion and the baby will require a lot of sleep. The baby will probably need to be woken up for its feed.



DEHYDRATION



What is dehydration?

Fluid loss

Signs (what to look for)

- Skin tents when pinched
- Sunken or dull eyes
- Pale gums
- Inactive and very quiet
- An assessment of the baby flying-fox will be carried out by an experienced carer before you receive the bat.

Important points

- All young come into care suffering differing levels of fluid depletion.
- The young flying-fox will commonly require an amount of fluid injected just under the skin known as a subcutaneous injection. This provides faster rehydration and is safer in compromised animals that are weak and not able to swallow effectively.
- Only give oral fluids if baby is alert and keen to suck.
- Remember milk is a food **not** a drink, and you rehydrate with 5% glucose in water which needs to be accurately measured. It is absorbed faster than water and offers better recovery rates.
- The baby must be fully rehydrated before starting milk feeds.
- If not rehydrated adequately it will take several days longer and require small and frequent feeds before it regains its strength to bottle feed.
- Frequent feeding means time taken away from sleeping and therefore growing.
- Ensure animal is warmed before offering fluids.
- If you receive a baby flying-fox with any dehydration problems you will be directed by your mentor if extra water is required

EQUIPMENT CHECKLIST

The following items are necessary for orphan rearing:

Cat Carry Cage

A cat carry cage or basket can be used to house your baby during the first 4-6 weeks of age.



Heat Pad

Required for first 4-6 weeks of age (after then the baby will be thermoregulating).

IMPORTANT NOTE: If you wish to use the car adaptor for transporting animals, you MUST have the thermostat control (which comes as an optional extra).



Thermometer

Indoor/outdoor temperature alert thermometer with external probe. This is measured on a continual basis but we do not record unless there are extremes and you wish to make a note of it.



Calipers

Vernier calipers are used to measure the forearm length (the distance between the wrist and the elbow).

Measure the same wing each time e.g. the right wing



Digital Scales

Digital scales are used to measure the weight in grams of the baby flying-fox. Measure before a feed at the same time of the day (e.g. before the morning feed). Use scales with 1-2gm increments.



Dummies and teats

Dummies and teats are available in either latex or silicone. Ensure you have a variety of sizes on hand. Smaller sized teats (without the length and hole) may also be used as a dummy.



Mumma Rolls/Hankies/Wraps

A roll of toweling is used to imitate the mother's body. It reduces stress in your baby. You will need a large supply of cotton face washers or small handtowels, cotton handkerchiefs or dusters. A men's size hanky is sufficient to cover the baby bat on the roll.



Bedding

All bedding should be made of non-synthetic fibres. Be sure if you use any flannelette or fleece that it is 100% cotton. It is easy just to stick with wool, toweling or tea towel fabrics.

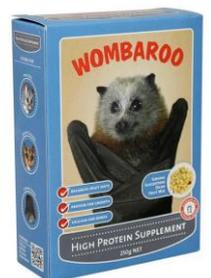


FEEDING EQUIPMENT

Milk Formula & High Protein Supplement

BIOLAC Flying-fox formula or
Wombaroo Flying-fox formula
Wombaroo High Protein Supplement

(Supplied to Bat Rescue Inc in bulk and distributed to carers)



Bottles & Teats

15ml glass bottles
A human baby teat brush is ideal for scrubbing the bottles



Syringes

5ml, 10ml, 20ml
Available from Bat Rescue



Water dripper

For attachment to ailer and cage



Feeding Bowls

For attachment to ailer and cage:
Plastic or metal bowls in small and large sizes



Measuring equipment

Medicine cups or syringes are the most accurate equipment for fluid measurement



Sterilisation

Milton tablets or solution



Cleaning options



See page 22 for further information about the recommended options

Additional Equipment (for 4 weeks of age and older)

Clothes Airing

These are the 12 rung type and are readily available from hardware stores. A strip of gutter guard is attached to hang bowls from for fruit and water. You can remove the lower rungs on the ailer so flapping is not impeded. Ailer needs to be stabilised so it cannot fall over. Clothes pegs are useful to secure towels, hammocks and toys. Plastic tarp and newspapers for floor protection is recommended.



Large Cage (if no spare room available)

It is best to cover the cage with shade cloth on the sides and roof to prevent stress, and prevent heads getting stuck. There may be several available to buy. The dog cage variety is a good example. It should be covered with shade cloth to prevent escape attempts.

Size: 630cm H x 570cm W x 720cm L



OTHER OPTIONAL EQUIPMENT IDEAS

Bottle Warmer

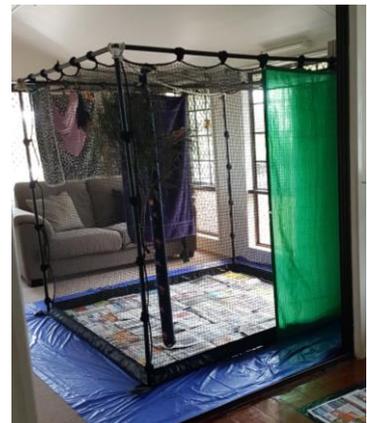
Good quality secondhand warmers can often be found on sites such as eBay



Portable Indoor Enclosure (if no aviary available)

Ideal for carers who do not have an outdoor aviary and need to safely house older babies who are flying. With a tarp on the floor, ropes, toys, pool noodles and foliage, youngsters have plenty of space to play, stretch and build up their strength ready for creche. For indoor use ONLY.

Size: 1.8m x 1.8m x 1.8m



IMPORTANT GUIDELINES ABOUT SOME OF YOUR EQUIPMENT

Dummies

- Your orphan should be encouraged to accept a dummy from the outset. This imitates a natural wild behaviour and babies should not be denied one simply because a carer may have a personal dislike of dummies for human babies. Lacking the comfort and emotional security of a dummy can result in nervous and clingy behaviour, and can lead to biting. If the baby appears not to like their dummy, ask your coordinator about trying a different shape and size dummy as it is very important they take a dummy for security. This can also prevent an insecure bat from sucking on another baby bat.



Heat Pad

- You will need to experiment and adjust the settings to maintain your ambient temperature. Generally you can keep a constant 28°C with the lowest heat setting.
- Place a towel or woollen padding under the heat pad as this helps to retain the heat by preventing heat loss through the bottom of the cage.
- On hot days you may not need the heat pad turned on at all if the outside temperature is high enough, and you in fact may need cooling (see section on ambient temperature).
- Never place your baby directly onto the heat pad. There needs to be layers of fabric between the heat pad and the hammock that the baby is lying on.

Thermometer

- The probe on the thermometer is placed next to the baby's head, not under the body. The external device can be outside the cage to be easily read at a glance.

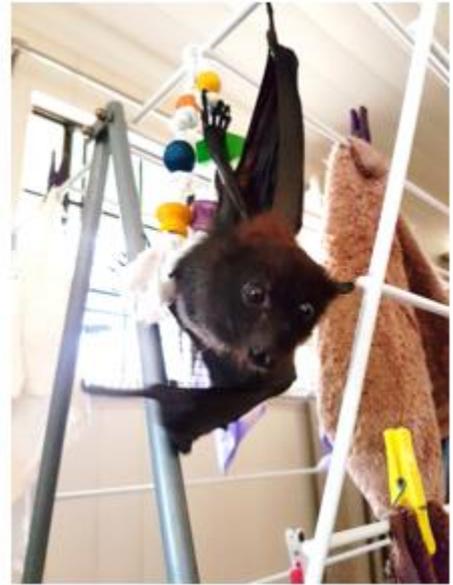
Cat Carry Basket

- Place your basket off the floor in a quiet place away from people, pets and other wildlife. A spare room is a good place if you have one.
- Ensure it is in a well ventilated area, but there are no drafts.
- Ensure the area is completely snake-proof. Flying-foxes have a strong scent and can attract predators. An outdoor shed for example is not suitable. They also need to be where you can check regularly on the temperature etc.

Clothes Airer

- At 4 weeks of age your flying-fox will begin spending time on a clothes airer for approximately one hour after each feed. The baby is then wrapped and returned to bed
- The time the flying-fox spends on the clothes airer will gradually increase until it reaches 6 weeks when the flying-fox will spend all day on the clothes airer (only sleeping in the cat cage at night if necessary for safety).
- You will need to provide a hammock on the clothes airer with a mumma roll hung in the hammock for the flying-fox to cling to (see section 1-4 weeks of age). Any mumma rolls placed on airer must always be attached with a clip/peg.

- When the flying-fox is 7 -10 weeks of age you will need to provide containers for fruit and water on the clothes airer. This is done by attaching plastic gutter guard to the clothes airer and the containers are hooked onto it (see photo page 32)
- When the time comes for the bat to be on a clothes airer, ensure the airer is in a safe environment away from other animals and noise, e.g. spare room
- When the bat starts to fly it is extremely important that the area in which the airer is located is free from hazards, e.g. anything with sharp edges or that can be knocked over.
- Areas such as kitchens and living rooms are not to be used as a space to house the bat on a clothes airer – these are busy, noisy and hazardous areas.



Why is it important to follow these guidelines?

- It is important in reducing stress. Stress will hinder the baby's growth rate
- Remember the **safety first** principle – “it is better to be safe than sorry”

Out and about with your flying-fox (in relation to housing)

If you have to take your flying-fox with you when you go out, there a few things you need to think about:

- Is it necessary to take your flying-fox or can you do a feed and then go out? Remember there are 3-5 hours between feeds
- Consider using a flying-fox babysitter if you are out for the whole day
- Do not leave your flying-fox with someone that is not bat vaccinated even if there are no feeds due
- Do not leave your flying-fox in a car, remember it's summer and heat kills
- Feeding and/or handling your flying-fox in public is strongly discouraged as it causes stress to the animal, it enhances the risk of someone accidentally getting bitten or scratched and it is in fact illegal to 'display' wildlife without a permit
- Remember **any** new environment you place your flying-fox in will be stressful.



TEMPERATURE CONTROL

It is important to consider temperature control when hand-raising a baby animal. Mothers in the wild are able to maintain their baby's temperature in a number of ways and we need to also use various means to achieve this. In discussing this topic there are some terms that you need to understand:

Thermoregulation

- the ability to regulate own body temperature

Ambient temperature

- the surrounding temperature (i.e. the temperature of the air around the animal)

Your baby bat is unable to control its own body temperature until 5-6 weeks of age. Until then, their body temperature must be maintained artificially by providing a constant ambient temperature of 28°C. This number is based on studies performed on mother-reared young in a captive program, it is not a guess.

The consequences of not maintaining a constant temperature will be evident in growth rates and overall well-being of your baby bat. There are circumstances that make it difficult for us to maintain this constant ambient temperature such as during transportation of the baby or daily temperature fluctuations, but it is the ideal that we are aiming to achieve.

It is impossible for us to replicate the wild behaviour as mothers have their baby on their body 24 hours per day. They can fan their baby on hot days or wrap them tightly on cold nights. We do not and cannot "wear" our babies 24 hours per day and perform these same tasks so we rely on alternative methods.

There will be times when the air around your baby needs to be heated and other times when it needs to be cooled. Remember we are raising baby bats in the hottest months and cooling will be just as important as heating.

Measuring the ambient temperature in a carry basket

To measure this, a digital thermometer with a probe is available for carers and is found to be the most reliable. The model provided in the starter kits also has a temperature alert that signals if an unacceptable high or low threshold has been reached. This is particularly useful, for example, if a power failure causes the heat pad to be off overnight and the ambient temperature drops.

The probe is placed next to the baby's head in the carry basket. It is not underneath the baby or touching the baby. The temperature indicator sits outside the carry cage or clipped to the side of the cage so you can see it easily. Helpful hint: Place some elastoplast over the probe's cord (not the probe itself) to hold it in place.

How to maintain the ambient temperature in a carry basket

HEATING TO 28°C

(usually required at night and sometimes during the day)

Equipment	Adjustments
Heat Pad	Use the lowest setting
Cloth cover or towel for placing over basket	This keeps the warm air inside the cage and conserves energy
Cloth padding, towel or sheep skin for placing on top of the heat pad	The padding is put over the heat pad as a protective measure and insulation between hammock and heat pad.
Tea towel or other natural fabric to create a hammock over the heat pad inside the basket	Do NOT place the baby directly onto the heat pad as it would be too hot. The hammock above the heat pad prevents the baby over-heating from direct contact with the heat pad.

COOLING TO 28°C

(usually during the heat of the day when outside temperature reaches more than 28°C)

Equipment	Adjustments
A cold pack or water bottle filled with cold water and placed under the padding	Do NOT place baby directly onto cold pack or bottle, place pack or bottle under the padding the same as when heating is required.
Wrapping	Loosen the handkerchief around the baby, or just drape it over the baby to provide security
Damp cloth or towel hung over the top of the cage	This will create a cooler airflow in the cage if the cold pack is not successful

PLEASE NOTE THE FOLLOWING POINTS:

- The baby bat should always be warm to touch. If the baby is cold or hot then your ambient temperature is wrong, so check your thermometer.
- Never place the baby directly onto a heat pad or cool pack. Hammock method should always be used.
- Although your baby needs sunlight to develop, never leave the baby unattended in the sun – it will overheat.
- Watch for signs of heat stress such as panting, salivating, and wing fanning. Ensure the baby is not dehydrating, and offer water between feeds.
- By six weeks of age the baby should be thermoregulating and will not need artificial heat, but may need cooling on very hot days. To do this set up a hammock as outlined below and place the thermometer probe in the hammock with the baby and put a cold pack on another hammock beneath the baby. Again, if this does not work, place a damp towel over the cage or aircer where the baby is sleeping.
- When travelling in a car, always be aware of sun through the window and place the cage somewhere like the floor of the back seat. If heating is required whilst travelling, then use a heat pad, snugglesafe disc or hot water bottle half filled with hot tap water (not boiling) and make sure it is well insulated from the baby.

Setting up a hammock

The cage is set up using the hammock method. The heat pad is in the bottom of the cage with a woollen layer over it and then a tea towel, t-shirt or cotton flannelette is hung above this like a hammock, using safety pins or clothes pegs.

You can place additional bedding over the top of the baby, and over the cage as well to maintain the temperature particularly on cold nights. During the day you may not need any more than is shown here, and you may not need the heat pad turned on at all on hot days.



Place the temperature probe inside the cage near the baby as described on page 16 and fix the temperature indicator to the outside of the cage for easy monitoring. You can set these thermometers to “alert” if the temperature falls below or rises above the preset temperature range.

WRAPPING

In the wild, the mother flying-fox wraps her wings around her young and baby is attached to her nipple. This provides security, maintains temperature and relaxes the young. As foster carers, we mimic this by placing the baby on a mumma roll and wrapping the baby in a hankie. Men's cotton hankies are ideal because they are just the right size, and thumb hooks are less likely to get caught, however other natural material can be used. Remember to ensure there are no loose threads, these can wrap around flying-fox wing membranes and cause damage.

Mumma rolls are Bat Rescue's recommended method. If using batwraps, always cut off the wrap part and hem to ensure there are no loose threads.

Wrapping the baby

Step 1

Make a roll out of toweling, that is longer than the baby bat



Step 2

Place the baby on the roll of toweling belly down and support with one hand



Step 3

Wrap the hankie folded in a triangle around the body and wings but allow movement of the feet. The baby should be able to wriggle out if it wants to, but also feel secure. You can also cover the baby's head with the pointed end to mimic the mother's wing pit.



Batwraps

Enormous quantities of 'batwraps' have been donated by craft groups in recent years. If not completely dry, the core of the synthetic stuffing could remain damp harbouring bacteria and potentially causing fungal infections (especially if the bat is wrapped too tightly).





FEEDING

There are a number of items required in order to feed a baby bat. The following table describes what these are and when to use them. Practical demonstrations will also be used during the training session. Preferred milk formulas tend to change from time to time, however the Biolac or Wombaroo formula has proven to work well in the majority of cases and is what we recommend all new carers to use.

WHAT	HOW	WHEN
BIOLAC FFOX Formula Wombaroo FFOX formula	See feed charts via the online records system and in Appendix 2 of this manual.	Until age 11 weeks
High Protein Supplement (HPS)	3–10g mixed with fruit	From 71 days old – 10 weeks and 1 day
Fruit (apple only)	<ul style="list-style-type: none"> – Peeled, steamed and cut into small teat-like sizes – Start to increase the size of the fruit (e.g. double) – Peeled and cut into eighths – Peeled and cut into pieces between 1/8 and 1/4 	From week 7 From week 9 From week 10-12 From weeks 12-14
2 other types of fruit e.g. pear and rockmelon	No need to provide a smorgasbord, 3 different fruits is ample. Do NOT give any citrus, pureed or soft fruit.	From week 9
Glass bottle (25 ml)	As provided	Throughout bottle feeding stage. No one feed is greater than 15 ml so this size only is sufficient
Flying-fox Teat	As provided with a small hole pierced in end (see demo)	Should be just a constant drip when upending the bottle, not pouring out
Measuring	This should be a medicine cup (they are more accurate than kitchen cups) or large syringes.	Used for measuring the exact amount of water to add to your formula
Syringe – 5ml and 10 ml	A glass or plastic syringe is used for measuring out each milk feed into a bottle. An accurate measurement is required.	For all milk feeds (See Demo)
Sterilising solution and bottle brushes	Use Milton or boil your equipment (for at least 3 minutes). For bottles, teats, syringes and cups	Until milk feeds cease

Mixing the Formula

BIOLAC FLYING-FOX MILK REPLACER (Yield @81ml total volume)

1 level scoop (supplied) of Biolac mixed with 70mls of pre-boiled very warm water. Initially add the powder to 10-15mls of the warm water. Mix to a smooth gravy consistency and then add the remaining warm water. Mix thoroughly and make up fresh milk daily.

WOMBAROO

To make 250ml milk, add 43gm of powder to 100mls of warm water. Mix to a paste, then make up to 250mls with warm water, mix thoroughly.

To make 100mls of milk, add 17gm of powder to 50mls of warm water. Mix to a paste, then make up to 100mls with warm water, mix thoroughly.

To make 50mls of milk, add 9gm of powder to 25mls of warm water. Mix to a paste, then make up to 50mls with warm water, mix thoroughly.

Teats

- Teats (latex or silicone) are supplied without holes.
- Latex teats are less durable than silicone and will not last an entire season. When the hole in the latex teat becomes too large, start on a new teat as a fast-flowing teat can cause aspiration pneumonia.
- For latex teats, some people use a hot needle to make a hole, others have their own favourite ways. The desired result is that the milk should be able to be 'milked' from the teat in a fine stream, not pouring through in a constant stream. Probably the easiest and most foolproof method is to pierce a small hole in the teat and run a bamboo kebab skewer up through the teat and out through the nipple. Ensure you have spare teats on hand as it can take some practice to find out which method works best for you.
- Silicone teats are more expensive than latex and are not provided to members annually for baby season. If carers wish to use silicone they may purchase directly from suppliers. Some suppliers will also sell special tools which make the ideal sized hole in the teats.

Sterilisation

- After feeding, rinse equipment in cold water.
- Wash well in very hot soapy water to dissolve the fatty milk residue
- Rinse soap from bottles and teats
- Soak in disinfectant solution (Milton is recommended), ensuring all equipment is completely submerged.

Note: use a plastic or glass container and make up fresh sterilizing solution daily according to the manufacturer's directions.



FEEDING POSITION

The baby is held at a 45° angle on a mumma roll. It is comfortable for both the baby and foster carer

Helpful Hints

- Ensure the milk is the right temperature (37°C) by testing a drop or two on your wrist.
- Make up 25, 50, 75 ml as required for the day and store the milk in a glass jar in the fridge.
- Warm the required amount for that feed (e.g. 6 ml) by placing it in the bottle and putting the bottle in a cup of warm water. Put a thermometer in the water to monitor the temperature remembering the cold milk will cool the water down.
- Do not microwave! You can microwave the water to heat it, but do not microwave the formula feed.

VERY IMPORTANT

NEVER feed a baby if it is cold to the touch. Sometimes they can wriggle out of their mumma rolls or the heatpad has been switched off for too long and they get cold.

A young baby that is cold will not be able to suck properly and the milk could be inhaled into the lungs instead of going down to the stomach. The result is usually ASPIRATION PNEUMONIA, which is fatal if not identified quickly and treated with antibiotics.

Early signs of aspiration pneumonia include a rattling sound in the chest, clicking noises and snuffly breathing with lips flaring out.

WATER

Remember to offer your baby a drink of water (room temperature) between feeds, especially on hot days.



CLEANING



Why do we clean?

In the wild, a mother flying-fox cleans her young almost obsessively. Cleaning reduces the risk of bacteria, “slimy wing” and also stimulates skin. It must be done on a daily basis, and after the morning feed is always a nice time as you can combine this with their daily dose of sunshine. More frequent cleaning can be done if needed.

What do we use?

LOTION: Johnson’s baby lotion (pink bottle). If you have difficulty sourcing Johnson’s, a safe alternative is QV Skin Lotion.

OR

BABY WIPES: Johnson’s Skincare Baby Wipes, Curash Fragrance Free Baby Wipes or Curash Simply Water Baby Wipes.

- Cotton balls or make-up removal pads (not wipes) are recommended. Ensure fibres do not come off on wing membrane. Do not use tissues as they are made of wood fibre which can be abrasive on delicate skin.
- Cotton buds are ideal to clean small difficult to access areas (such as the small pocket above the shoulders).
- Warm water may be used on the head and body to remove High Protein Supplement etc. Care must be taken to ensure that no moisture remains. Never use heaters or hairdryers.

See ‘Important Points’ section on the following page.

How do we do it?

Wings are thoroughly and gently wiped either using a cotton ball or make-up pad with a small amount of lotion OR with a baby wipe. Gently wipe the wing dry. Do not rub lotion into the membrane or leave lotion on the skin. The goal is to use the lotion to clean the skin, not to apply moisturiser.

Do not wrap baby up immediately after cleaning but let the wings air. Letting baby hang and flap is ideal. This can be combined with daily sun time.

When you receive your first orphan, your mentor or care co-ordinator will demonstrate the cleaning procedure.

When do we do it?

Cleaning should be done daily until the baby is observed washing its own wings. This usually takes place around the time that the baby starts hanging on the ailer all day. Cleaning of face and genital areas can continue after each feed and toileting and whenever there is poo etc. stuck to fur.

Important Points

- **Only ever use Baby Wipes.** NEVER use Wet Ones, makeup wipes or anything containing alcohol, eucalyptus, tea-tree oil, soaps or detergents (body wash) on babies. Flying-foxes have a natural layer of oil on their wings that keeps membrane soft and waterproof and protects the integrity of the skin.
- When cleaning, pay extra attention to areas where wing membrane and body meet, armpit, elbow, finger and wrist joints.
- Johnson's pink baby lotion has been used successfully for many years, although it is now a different scent and formulation. It is particularly effective removing poo from fur. If you choose this option, ensure that you purchase it from supermarkets or pharmacies (usually made in Malaysia). The version found in dollar shops is manufactured elsewhere and contains different ingredients.
- A perfume-free option is QV Skin Lotion (available in pharmacies) which is dermatologically formulated for delicate, sensitive skins, and has been trialed successfully by carers for several years.
- Do not use any other lotions or moisturisers despite any claims they might make of being 'natural', 'organic' or 'preservative/additive/chemical-free'.

Daily Sunshine

Baby flying-foxes need 10-20 minutes of filtered sunshine **every day**. This is best done in the early mornings/late afternoons and not during the heat of the day. Without this sun exposure, wings can become dry and flaky and the deficiency of Vitamin D3 can lead to bone deformity. Encouraging the baby to hang from your shirt and flap in the sun maximises the exposure.

For older babies, their sunshine sessions can be in a cage or enclosure under supervision. Always ensure the cage is not placed in the blazing sun or left unattended. Black Flying-foxes can particularly overheat.



Please refer to page 55 for more detailed information.

TOILETING



Why do we toilet the baby?

In the wild, the mother licks the genital area of the baby to stimulate urination and defecation. She licks her baby clean and grooms her baby constantly. We simulate the wild behaviour by using a damp cloth or tissue. In the wild, the mother continues cleaning her baby until it is at least 12 weeks of age.

When do we toilet the baby?

It is done before and after each feed. Before a feed, the bladder will then be empty and after the feed the baby may stay dry until the next feed, particularly for babies under 4 weeks old. This is also the time your baby is already being handled. The baby needs to sleep between feeds so it is important not to disturb it unnecessarily.

How do we toilet the baby?

This is done by using a damp cloth or tissue and gently stroking the genital area. It needs to be done gently so as not to irritate this very sensitive part of the bat anatomy. Remember, in the wild the mother licks her baby clean. In time the baby will invert. This is instinctive behaviour and will occur naturally.

What to look for

After the baby has been on the milk diet for a few days, the faeces should be a yellow/mustard colour and be the consistency of toothpaste. The colour may start as dark green when first rescued, but it will change in a few days.

If you notice any bad odour or if the consistency is mucoid (mucous-like), white or deviates from the norm in any way, consult your mentor as treatment may be required.

Any diarrhoea or watery faeces needs to be reported to your mentor immediately. Babies can rapidly lose valuable fluid and electrolytes, which can be fatal.



HYGIENE

Rationale

It is important to discuss hygiene not only for the baby's benefit but for the carer's benefit as well. A clean environment with clean housing and feeding equipment will ensure your baby remains healthy. It is also important to understand that we have just rescued a wild animal that has only known its mother's smell up until this point. We therefore need to be aware of the baby's new environment and reduce stress as much as possible.

This is a baby animal from the wild and it may have diseases, worms, parasites or infections and carers must be diligent to ensure they are not risking their own health whilst fostering their baby bat. Remember as a volunteer, there is no provision under our permit or association to safeguard you (e.g. income protection) if you were to fall ill in the line of duty.

Tips on hygiene for baby and carer

- Be sure to wash your hands before and after handling the baby, particularly if you have domestic animals.
- Avoid perfumed laundry detergents and do not change washing powder during bat season.
- Minimise the amount of strong perfumes or deodorants you use during bat season.
- Smoking around baby bats is definitely not advisable, as any damage to their sense of smell will compromise their survival in the wild.
- Wear the same shirt when you feed your baby bat (a long-sleeved shirt is good as it can protect you from scratches and the baby gets used to the smell of this shirt).
- Don't place your baby in a room where strong odours such as disinfectant have been used.
- Clean your baby daily.
- Toilet your baby routinely before and after each feed.
- Sterilise feeding equipment including the dummy with boiling water, Milton or oxygen drops.
- Replace the bedding if it becomes soiled from urine and faeces.
- Do not kiss your baby bat or allow it to lick you on the face at any time, no matter how adorable and loving they appear.
- Try to minimise scratches by wearing long sleeve shirts and feeding your baby on its mumma roll.
- If you are raising more than one baby ensure to keep teats and dummies for each baby separated as well as wearing a different shirt when you feed them. They should only get used to your smell alone.

MEASURING, WEIGHING AND RECORD KEEPING

It is extremely important that all statistics are collated on any rescues conducted by Bat Rescue Inc. for a number of reasons:

- Requirement of our group rescue permit
- Monitoring progress of animals in care
- Ongoing review of procedures (e.g. treatments)
- Assessment of local colonies
- Funding
- Collection of data for research.

Bat Rescue's preferred means of record-keeping is via the WILDMAN online records system. For any members who do not have access to a computer or the internet, you will be required to report once a week with details to a person nominated to keep your records for you.

What do we measure?

The most important measurements to monitor the progress of the baby are listed below:

WHAT	HOW	WHY
Weight	Measured in grams (g), using digital scales	This helps to assess the health of the animal
Forearm length	Measured in mm, using a set of dial or digital vernier calipers	This helps to determine the age of the animal in care
Age	Based on the forearm measurement when rescued, refer to feeding chart (Appendix 1)	The age is important to know for feeding and monitoring the stages of development
WFA (Weight For Age) (See feeding chart Appendix 1)	This tells us how much over- or underweight your baby bat is. It is simply the actual weight minus the expected weight for that age, and will be recorded as + or – value. E.g. +20 g	This is a general guide and is based on averages of bats studied over time
GPD (Grams Per Day)	Measured in grams, this is an average weight gain per day. Generally GPD is based on measurements taken weekly. If you measure every Saturday simply divide the weight gained in that week by 7	This is a calculation based on the gain in weight averaged over a number of days. It tells us how the animal is developing.

What else do we record?

Species, age, sex, injuries, cause of injuries, contact numbers, vet consulted, treatment and outcome achieved. These are mostly recorded on the Bat Rescue Record (Appendix 2)

Weighing a baby bat



Weigh the baby on a mumma roll or wrapped in a hankie, then inside a bowl.

Remember to hit the TARE button with just the bowl, hankie and/or mumma roll which sets it to zero. That way you will end up with just the weight of the baby without the additional bedding.

Measuring the forearm of a baby bat



The correct method is to measure the distance between the wrist and elbow when the wing is closed. Always measure the RIGHT arm each time.

Measuring ambient temperature

Place the probe near the baby's head in the carry basket to measure ambient temperature. Do not put the probe under the baby's body as we are not measuring body temperature, we are measuring ambient temperature.



STAGES OF DEVELOPMENT

1 to 4 Weeks of Age

Goals of this stage

- Establishing a stress-free environment
- Settling into a routine
- Feeding baby for its age
- Obtaining weight gains

The baby bat has become orphaned or separated from its mother and will be hand-raised by a foster carer. It must adjust to many new things including:

- New milk formula
- New foster mother (YOU)
- New feeding process (Bottle and teat)
- New environment (your home)

What to expect

- Baby may have no weight gain for a week (sometimes longer)
- Baby may be unsettled and may make frequent distress calls
- Bonding between baby and foster carer occurs
- Some sleepless nights for you

Working out feeding volumes

When a baby bat is orphaned it may have been a day or more before being rescued. This could result in weight loss, dehydration, and exhaustion. This is often the case when encountering an orphaned or abandoned baby. After initial assessment and stabilising, it will be passed onto a new carer within 24 hours generally. Baby bats are orphaned at different ages, sometimes a week old, two weeks old etc. An older baby does not necessarily mean it will be healthier, it depends on the individual circumstance of why it is now in care.

Because the baby is debilitated, it will usually weigh less than the weight chart indicates it should weigh based on its forearm measurement. Therefore you will begin feeding your baby according to what its **weight** is, NOT what its **age** is. This is referred to as **feeding for weight**. Gradually, you need to increase the volumes of milk so that your baby is feeding according to its age. This is referred to as **feeding for age**. It can take up to 2 weeks or more to achieve this depending on how underweight the baby was when rescued.

See below for a worked example:-

Days in care	Forearm (mm)	Weight (gm)	Age of baby (Days)	WFA (gm)	Feeding according to weight (ml) / 24 hours	Feeding according to age (ml)/ 24 hours
Day 1	79	78	18	-20	20	25
Day 2	80	80	19	-20	20	25
Start increasing volume from now:						
Day 3	81	83	20	19	22.5	26
Day 4	82	85	21	-19	24	26
Day 5	82.5	88	22	-18	27	27

In this example, the baby is 22 grams under weight according to the weight chart (Appendix 1). We would therefore start to feed the baby on 20 ml per day (24 hour period), based on its weight, not on its age which would be 25ml.

How to increase the volume

Your goal is to be feeding for age by 3-4 weeks old and preferably sooner. When the baby bat is accepting the volume of milk for **weight** you can begin increasing this volume.

After 2 days in care, offer the baby bat an amount **halfway** between these 2 volumes (volume for weight and volume for age) which in the above example would be 22.5 ml in a 24 hour period. If the difference is 4 ml or less, offer the **milk volume for age**. In our example above, on day 3 in care you begin offering your baby an amount of 22.5 ml. If this was readily accepted, then the next day offer the increased amount halfway between again. On day 5 in care, begin offering milk for age as the gap has shrunk to only 2 ml difference on day 4. If your baby did not drink all the 24 ml on day 4 in care, then offer it again on day 5, don't increase it until it has accepted this amount.

If your baby is not drinking all the milk you are offering then don't worry, it will eventually accept it. The main point is that you are simply **offering** this amount of feed which does not necessarily mean it will accept it all.

Follow the weight chart and feed according to the daily volume. DO NOT be tempted to over-feed as it can result in poor weight gains as the baby will usually regurgitate or have very runny faeces. In other words, it can have the same effect as underfeeding which is NO weight gain.

You can see by this example that it is important that you monitor closely what your baby is drinking, and sometimes it helps to measure what is left in the bottle after each feed. The daily record sheet (Appendix 2) helps you record daily progress in these early days until your baby is on track and feeding for age. In the first week or so you may also be weighing and measuring your baby bat on a daily basis to assess its progress. Remember to weight at the same time each day before feeding.



It may be some weeks before your baby catches up to its expected weight for its age. In the above example there was steady weight gain, but notice the baby was still 18 g under weight by day 5. This is normal, and it may take a couple of weeks to make larger weight gains in order to catch up. Remember DON'T be tempted to offer more than the recommended volume for age. You will find that sometimes a baby bat will suddenly have weight gains of 5 or 6 g per day. This is normal for babies that were quite under weight when they came into care.

Fitting in 5 feeds per day

- Not necessarily evenly spaced but consistent
- Get into a routine
- Minimise handling, baby needs sleep between feeds
- Get things done between feeds

To achieve your goal of adequate weight gains, it is important to fit in five feeds per day as per the feeding chart. This can be difficult to juggle for people who work. The important point to remember is try to establish a **routine**. It is not necessary to have five evenly spaced feeds including through the night. It is necessary however, to do the same thing day after day and remain **consistent** in how the feeds are spaced. Your baby needs to sleep between feeds too, so minimise handling as much as possible in this first stage. You may find that you are finding it hard to get anything done at all during the day, so make sure you make use of the time between feeds to get things done.

Examples

Feeding routine evenly spaced

8:00am	12:00pm	4:00pm	8:00pm	12:00am
--------	---------	--------	--------	---------

Feeding routine unevenly spaced

7:30am	12:30pm	5:00pm	8:30pm	12:30am
--------	---------	--------	--------	---------

Temperature Control

- Aim for the optimal ambient temperature of 28°C
- Monitor temperatures regularly particularly hot days and cold nights
- Rearrange bedding and wrapping accordingly

It is important at this age to maintain a constant **ambient** temperature as the baby cannot thermoregulate yet. In the wild, the mother has her baby close to her body and can wrap her wings around the baby to keep it warm. We can simulate this situation with a mumma roll and artificial heating such as a heat pad. The optimal situation is to maintain a 28°C ambient temperature at all times during this stage and will result in the best growth rates for the baby. Fluctuations may be unavoidable during extremely hot days or cold nights, but if we aim for the optimal then we should see good results. This can be achieved by adjusting the baby's surrounds and bedding.

Cleaning and toileting baby

You need to be diligent in cleaning your baby on a daily basis. In the wild, the mother is continuously cleaning her baby by licking it all over. Any urine or faeces allowed to accumulate in armpits or between fingers can lead to fungal infections and requires immediate treatment. This is particularly important in the hot and humid temperatures of summer. It is good to get into a routine of cleaning your baby, and you could do this in the morning sun so your baby is getting its daily dose of sunshine at the same time. Toileting your baby before and after its feeds will help keep your baby clean as well as simulating the wild behaviour of its mother.

Using a Clothes Airing



The clothes airer is introduced at 4 weeks old and a hammock is created in the top of the airer as shown. Start by placing your baby in the hammock for about an hour after each feed. Then wrap the baby and put it into the basket again. If your baby shows any sign of stress or discomfort, then don't persist until he/she is ready. Wrap your baby and return it to the cage until the next feed. You can peg the mumma roll onto the airer which may make it less stressful for the baby. Increase the time on the airer gradually – for example, leave baby on airer

between morning and midday feed, and between the afternoon and evening feed. Start to hang a small water dripper on the airer.

Stress

Cause of stress can include:

- Close proximity to domestic pets
- Injuries
- Changing environments (home-work-home)
- Exposure to too many different environments
- Noisy environment
- Strong smells such as deodorant/perfume/household cleaners
- Lack of attention e.g. regular cleaning and handling
- Stressed foster carer (they can pick up on it)

The key to good growth rates and happy foster caring is to provide an environment with minimal stress to your baby.

Symptoms of Stress

- Poor weight gains
- Hair loss
- Unsettled behaviour

Record Keeping

Record keeping is used to monitor the health of your baby bat. As with any newborn, you need to know if there is sufficient weight gain and if your baby is developing well. The feeding charts indicate the minimum weights achievable with that feeding regime. If your baby is not achieving the minimum, then a closer look is required as to why your baby is not gaining weight. One of the most common symptoms of stress is poor weight gain. This is why weight is monitored closely.

Intestinal Worms

If your baby is lethargic, not gaining weight, is always hungry or vocalizing, passes a worm or any other unusual signs, discuss with your mentor as treatment for worms may be necessary. Either kitten worming paste (Exelpet All-wormer) or Drontal worming suspension for puppies is recommended. When you introduce fruit to the diet it is common for babies to excrete any worms they may have caught from their wild mothers. These worms are specific to flying-foxes.

5 to 10 Weeks of Age

Goals of this stage

- Maintaining a stress-free environment
- Reducing to 4 feeds per day
- Introduction of fruit to the diet
- Increasing time on the clothes airer
- Achieving the expected weight gain of 18g per week

What to expect

- Baby should be settled into your care and recognising you as its “mother”
- Baby will start to get more active and move around a lot, sometimes trying to escape from the cage
- Baby will require more time on the clothes airer and start to flap its wings
- Baby will start to invert on its clothes airer

Reducing to 4 feeds a day

This is usually the time that most carers give a sigh of relief when they can cut out one feed per day. At 27 days of age your baby should be on 30 ml spaced over 5 feeds of 6ml + 6ml + 6ml + 6ml + 6ml

On day 28, it is recommended to go to 4 feeds of 7ml, 8ml, 8ml, 8ml. If your baby is not handling this dramatic change, then continue with 5 feeds but increase to the same volume (increase from the last feed of the day first).

Your baby should be gaining a minimum of 18g per week during this stage. If your baby does not achieve this, then check the trouble-shooting section or speak to your mentor.

Using a Clothes Airer

By 6 weeks of age your baby should be on the airer all day between the morning and evening feed, then wrapped and put back into the cage at night. You will notice your baby starts moving around and flapping on the airer. They cannot fly at this stage so don't be concerned that they may take off around the room. If your baby struggles out of its mumma roll and continually tries escaping from the cage, try putting your baby to bed on its mumma roll in the hammock on your clothes airer. Eventually by the end of this stage, you will find your baby bat has wriggled out of its mumma roll and is hanging on the clothes airer with wings wrapped around its body when sleeping. This is normal behaviour and is a sign that your baby has outgrown the mumma roll. By the end of this stage your baby is very active at night, more so than during the day. Exercising on the airer is very important for building muscle tone.

Teething

There will be a week around the 6 or 7 weeks of age when your baby does not gain as much weight as previous weeks. The baby will chew on its dummy and teat when feeding and can be irritable. There is some serious teething going on now, and you can see the white teeth below the gums about to break through. The little milk teeth that point to the back fall out and their canines come through. There is nothing you can do except let them chew on their dummies to ease the pain.

Introducing fruit to the diet

At the age of 7 weeks, you can begin to introduce fruit to their diet. It is important to understand the diet of the flying-fox and its digestive system. In the wild their diet is:

- High carbohydrate
- Moderate protein
- Low fat

The average “food passage time” from eating to excreting is around 30 minutes. This is very fast compared to other mammals, and bats have adapted this way for flight. Therefore, we must be very particular about what fruits we feed our bats, and how we prepare it. We also need to prepare it in such a way that they can extract the juice from the fruit and not eat any of the pulp. This is why we do NOT puree the fruit. The bat’s palate (roof of mouth) is deeply ridged. This helps the bat to process its food by squeezing the juice out. They then spit out the pulp that is left over.

Babies must never be given soft fruits, such as pawpaw, banana and mango, as they cannot separate the juice and fibre and end up swallowing fibre which they are not ready to handle. Too much fibre in small babies can lead to deadly bowel obstructions.

We also must be aware that we don’t give our baby bats orchard fruits such as lychees or peaches, as Queensland farmers are still permitted to shoot flying-foxes for crop protection. The closest approximation to a native fruit such as lilly pilly is apple which is also readily available and affordable during bat season.

Apple will form the basis of the bat’s diet during creche and release stage so it is important that your baby is eating apple by this stage. To begin feeding your baby apple, follow these steps:

7-9 WEEKS OF AGE

- Peel the apple first
- Cut into pieces the size of a teat end (about 2cm by 1cm)
- Steam the apple or microwave until soft (be careful with microwaving as it can be hotter on the inside)
- Offer it to your baby after the morning feed to begin with
- Start to put the fruit in a bowl on the ailer, attached to the gutter guard
- Start to offer water in a bowl



9-10 WEEKS OF AGE

- Discontinue peeling the fruit
- Increase the size of the fruit to a whole teat size
- Start adding half raw apple with the steamed apple
- Add another fruit to the diet (for example pear or rockmelon).
- Still on 4 milk feeds per day
-



10-12 WEEKS OF AGE

- Baby can be offered 3 fruits in their bowl
- Increase the size to eighths
- Baby should be consuming between 100 and 200 grams of apple per day between milk feeds
- Discontinue steaming the apple
- Start getting into the habit of **weighing** what you offer and how much is left over



By the time your orphan goes to crèche it should be used to eating fruit this size. Why? In the wild fruit does not come chopped into dainty pieces. It is important that hand-reared bats learn to manipulate large pieces, holding it with one foot while taking bites.



Cleaning and Toileting



You will notice that your baby will start to groom itself and invert off the clothes airer to urinate and defecate. They do this instinctively and do not need to be shown. Your baby will still need to be cleaned daily however, until they are competent at this, which is usually by the end of this stage.

Stress

Stress can be an issue if you have not followed some of the guidelines. Ensure your baby is not on a clothes airer in a wide-open space (for example in the middle of your living room with TV and other noises). They need a quiet and peaceful environment away from household noise and domestic pets. If your baby is not accepting fruit initially, don't substitute for something else, persist in offering apple until it is readily accepting it. This will make their life in creche and release far less stressful if they are familiar with the fruits which will be on offer there.

Record Keeping

Continue with your record keeping on a weekly basis, but use your daily sheets to record any unusual observations or milestones. It is important that the weekly weights and forearm measurements are recorded for the weight analysis and to pick up any problems early.

11 to 14 Weeks of Age

Goals of this stage

- Maintaining a stress-free environment
- Introducing powder feeds to the diet
- Preparing for the first flight
- Achieving the expected weight gain of 18 g per week
- Preparing for creche and distancing yourself

What to expect

- Baby will be very active at night now
- Baby may start to fly around the room/enclosure
- Baby may reject powder feeds at first

Introducing powder feeds to the diet

At this stage, we are going to be replacing milk feeds (or liquid feeds) with powder feeds. Sometimes referred to as “weaning”. The powder we use is the Wombaroo High Protein Supplement (HPS).

The procedure starts at 10 weeks and 1 day of age as follows:

Age in Days	Liquid Feeds (Formula)	Powder Feeds (HPS)
71	3 per day	1 powder feed = 3 g HPS mixed with fruit between liquid feeds
72	3 per day	3 g
73	3 per day	3 g
74	2 per day	2 powder feeds = 6 g of HPS mixed with fruit between liquid feeds and in evening
75	2 per day	6 g
76	2 per day	6 g
77 (11 weeks)	1 per day	3 powder feeds = 9 g HPS mixed with fruit and offered in afternoon and evening
78	1 per day	9 g
79	1 per day	9 g
80 (12 weeks)	0	10 g HPS mixed with 250 g fruit or more, offered in evening only

Helpful Hints

- Mix the HPS well with the fruit, adding water if required. It should be a smooth wet coating on the fruit not a powdery or gluggy coating.
- Weigh your fruit daily and increase amounts by 25g if all the food is gone by early evening (don't add extra HPS). There should always be a small amount left over and if not, this indicates that your baby needs more fruit.
- It is a good idea to mix up the fruit in one go for the day with the required HPS added in. Refrigerate and it's ready for the day.
- Do not use more than 10 g of HPS per day, however continue to increase the fruit intake.
- If your baby is consuming a lot of water (a bowl a night) then be sure at first that it hasn't been tipped out. Then make sure you are not giving too much HPS in the fruit.
- Once babies have HPS in their fruit they may need to have dried HPS cleaned off their facial fur daily until they get more skillful at feeding and grooming. While it may look cute, rotting HPS and fruit juice on their face is bad for their skin.



When baby starts to fly



At around 12-13 weeks of age, your baby bat will suddenly take off when flapping madly on its airer. Be prepared for this event and ensure your baby is in a safe environment for this to occur. If you cannot provide a safe room, then your baby must be placed in a cage. It is not vitally important that the baby actually takes off from its airer, as long as it has plenty of room to flap without touching any obstacles. It will get all the flying practice it needs in creche. An ideal cage would be one in which the airer can comfortably fit. However, if this is not possible then a large cage will suffice as long as flapping is not inhibited by the dimensions of the cage.

There have been near disasters in the past when baby bats have flown into unsafe areas because they are only just learning. It is better to be safe than sorry.

The first sign that your baby is about to fly is when they are flapping to a point that their body rises to a horizontal position. Their forearms will need to be around 120mm for them to fly. Do NOT encourage your baby to fly towards YOU. This is not good preparation for survival in the wild.

If your baby lands on the floor, which is likely for a few times, ensure that there is a way for it to climb back onto the airer by ensuring that a cloth hangs from the airer and reaches the ground.

Eliminate obstacles in your room as much as possible so the baby cannot get itself wedged or caught in or behind anything. Remember your baby will be very active at night and you could wake up to find an injured or at least one very stressed-out bat.

'Sooky' and scared babies

Some babies are very sooky and cry out for you in the early hours of the morning (e.g. 4am). This is usually when the mother would be returning to the colony after feeding. It is best to attend to its needs by wrapping and holding your baby or even giving it a bottle (if still under 12 weeks of age). Remember they are still babies who get scared and need comforting. Your baby may get very stressed in bad thunderstorms. Even moving curtains from breezes can be enough to scare it and the baby may need reassurance and comforting. If your baby's living quarters are external to the house (for example on a verandah), then ensure that you can hear what is going on and be prepared to leap out of bed at the sound of extreme vocalisation and flapping. Ensure the area is snake proof.

Preparation for creche at week 13-14



At weeks 13 or 14 your baby will need to be placed into creche. If you are raising only one baby, then it will need some socialisation before creche and your care coordinator will possibly place your baby in a group situation prior to creche.

Your baby must be eating apple in large raw and unpeeled pieces, and two other fruits such as rockmelon and pear. Your baby must not be taking any liquid

feeds and be readily accepting the HPS on its fruit. These are the basic requirements for entry into creche. If there is any problem, then your baby will be held back before entering creche. Because there are usually “late” and “early” babies, we have different creching times, but the aim is to identify any problems well before this stage.

You will be permitted to observe your baby bat in creche from a distance but not be able to handle the baby again once placed into creche. This is the time when “grief and loss counselling” is offered to carers (cuddles and chocolate). When the bats are placed in the release aviary human contact is kept to a minimum, and no one other than the release site officer enters the cage at all.

When handing your baby into creche, your baby will be weighed, measured and banded (temporary bands) on receipt. Each week the babies in creche are weighed to monitor weight gains. This way, any problems with stress can be picked up early.

If the procedures in this manual have been followed and your baby has developed as it should with the appropriate growth rates, then your baby should enjoy a successful release to the wild. This procedure is designed to help these bats SURVIVE in the wild. The satisfaction of reaching this end point is incredible for new and old carers, and we usually celebrate the conclusion of bat season with a get-together.

WEIGHT ANALYSIS

In preparation for release it is necessary to monitor average daily weight gains and check weight for age through the stages of care. This can be done using the online records system.

STAGE	MINIMUM GROWTH
1 (first 4 weeks in care)	2.0 GPD
2 (4 weeks until creche)	2.6 GPD Ideally bats should enter creche +20gms
3 (Creche to Release)	2.6 GPD

Babies should be weighed weekly and the results entered online whilst in care. After being handed in to creche they continue to be weighed weekly, and weighed once on entering the release stage.

Analysing the data in this way demonstrates how the hand-rearing program is going. It highlights any problems, along the way. If an animal is doing poorly in Stage 1 and fails to thrive still in Stage 2 then remedial action can be taken so the animal is fit for release. There should be an even or gradual weight gain over the three stages. In some circumstances, the animal may need to be put in alternative care if it is a management issue, otherwise it could be the animal itself. Your mentor will need to review your weekly figures to ensure there are no problems during these critical stages of development. Most animals tend to thrive during the creche stage. However, if there is a problem with stress and weight gains are inadequate during creche (Stage 3), then the animal needs to be reviewed.

Weight and forearm measurements

Other statistics demonstrate whether our animals have had adequate “growth”, as well as adequate weight gains. This is analysed using the forearm measurement in relation to the weights. The table below is a baseline for assessing our own hand-reared babies. If our measurements fall within these guidelines, then we are achieving the desired growth rates.

Weight (grams)	Forearm (mm)
200-300	120-130
301-400	131-140
401-500	141-150
501-600	151-160



Monitoring progress

Individual animal growth history can be reviewed in the online records system. See page 62 for instructions on how to use the system.

The screenshot displays the WildMan Wildlife Management System interface. At the top, there is a navigation bar with icons for Return, Add, Details, Growth, Carers, Health, Release, Monitor, Photos, Diet, Necropsy, History, and Buddy. Below this is a 'Growth Chart' showing 'Weight in grams' on the y-axis (ranging from 160 to 340) and 'Age In Days' on the x-axis (ranging from 40 to 84). Two lines are plotted: a blue line for 'Predicted' weight and a red line for 'Actual' weight. The actual weight consistently stays above the predicted weight, indicating the animal is growing faster than expected. Below the chart, a text box defines 'WFA = Weight For Age' with an arrow pointing to the 'WFA +/-' column in the table below.

Date	Weight	ForeArm	Age	Grams per Day	Weight for Age	WFA +/-	Notes
18th Dec 2020	333.00gm	133.50(+3.50 mm) mm	+83 days		294.00gm	+39.00gm	Off to Batavia to be with some mates
13th Dec 2020	318.00gm	132.00(+4.00 mm) mm	+78 days	+3.00	279.00gm	+39.00gm	
6th Dec 2020	295.00gm	126.00(+2.00 mm) mm	+71 days	+3.29	258.00gm	+37.00gm	
29th Nov 2020	254.00gm	120.00(+0.00 mm) mm	+64 days	+5.86	237.00gm	+17.00gm	
22nd Nov 2020	220.00gm	115.50(+0.50 mm) mm	+57 days	+4.86	217.00gm	+3.00gm	
15th Nov 2020	188.00gm	107.00(-3.00 mm) mm	+50 days	+4.57	197.00gm	-9.00gm	Alone on ailer
8th Nov 2020	171.00gm	103.50(-0.50 mm) mm	+43 days	+2.43	178.00gm	-7.00gm	
5th Nov 2020	165.00gm	101.50(+0.50 mm) mm	+40 days	+2.00	170.00gm	-5.00gm	No injuries, fed well

© Copyright Birdsong Software, 2015

TROUBLE SHOOTING

PROBLEM	POSSIBLE CAUSE	POSSIBLE SOLUTION
Not gaining weight after 4 weeks in care	<ul style="list-style-type: none"> Bat is still adjusting Suffering stress Worms Other underlying illness (ask mentor) 	<ul style="list-style-type: none"> Review food quantities Review causes of stress e.g. pets, noise etc. Requires dose of kitten worming paste
Vomiting after feeds	<ul style="list-style-type: none"> Hole in bat teat is too large Quantity too large Not adjusting well to milk formula 	<ul style="list-style-type: none"> Try another teat with smaller hole Review quantity being fed Try another method such as glass syringe Discuss with mentor, maybe lactose intolerant (alternative formula required)
Baby won't let go of the teat	This is normal, they get attached to teats and that is why a dummy is provided	Try squeezing the side of its jaw and it should release. Don't pull straight out, you need to unhook from the backward pointing milk teeth.
Vocalising a lot	<ul style="list-style-type: none"> Stress or Pain Potential ABL 	<ul style="list-style-type: none"> Check for stressors Consult mentor
Showing aggression	<ul style="list-style-type: none"> Stress or Pain Potential ABL 	<ul style="list-style-type: none"> Check for stressors and monitor closely Consult mentor
Has white, runny faeces	Overfeeding – digestive system not coping with volume	Review feed quantities
Has bald patches appearing in fur	<ul style="list-style-type: none"> Stress Skin disorder 	<ul style="list-style-type: none"> Check for stressors Consult with mentor
Has a different odour and wings are slimy looking	Fungal infection caused by inadequate cleaning	<ul style="list-style-type: none"> Ensure baby is cleaned daily paying particular attention to wingpits, wrists etc, Consult with mentor may need medicating
Screams early in the morning and seems distressed	Needs comforting and/or food – normal behaviour	Attend to its needs
Crawls onto ground to reach me	Needs comforting, food	Attend to its needs and place back on clothes airer, may need wrapping for extra comfort/security
Will not eat apple	<ul style="list-style-type: none"> Apple not soft and small enough Just doesn't seem to like it 	<ul style="list-style-type: none"> Review the preparation process Continue to offer after milk feed. DO NOT substitute with any other fruit.
Tries to bite me	<ul style="list-style-type: none"> Asserting its independence If baby become more and more aggressive consult mentor immediately 	Take a hint and give your baby its space
Black flecks in poo	<ul style="list-style-type: none"> Baby is beginning to self-clean, the black specks are dead skin cells from the wings. This is perfectly normal. 	This is a sign to reduce the amount of cleaning to avoid the baby ingesting the products you are using.

Raising Multiple Babies

The number of orphans a carer can raise each season will vary depending on the time and space available. Raising one single orphan is not ideal, and all carers will generally be asked to take on a minimum of two. This allows the babies to have company and learn to socialize when they are a little older, which mimics their natural behaviour in the wild. Carers are never encouraged to take on more than they can comfortably manage as it doesn't help the animals or the carer.

When raising multiple orphans, it is important that they are physically separated with their own baskets and their own airers until they reach an age when they would start to take an interest in other babies and interacting in the wild (around 6-7 weeks of age). It is also important to ensure that each baby receives the amount of emotional support and individual attention that it needs from you.

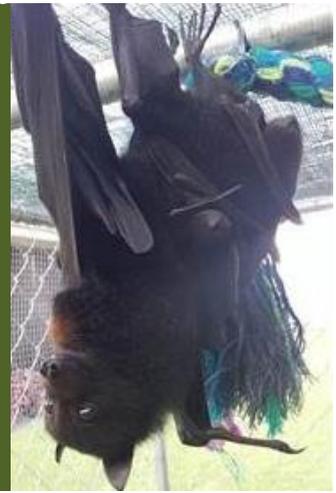
If kept in close proximity, babies may seek each other out, cling together ('hugging') or latch on to ears, wing tips and other body parts which can then become badly damaged by sucking. The orphans involved must be separated. This unnatural behaviour can result not only in permanent physical damage, but can also be detrimental to the longterm survival of both bats post-release. Older insecure babies can also develop clinging habits, so it is important to observe and supervise all interaction between your orphans.

Discuss with your mentor if you notice your orphans display any hugging, sucking or bullying behaviour.



← This is **NOT** 'cute'

The same bats three months later →



THE PUBLIC



Regrettably the flying-fox has faced extensive negative criticism in the public domain due to their potential to carry ABL. As a bat carer you will always be faced with the challenge to educate and inform the public concerning Flying-fox issues. One issue which as carers we are occasionally faced with is the Category 3 bat or C3 bat. These are bats that have bitten a non-vaccinated member of the public. The only means of testing if the bat is carrying ABL is by euthanasing the bat and testing its brain tissue.

To ensure your baby bat is not at risk of being euthanased as a result of exposure to a member of the public, please follow these guidelines:

- Never allow any member of the public (including family and friends who are not vaccinated) to touch any bat in your care or that you are rescuing.
- Never display a bat in public unless you have a specific reason to do so and you have a display permit.
- When your bat has reached the stage where it is beginning to fly, ensure that it does not pose a potential risk to family and friends by flying onto them.

RECOMMENDED READING

Churchill S, *Australian Bats*, Reed/New Holland, Sydney, 1998

Hall L and Richards G, *Flying Foxes Fruit and Blossom Bats of Australia*, UNSW Press, 2000

Collins L, *Hand-Rearing and Development of the Orphaned Flying-fox*, 2002 revision

Pinson, D, *The flying-fox Manual*, Stickeebatz Publishing 2021



APPENDIX 1

BASIC BAT ANATOMY AND PHYSIOLOGY

Overview

“Bats are the only mammals capable of active and sustained flight.”

(Hall & Richards 2000)

Bats, as we recognise them today, have been on earth for at least 55 million years and their evolutionary origins are still a subject of debate. Bats belong to the order Chiroptera (meaning “hand winged”) and are divided into two suborders:-

Microbats (Yangochiroptera) – small, mainly insectivorous bats that hunt using echolocation. The smallest is the bumble bee bat from Thailand weighing 1.5 g. In Australia we have 63 species of microbats.

Megabats (Yinpterochiroptera) – (includes flying-foxes, tube-nosed bats and blossom bats) Large vegetarian bats which navigate principally by sight and smell. The largest is *Pteropus giganteus* found in India, Pakistan and Burma and weighs up to 1.6 kg with a wingspan of 1.7 m. In Australia, we have 13 species of megachiroptera, 8 of which are Flying-foxes.

Flying-foxes are placental mammals. They are warm-blooded, deliver a well developed, open-eyed, furred (except for abdomen and under the chin) baby and suckle their young. Twins are very rare. The gestation period is approximately 6 months. *P. poliocephalus* and *P. alecto* are born from late September through to November. *P. scapulatus* are born from April to May.

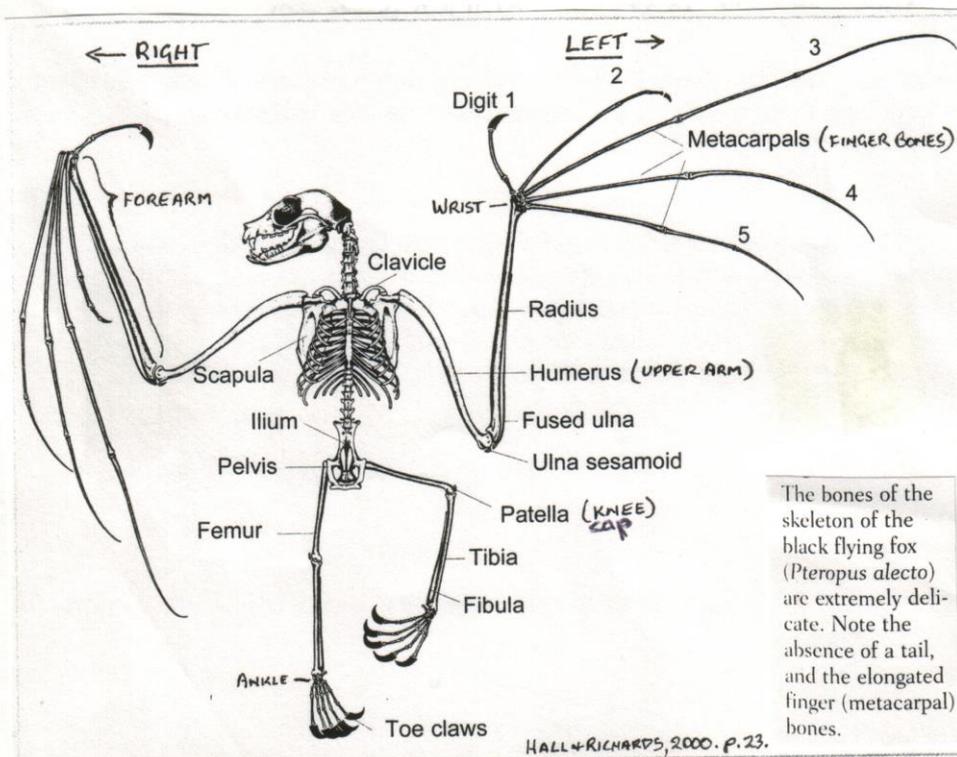
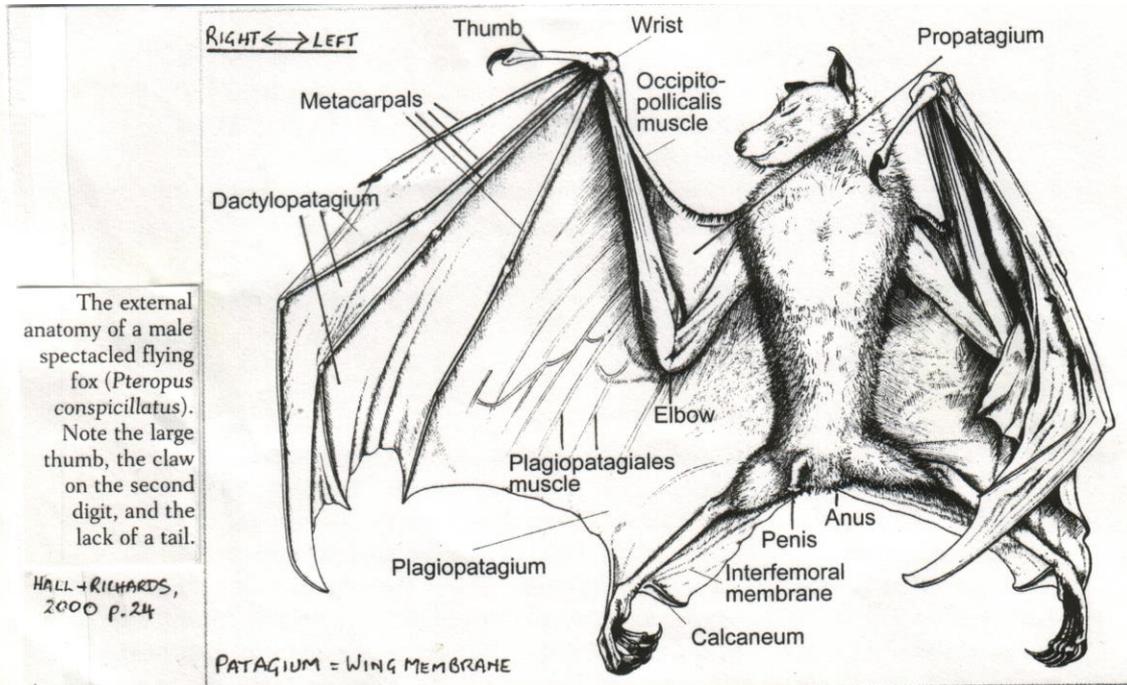
The baby has “oversized” feet and an extra little hook on the thumb hook and toenails to aid in clinging to its mother. By also latching on to mother’s teat located in her “wingpit”, the baby is carried very securely for the first month of its life.

From birth until 5-6 weeks old, the baby does not have the ability to control its own body temperature. This is called “thermoregulation”. By clinging to its mother and being wrapped in her wings, the baby is kept warm and secure. The mother also keeps her baby scrupulously clean, using her tongue to lick and groom.



Anatomy

The following diagrams will assist you when describing sites of concern or injury on your baby. These illustrations are the work of Louise Saunders and are reproduced with her permission.



The Wing Membrane – Patagium

This remarkable 'silky' tissue is composed of a double layer of almost hairless, pigmented epidermis (surface skin) sandwiching a thin layer of connective tissue.

- The epidermis of flying-foxes produces its own waterproofing agent.
- The connective tissue between these layers contains blood vessels, nerves, slivers of muscle and a network of elastin fibres.
- The elastin fibres (as the name suggests) allows the wing to spread, remain moderately rigid but stay flexible and tear resistant for the stresses of flight and normal wear and abrasion, yet these fibres also allow the wing membrane to contract and fold into a compact bundle when the bat is at rest.
- The presence of blood vessels and nerves in the connective tissue means that holes and damage to the wing will heal (provided there is 360° of normal tissue around the injury).
- By increasing the blood flow to the wings and "flapping", the bat can cool down. Conversely when cold, the bat reduces blood flow to the wings and wraps them around the body to conserve heat.

Teeth and Digestion

Milk teeth are present at birth and are slender and curved towards the back of the mouth. This shape aids the young in clinging to its mother. The milk teeth begin to disappear after 2 weeks and have all fallen out after 4 weeks. Adults have 34 teeth (widely spaced) and the molars show a unique design among mammals for crushing plant material. Flying-foxes don't actually "eat" fruit. They crush it using their teeth and pressing it between the tongue and a deeply ridged palate, swallow the extracted juices and smaller seeds, then spit out the pulp. This technique gives them sustenance but no "bulk" in the digestive system to weigh them down during flight. Food transit through the gut is rapid:- 12-34 minutes (Hall & Richards p69).

To urinate or defecate, flying-foxes "invert" – i.e. they turn themselves upside down and hang from their thumb hooks (bottom down), do their business, give a shake and then return to hanging by their feet.

Vision

Flying-foxes can see quite effectively in bright light (but not as well as humans). However their visual ability exceeds that of humans in low light. It is particularly adapted to recognising light colours in low light. "The visual ability of flying-foxes is considered to be equivalent to the cat which is well known for both its diurnal and nocturnal visual alertness" (Hall & Richards p37).

Hearing

The flying-fox's hearing is acute and the range (i.e. low pitch to high pitch) is very similar to that of humans.

Smell

The sense of smell is highly developed and appears to be the main sensory system for the location of food.

DISEASES & PARASITES

Worms – *Toxocara pteropodis*

- Found in all flying-foxes and grow up to 15cm long.
- Larvae transmitted through the mother's milk
- Adult worm is expelled spontaneously on weaning in the wild
- Sometimes inadequate weight gain in babies after 4 weeks of age can be due to a worm burden and treatment is recommended. Consult your mentor.



Mites

A variety of mites the size of a pin head and smaller are found at different locations on a bat's body (ears, wing membrane, fur, around wounds). Some can transfer to humans and cause dermatitis. Some can be removed using sticky tape; others can do significant damage to skin and require medication. Contact your mentor for an appropriate treatment.

Wingless Flies – *Nycteribiidae*

A small long-legged insect seen scurrying around the fur of just about every flying-fox. They feed on dead skin cells and are "bat-specific" (i.e. they won't crawl all over you) and as far as we know are harmless. The best treatment is to pick them off and "crack" them under your thumbnail, however they really don't tend to bother the flying-fox too much.

Membrane Infections ("Slimy wing")

This can appear as white spots or greyish translucent patches on the wing and may feel sticky with an "infectious" odour. The most common cause is inadequate cleaning and drying of the wings especially in and around the wrist and wingpit and along the baby's body where the wing meets the body. Remember, in the wild, the mother keeps her baby scrupulously clean, removing all traces of dirt with her tongue.

Wing infections can be fungal or bacterial – a swab needs to be examined under microscope to be certain. Talk to your mentor. Initial treatment is to apply a 1:30 diluted solution of Malaseb (an antibacterial/antifungal wash) daily for three days.

Leptospirosis

An infectious organism found in livestock, pets and wildlife and recently found to be present in flying-foxes that bears the potential to cause infection in humans. It resides in the bat's kidneys and can be transmitted when the urine of an infected animal comes in contact with



mucous membranes such as the eyes or mouth or via an open wound. Leptospirosis is treatable but potentially lethal. It is still unknown what percentage of flying-foxes have this infection or whether babies are infected (only adults have been tested so far). Ref. Tarnya Cox (Hons Student UQ) WPSQ Councillor, Letter in WPSQ Newsletter Autumn 2003 No. 174).

Rat Lungworm (*Angiostrongylus cantonensis*)

Normally a parasite of rats and molluscs (slugs and snails) but is picked up by the flying-fox when they intentionally or accidentally eat slugs or snails. Larvae travel to the spinal cord and brain, grow into adult worms, then move to the heart and lungs. It has been found that just under 20% of flying-foxes showing symptoms of neurological disease were found to have worms in their brains. Flying-foxes infected with rat lungworm show very similar clinical signs to Flying-foxes infected with the Australian Bat Lyssavirus.

Ref:1. Raddacliff L.A et al, Aust. Vet J 1999; 77(7);466-8
2.Barret J et al, Aust. Vet J (submitted)

AUSTRALIAN BAT LYSSAVIRUS (ABL)

What is it?

ABL is a virus related to rabies (“mad dog disease” or “hydrophobia”) and the symptoms and course of ABL infection is virtually indistinguishable from those seen in rabies.

How does it work?

The virus lives in the salivary glands of an infected animal and enters the human body via broken skin (cuts, scratches and bites) or mucous membranes (eyes, mouth, nose etc). It then makes its way through tissue to nerve ends in muscle tissue, spreads up the nerve to the brain where it multiplies rapidly and exits via the nerves to other tissue-especially salivary glands where it multiplies dramatically, ready to spread to the next host by biting.

Once the virus enters the nerves, it is protected from the body’s defences (antibodies and scavenger blood cells). The incubation period (the time before the virus enters the nervous system) can be anything between 4 days and 19 years). This is why we need to be vaccinated so that we already have antibodies in our system ready to pounce before the virus gets to the nervous system.

Protection/Prevention

If you do get bitten or scratched by a bat, wash the site thoroughly for 5 minutes with soap and water, apply an iodine-based antiseptic to the site and contact your mentor. When handling your baby bat:

- wear gloves which extend above the wrist (latex, cotton or soft leather)
- always wear a long-sleeve shirt when handling your baby
- the use of dummies helps to avoid the baby latching onto you for security
- keep in mind any bat may be infected with ABL so develop a habit of “universal precaution”

Symptoms of ABL in a flying-fox

The signs of Lyssavirus vary greatly, and the bat can be either very calm or very aggressive. Many different signs have been noted and can include:

- Staring
- Abnormal responses
- Weakness - unable to hang or climb
- Unable to eat
- Coma
- Sudden aggressive behaviour
- Neurological signs
- Biting randomly at everything including themselves
- Body tremors and convulsions
- Agitated, hyperactive
- Drooling
- Fixed dilated pupils

A bat that is suspected of ABL should be isolated. Keep handling to a minimum - protective equipment (including thick gloves, long sleeves and eye protection) should be worn. Report suspicions to your mentor or care co-ordinator.

The stages of Lyssavirus have been observed in a captive flying fox and took almost one week from start to finish, although it has been noted that the same process can also take as little as 18 hours. Generally the following symptoms were noted (in roughly this order):

- Aggression (probably associated with the pain and headache associated with swelling of the brain)
- Screaming and vocalisation
- Cramping (drawing legs up as if in pain)
- Aloofness from other bats – hanging away from the others. It was noted that other bats also deliberately avoided the animal
- Salivation (drooling)
- Eyes darting
- Paralysis in legs
- Abnormal aggression
- Excessive grooming of genitals (maybe sign of kidney problems, animal attempting to stimulate urination)
- Snuffly breathing, nasal discharge (sounds like it has a heavy cold)
- Lethargy
- Death

THE IMPORTANCE OF SUNSHINE



Flying-foxes have an incredible bone structure, which they rely upon to transport them up to 100 kms in a night. It is widely accepted that calcium is needed for strong bones, however Vitamin D3 is required to synthesise it. Without calcium, baby flying-foxes can become hypocalcemic and suffer from bone curvatures, spontaneous fractures and lack of forearm growth as well as complications with their immune system, cardiovascular system, sight, breeding potential and overall wellbeing.

The D3 cycle is a biological process dependent on a combination of factors including exposure to sunlight, heat, cool and rest.

This amazing process begins with a Cholesterol called Pro Vitamin D (7DHC), which is produced in the skin. When this cholesterol is exposed to sunlight (including the all-important UV-B) it is turned into Pre-Vitamin D within the skin membrane. Exposure to warmth converts this

newly manufactured pre-vitamin D into Vitamin D3 which is sent out into the blood plasma combining with a Vitamin D binding protein. It is then carried to the liver where it is converted into the steroid hormone Calcidiol (25-hydroxy vitamin D3). The blood then carries this Calcidiol around the body to the kidneys. Here, some of the Calcidiol converts into the active Vitamin D hormone called Calcitriol which plays an essential role in the mineralization of bone, and regulating calcium (and phosphorous) levels in the body. Calcitriol also provides significant benefits to the immune and cardiovascular systems.

Exposure to direct sunlight (even on a cloudy day) is the start of this process and is vital to ensure optimum health of your orphans. If any part of the cycle is missed, the process will be incomplete and your baby flying-fox could suffer spontaneous fractures as they become more mobile in the aviary.

Baby flying-foxes need a MINIMUM of 10-20 minutes of dappled sunlight per day. Encourage them to open their wings and receive maximum skin exposure outside (not through a window) and NOT during the hottest part of the day.

Jeannie Campbell
Bat Rescue Inc.



APPENDIX 2



AGEING GUIDE FOR BLACK & GREY-HEADED FLYING-FOXES

Statistics sourced from numerous groups over multiple years

MALE			FEMALE		
Premmie	<0-days	<p>Usually come in Sep-Jan. Forearm less than 57mm. Weight less than 85 g (weight is highly variable). Long umbilicus and/or placenta may still be attached.</p> <p>NB: if forearm 57mm plus, but weight is less, probably an underweight baby – not a premmie.</p>	Premmie	<0-days	<p>Usually come in Sep-Jan. Forearm less than 57mm. Weight less than 85 g (weight is highly variable). Long umbilicus and/or placenta may still be attached.</p> <p>NB: if forearm 57mm plus, but weight is less, probably an underweight baby – not a premmie.</p>
Baby	0-3 months	<p>Usually come in Sep-Jan. Forearm 57mm plus. Weight 85 g plus (variable – may be as low as 50 g). Umbilical stub may be present, but usually no umbilicus, unless just born.</p>	Baby	0-3 months	<p>Usually come in Sep-Jan. Forearm 57mm plus. Weight 85 g plus (variable – may be as low as 50 g). Umbilical stub may be present, but usually no umbilicus, unless just born.</p>
Juvenile	3-6 months	<p>Usually come in Jan-May. Forearm 130-150mm. Weight 250-400 g. Forearm measurement essential to help establish age.</p> <p>NB: juveniles often come in grossly underweight for their size from malnutrition.</p>	Juvenile	3-6 months	<p>Usually come in Jan-May. Forearm 130-150mm. Weight 250-400 g. Forearm measurement essential to help establish age.</p> <p>NB: juveniles often come in grossly underweight for their size from malnutrition.</p>
Sub-Adult	6-18 months	<p>Usually come in Apr-Apr. Forearm 145-155mm. Weight 400-600 g. Small penis.</p> <p>NB: sub-adults often come in grossly underweight for their size from malnutrition.</p>	Sub-Adult	6-18 months	<p>Usually come in Apr-Apr. Forearm 140-150mm. Weight 400-500 g. Nipples are small.</p> <p>NB: sub-adults often come in grossly underweight for their size from malnutrition.</p>
Adult	18 months >	<p>Can come in any time of the year. Forearm 160mm plus. Weight 600-110 g.</p> <p>Has a large penis.</p>	Adult	18 months >	<p>Can come in any time of the year. Forearm 160mm plus. Weight 500-800 g. Nipples are large and elongated after second year – if fertile.</p> <p>NB: If forearm and weight match, but nipples are small, you probably have an infertile adult – not an extra large sub-adult.</p>

NOTES

This chart is intended to follow nationally accepted guidelines to establish a common age classification of flying-foxes for records.

Sub-adult and adult classification is based on the assumption that sub-adults turn to adults around ± 2 years old – actual maturity determined by penis size (male) and nipple size/lactation (female). Full sexual maturity reached in second or third year.

Forearms are a guide only, and may be slightly above or below indicated figures. Similarly, weights are averaged, and may be lower in adults due to factors such as malnutrition.

Adult males are heavier in summer than winter. Females (if pregnant) are heavier in winter than summer.



BIOLAC CHART FOR GREY-HEADED & BLACK FLYING-FOXES

BIOLAC INFANT FLYING-FOX MILK FORMULA

Approximate age, forearm measurements and weights (to be used as a guide only).

VOLUMES FOR BIOLAC INFANT FLYING FOX MILK FORMULA BASED ON TOTAL INTAKE OF @ 25% BODYWEIGHT PER DAY*. MIXING INSTRUCTIONS ON REVERSE. THIS PRODUCT IS CONCENTRATED. DO NOT OVERFEED.

Important: All orphaned flying-foxes on receipt are fed volume of milk for their WEIGHT (not age).

AGE	ARM	WT	FEED	
[days]	[mm]	[grams]	[mL/day]	[schedule]
1	57.5	71	18	3 3 4 4 4
2	59	72	18	3 3 4 4 4
3	60	73	18	3 3 4 4 4
4	61.5	74	19	3 4 4 4 4
5	63	75	19	3 4 4 4 4
6	64	76	19	3 4 4 4 4
1 week	65	78	20	4 4 4 4 4
8	66.5	79	20	4 4 4 4 4
9	68	80	20	4 4 4 4 4
10	69	82	21	4 4 4 4 5
11	70	83	21	4 4 4 4 5
12	71.5	85	21	4 4 4 4 5
13	72.5	87	22	4 4 4 5 5
2 wks 2	73.5	89	22	4 4 4 5 5
15	75	91	23	4 4 5 5 5
16	76	93	23	4 4 5 5 5
17	77	95	24	4 5 5 5 5
18	78.5	98	25	5 5 5 5 5
19	79.5	100	25	5 5 5 5 5
20	80.5	102	26	5 5 5 5 6
3 wks 3	81.5	104	26	5 5 5 5 6
22	83	106	27	5 5 5 6 6
23	84	109	27	5 5 5 6 6
24	85	112	28	5 5 6 6 6
25	86	115	28	5 5 6 6 6
26	87	117	29	5 6 6 6 6
27	88	119	30	6 6 6 6 6
4 wks 4	89	122	31	7 8 8 8
29	90	125	31	7 8 8 8
30	91	128	32	8 8 8 8
31	92	131	33	8 8 8 9
32	93	134	34	8 8 9 9
33	94	137	34	8 8 9 9
34	95	140	35	8 9 9 9
5 weeks	96	144	36	9 9 9 9
36	97	147	37	9 9 9 10
37	98	150	38	9 9 10 10
38	99	153	38	9 9 10 10
39	99.5	156	39	9 10 10 10
40	100.5	159	40	10 10 10 10
41	101.5	162	41	10 10 10 11
6 weeks	102	166	42	10 10 11 11

AGE	ARM	WT	FEED	
[days]	[mm]	[grams]	[mL/day]	[schedule]
43	103	169	42	10 10 11 11
44	104	173	43	10 11 11 11
45	105	177	44	11 11 11 11
46	105.5	180	45	11 11 11 12
47	106.5	183	46	11 11 12 12
48	107.5	187	47	11 12 12 12
7 wks 5	108.5	192	48	12 12 12 12
50	109.5	195	49	12 12 12 13
51	110	198	50	12 12 13 13
52	110.5	202	51	12 13 13 13
53	111.5	206	51	12 13 13 13
54	112	209	52	13 13 13 13
55	113	213	53	13 13 13 14
8 weeks	114	217	54	13 13 14 14
57	114.5	221	55	13 14 14 14
58	115	225	56	14 14 14 14
59	116	229	57	14 14 14 15
60	117	232	58	14 14 15 15
61	117.5	236	59	14 15 15 15
62 6	118.5	240	60	15 15 15 15
9 weeks	119	244	60	15 15 15 15
64	119.5	248	60	15 15 15 15
65	120	252	60	15 15 15 15
66	121	256	60	15 15 15 15
67	121.5	260	60	15 15 15 15
68	122	263	60	15 15 15 15
69	123	267	60	15 15 15 15
10 wks 7	123.5	272	45	15 15 15
71	124	275	45	15 15 15
72	124.5	279	45	15 15 15
73	125	283	30	15 15
74	126	287	30	15 15
75	126.5	291	30	15 15
76	127	295	15	15
11 wks	127.5	298	15	15
78	128	303	15	15
79 8	129	307	0	0
80	129.5	310	0	0
81	130	314	0	0
82	130.5	317	0	0
83	131	322	0	0
12 wks	131.5	326	0	0

NOTES FOR STAGES ABOVE:

- (1) Feed for weight; offer volume only – do not force.
- (2) Start making transition to feeding for AGE.
- (3) All orphans should now be drinking volume of milk for AGE.
- (4) Reduce from 5 feeds to 4.
- (5) Introduce fruit (apple only) – blacks and greys.
- (6) Max' volume reached: 15mL.
- (7) Weaning - start adding powder to fruit.
- (8) All orphans now weaned, and eating appropriate sized fruit in readiness to enter crèche.



AGE	ARM	WT	FEED	
[days]	[mm]	[grams]	[mL/day]	[schedule]
85	132	329	-	-
86	132.5	333	-	-
87	133	337	-	-
88	133.5	340	-	-
89	134	344	-	-
90	134.5	348	-	-
13 wks	134.5	352	-	-
92	135	355	-	-
93	135.5	358	-	-
94	136	362	-	-
95	136.5	365	-	-
96	137	368	-	-
97	137	372	-	-
14 wks	137.5	375	-	-
99	138	378	-	-
100	138.5	382	-	-
101	139	385	-	-
102	139	388	-	-
103	139.5	391	-	-
104	140	394	-	-
15 wks	140	398	-	-
106	140.5	401	-	-
107	140.5	404	-	-
108	141	407	-	-
109	141.5	409	-	-
110	141.5	412	-	-
111	142	415	-	-
16 wks	142	418	-	-

AGE	ARM	WT	FEED	
[days]	[mm]	[grams]	[mL/day]	[schedule]
113	142	420	-	-
114	142.5	423	-	-
115	143	426	-	-
116	143	428	-	-
117	143	430	-	-
118	143.5	433	-	-
17 wks	143.5	435	-	-
120	144	437	-	-
121	144	439	-	-
122	144	441	-	-
123	144.5	443	-	-
124	144.5	445	-	-
125	145	447	-	-
18 wks	145	448	-	-
127	145	450	-	-
128	145	452	-	-
129	145.5	454	-	-
130	145.5	455	-	-
131	145.5	457	-	-
132	146	458	-	-
19 wks	146	459	-	-
134	146	460	-	-
135	146	461	-	-
136	146	462	-	-
137	146.5	463	-	-
138	146.5	463	-	-
139	146.5	464	-	-
20 wks	146.5	464	-	-

SUGGESTED FEED TIMES 5 x DAILY [4 hours between each feed]				
7.00 am	11.00 am	3.00 pm	7.00 pm	11.00 pm

SUGGESTED FEED TIMES 4 x DAILY [5 hours between each feed]			
7.00 am	12.00 pm	5.00 pm	10.00 pm

NB: THIS MILK REPLACER IS CONCENTRATED. DO NOT OVER-FEED. THE RECOMMENDED TOTAL MAXIMUM DAILY INTAKE IS 25% BODYWEIGHT OF THE ORPHAN PER 24-HOUR PERIOD. THUS, A 100g ORPHAN SHOULD BE TAKING 25mL PER DAY – NOT PER FEED.

MIXING (BIOLAC INFANT FLYING-FOX MILK REPLACER) YIELDING @ 81mL TOTAL VOLUME.

- 14 GRAMS or 1 LEVEL BIOLAC-SUPPLIED scoop of BIOLAC FLYING-FOX MILK FORMULA POWDER.
- 70mL warm PRE-BOILED WATER. **WE RECOMMEND VERY WARM WATER.**
- Initially add powder to @ 10-15 mL of the warm water. Mix to a smooth paste (like gravy), and then add remaining warm water. Mix thoroughly.
- It is recommended to make up fresh milk daily.

EXTRA NOTES:

- For initial feeds (after full hydration), transition at 50:50 milk/water mix for first feed, 75:25 milk/water mix for second feed, and full strength milk from third feed onwards.
- Faecal consistency should resemble firm toothpaste. If constipation occurs (hard pellets), mix back to slightly weaker strength, and feed a little more volume. Alternatively, simply add a little water to one of the feeds: e.g. if feeding 5mL, draw up an extra 2-4mL of water and add to syringe or bottle.

WATER FOR ORPHANS: All orphan pups should be offered water ad lib between milk feeds at least once per day – more so in very hot weather. Water to be available at all times once on airer/frame.

Chart (weight & forearm) compiled and produced by Dave Pinson & Connie Kerr (2009) from graphed data (n=60 known age babies, cross-referenced with 270 hand-reared orphans) with 3-step polynomial regression applied. Volumes based on 25% bodyweight at recommended 1 scoop to 70mL water (1:70). Note: the manufacturer recommendation is 1:50, feeding at 10-15% bodyweight/day, but for general use, we have found mixing and feeding as per this chart to achieve optimal results in almost all situations, with particular regard to digestion and closely matching growth rates of wild mother-reared pups.



WOMBAROO FEED CHART For Black & Grey-headed Flying-foxes

Age	FA	Wt	Feed					Notes	Age	FA	Wt	Feed					Notes	
Days	mm	g	ml	Schedule					Days	mm	g	ml	Schedule					
0	60	70	22	4	4	4	5	5		46	106	186	42	10	10	11	11	
1	62	72	23	4	4	5	5	5		47	107	189	42	10	10	11	11	
2	63	75	24	4	5	5	5	5		48	108	192	43	10	11	11	11	
3	64	77	24	4	5	5	5	5		Wk7	109	194	43	10	11	11	11	
4	65	79	25	5	5	5	5	5		50	110	197	44	11	11	11	11	
5	66	82	25	5	5	5	5	5		51	110	200	44	11	11	11	11	
6	67	84	25	5	5	5	5	5		52	111	203	44	11	11	11	11	
Wk1	69	86	26	5	5	5	5	6		53	112	205	45	11	11	11	12	
8	70	89	26	5	5	5	5	6		54	113	208	45	11	11	11	12	
9	71	91	26	5	5	5	5	6		55	113	211	45	11	11	11	12	
10	72	93	27	5	5	5	6	6		Wk8	114	214	46	11	11	12	12	
11	73	96	27	5	5	5	6	6		57	115	217	46	11	11	12	12	
12	74	98	28	5	5	6	6	6		58	115	220	47	11	12	12	12	
13	75	101	28	5	5	6	6	6		59	116	222	47	11	12	12	12	
Wk2	76	103	29	5	6	6	6	6		60	117	225	48	12	12	12	12	
15	77	106	29	5	6	6	6	6		61	118	228	48	12	12	12	12	
16	79	108	30	6	6	6	6	6		62	118	231	48	12	12	12	12	
17	80	111	30	6	6	6	6	6		Wk9	119	234	49	12	12	12	13	Stop peeling
18	81	113	31	6	6	6	6	7		64	120	237	49	12	12	12	13	
19	82	115	31	6	6	6	6	7		65	120	240	50	12	12	13	13	½ raw - 2 fruits
20	83	118	32	6	6	6	7	7		66	121	243	50	12	12	13	13	
Wk3	84	120	32	6	6	6	7	7		67	121	246	51	12	13	13	13	
22	85	123	33	6	6	7	7	7		68	122	249	52	13	13	13	13	
23	86	125	33	6	6	7	7	7		69	123	252	52	13	13	13	13	
24	87	128	34	6	7	7	7	7		Wk10	123	255	39	13	13	13		3 bottles
25	88	131	34	6	7	7	7	7		71	124	258	39	13	13	13		Add HP
26	89	133	35	7	7	7	7	7		72	124	261	39	13	13	13		
27	90	136	35	7	7	7	7	7		73	125	264	39	13	13	13		
Wk4	91	138	35	7	7	7	7	7	Airer	74	126	267	39	13	13	13		
29	92	141	36	7	7	7	7	8		75	126	270	26	13	13			2 bottles
30	93	143	36	9	9	9	9		4 bottles	76	127	273	26	13	13			
31	93	146	36	9	9	9	9			Wk11	127	276	26	13	13			3 fruits
32	94	149	37	9	9	9	10			78	128	279	26	13	13			
33	95	151	37	9	9	9	10			79	128	282	26	13	13			
34	96	154	37	9	9	9	10			80	129	285	13	13				
Wk5	97	156	37	9	9	9	10		Airer Fulltime	81	129	288	13	13				
36	98	159	38	9	9	10	10			82	130	291	13	13				
37	99	162	38	9	9	10	10			83	130	294	13	13				
38	100	164	39	9	10	10	10			Wk12	131	297	13	13				Weaned
39	101	167	39	9	10	10	10			85	131	300						200 g fruit + HP
40	101	170	40	10	10	10	10			86	132	303						
41	102	172	40	10	10	10	10			87	132	307						
Wk6	103	175	40	10	10	10	10		Steamed Apple	88	133	310						
43	104	178	40	10	10	10	10			89	133	313						
44	105	181	41	10	10	10	11			90	133	316						
45	106	183	41	10	10	10	11			Wk13	134	319						



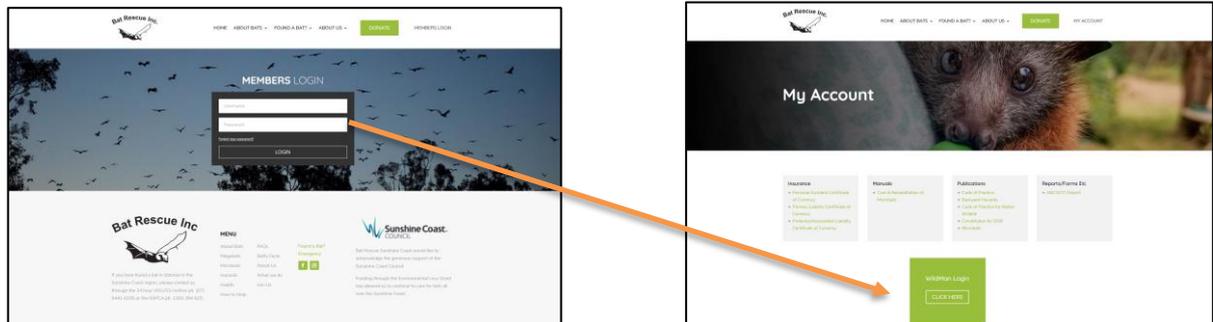
APPENDIX 3

WILDMAN ONLINE RECORDS SYSTEM

In order to fulfil annual reporting obligations and comply with Bat Rescue’s group permit requirements, rescue and call logs must be regularly maintained by members. Bat Rescue uses an online records system called **WildMan**.

The Bat Rescue Membership Form (Section E ‘Active Member Agreement’) requires that members commit to maintaining regular records and agree to abide by Bat Rescue By-Laws (By-Laws No. 22 to 24 refer to record-keeping):

- Records should be entered within 72 hours of receipt of a bat
- All records are entered into WildMan via the Members’ Area of the Bat Rescue website
- If you do not have access to the internet, you must make arrangements with the Care Co-Ordinator or another member to enter records on your behalf.



A username and password will be provided to you to access the Members’ Area of the website and your WildMan account. You may change the passwords on both of these if you wish. Access directly to WildMan without going through the website can be made through this link: <https://batrescue.org.au/WildMan/WildMan.php>

WildMan is touch-enabled to work on tablets and phones.

New carers are generally given orphans that have been stabilised and ready for their new home. Their WildMan record will have been created, and the baby will be transferred to appear under your name.

Growth records for orphans are recorded on a weekly basis, on the same day each week. You should also record the details of any medications or health issues which occur along the way (as well as reporting them to your mentor).

Should you have any questions, or experience any difficulties logging into or using the records system, please contact membership@batrescue.org.au.



A Brief Guide to Using WildMan

A WildMan UserID and password will be provided to you.

Enter your credentials, and login.

For demonstration purposes, an account in the name of **Dora Dingbat** has been created.

You are welcome to login as Dora and practice adding growth records, health issues etc to the bats she has in care.

USER ID: DoraDingbat
PASSWORD: Ding2002

CARER LIST

Depending on location, Bat Rescue's current carers are listed under either of these two Group dropdowns:

- **Bat Rescue (Sunshine Coast)**
- **Bat Rescue (Brisbane) 2014**

Dora's account can be found under Bat Rescue (Sunshine Coast)

ID	Name	Postcode	Area
460	Lashia Collins	4556	Buderim and surrounds
455	Anita Glover		Woombye and surrounds
408	Anita/Ashley Trimachi/Trebilcock	4561	Mt Coolum and surrounds
451	Annya Ellis	4558	Maroochydore and surrounds
246	Carmel & Ridley Givens/Kennedy	4552	Maleny/Witta/Landsborough/Peacheater
388	Charmaine Brayley	4021	Ex Bats QLDcreche and release at Woodford
444	Chris Wilson		Bribie Island To Woodford Member of BCRQ
355	Claire Smith	4560	Nambour and surrounds
404	Corina Viljoen	4680	Calliope and surrounds
461	Dana Bath	4562	

VIEW PROFILE

286	Dora Dingbat
-----	--------------

Selecting the ID number, or Dora's name, will reveal her profile.

NOTE: Carers are not able to view the profiles or bat records of others

Adding your photo is optional (this can be done for you by the administrators)

BATS IN CARE

Selecting **Animals** on the toolbar and Dora's name from the **Carer** dropdown will show the bats she currently has in care.

Select either of Dora's orphans to view their records.

ID	Name	Species	Status	Date of Birth	Age
4300	DemoBaby2 W+31.00 FA+5.00(30/01)	Grey-headed Flying-fox	In Care	31st Oct 2020	9 months 6
4301	DemoBaby1 W+27.00 FA+4.00(02/01)	Black Flying-fox	In Care	12th Oct 2020	9 months 2

VIEW OR EDIT ANIMAL DETAILS

This screen shows general details of the bat (i.e. rescue location, date, reason and condition etc).

To edit or add any information to the details, use the **Edit** icon on the toolbar.

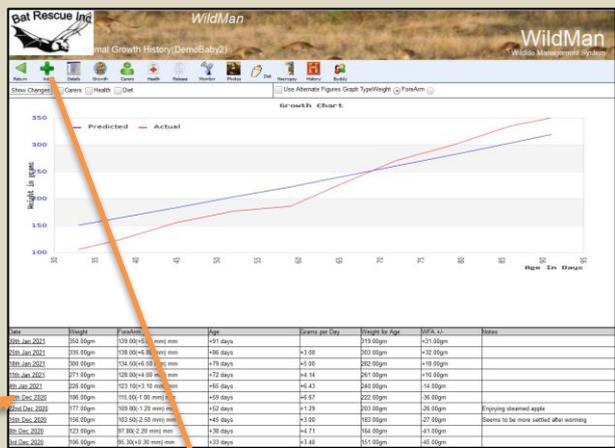
Press **Save** and **Return** when finished.

ADD A GROWTH RECORD



From the View Animals screen, select the **Growth** icon.

- Select **+** icon to add a new weekly measurement on the growth record.
- Select an underlined date to open or edit any particular growth record.



You only need to complete the **Weight** and **Arm Length** in this screen.

You may also add comments and observations in the **Notes** section if you wish.

Press **Save** and **Return**.

ADD HEALTH ISSUE/TREATMENT

Use the **Health** icon. Selecting underlined dates of entries will display details of medications, vet visits etc. Press **Save** and **Return**.

Date	Incident Type	Short Description
<u>10th Dec 2020</u>	Wormed	Wormed Drontal twice

