ON PHYSICAL AND CHEMICAL RESTRAINT OF MARSUPIALS

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Introduction

The safety principles for capturing, restraining and handling wild animals for examination are:

animal health and welfare (includes safety, security, comfort and stress minimisation)

handler safety

audience safety

Remember:

wild animals believe they need to escape or defend themselves if they are to survive when restrained

their responses often mask even severe injuries, disability and pain, including internal injuries

wild animals can move very fast

humans and domestic animals are regarded as dangerous predators.

Reasons for restraint

rescue, i.e. remove from an unsafe situation

capture within enclosures, in examination rooms, in the wild, and escapees

assist feeding

toileting/cleaning

treatment/vaccination

health examination to check for injuries and other signs of disease, including imaging

take blood and other tissues for health investigation or research

identification (ear tags, transponder chips)

transfer between enclosures/sites, containers, between carrier and cage,

reproductive assistance (pouch check, sex determination, semen collection, embryo transfer)

genetic analysis (skin sample for molecular typing)

managing the population – establishing new groups

euthanasia

The health of most wild animals must be significantly compromised for them to have been caught by usually unskilled members of the public but their injuries or illness may not be obvious without thorough examination that may require observation over time. For this reason wild animals presented for examination at a clinic or rescue organisation must be monitored for at least 24 hours to ensure normal appetite, drinking, excretion and behaviour before it can be successfully returned to the wild. Exceptions to this rule include juveniles recently separated from their parents (e.g., fledglings still learning to fly well enough to escape) and echidnas which are slow to move away from tormentors.

Methods of restraint

Behavioural restraint

Physical restraint

Suitable for minimally invasive procedures and to induce anaesthesia

Must be safe for handler and animal

Requires experience, expertise and knowledge of the species and even individual to avoid injury to handler and animal

Manual capture and restraint can be suitable for small to medium animals

Use nets and bags for small to medium sized animals

A hoop net resembles a giant butterfly net, with a long, strong handle fixed to a metal or fibreglass hoop supporting the net. This net should be made of fine, soft, strong mesh and deep enough to allow an animal to be trapped in its folds as the operator twists the handle.

Crates can be used to hold and transport conscious animals, or as recovery boxes for anaesthetised individuals. They should be big enough for an animal to stand up and turn around, while also allowing the operator to observe it easily.

Can use boxes, tubes, towels and specialised equipment (e.g., hook for snakes)

Latex gloves can be used to minimise the risks of transferring pathogens but thick gloves (such as welder's gloves) impair dexterity and sensitivity which increases the risk of injury to smaller animals and often only provide a false sense of security to inexperienced handlers. They should thus only be used if the handler is not sufficiently experienced to handle the species competently without them.

Chemical restraint

Required for many veterinary procedures to achieve sufficient restraint, analgesia and minimise stress and injuries

The most appropriate drugs and delivery method vary between species, the circumstances and the level of sedation/anaesthesia required

Ideally drugs are reversible at the end of the procedure

Remote delivery systems are used with many species

Intravenous anaesthesia

IV route rarely used to induce general anaesthesia in wild animals

Used in ratites after manual capture and restraint

Rapid induction

Most useful for giving supplemental doses to anaesthetised or sedated animals

Intramuscular anaesthesia

IM route most commonly used

hand injection once restrained physically

remote drug administration: there are four basic systems: pole syringes, blowpipes, dart pistols and dart rifles

pole syringe:

syringe and large bore needle fitted to an extension pole

used to safely inject animals from a distance of 1-2 metres

useful when the animal is contained, partially immobilised or easily approached

spring-loaded or manual pressure

Blow dart

useful over short distances (usually 5-15 m for most operators but can be effective to 20 m and very occasionally 30 m) and require consistent practice to be effective.

cheap and probably the safest system.

light and unlikely to damage small animals with little muscle mass

useful for small to large animals that can be approached

can only deliver small volumes of drug over 5-7 m distance

a prohibited weapons licence is required in NSW which means few people can use them

Dart rifle/gun

dart rifles provide the greatest range and accuracy – up to 80 metres. Consequently they are the system of choice for large enclosures or open range where the animals cannot be approached to within 15 metres

powder charged (.22 calibre blank) or CO2 powered

dart pistols – effective range 5-15 metres

dart rifles – effective range 10-80 metres

darts are aimed at a large muscle mass

pressure selected according to distance and dart mass (refer to ballistics charts)

misplaced or high velocity darts can cause severe injuries – fractures, penetrate body cavities

volume of drug limited by dart size

Inhalational anaesthesia

isoflurane and oxygen best

mask induction of small mammals and birds

general anaesthesia in large animals after induction with injectable sedatives

most species can be intubated with an endotracheal tube

Potential complications

darting injuries

capture myopathy

prolonged or violent induction or recovery – injury and misadventure

anaesthetic complications – regurgitation and aspiration, hypoventilation, hyperthermia

1. General Capture and Examination Principles

The basic principles for capturing wild animals include:

coaxing injured animals into a confined space or trap can greatly simplify capture

most wild animals can be enveloped in a towel or similar cloth material

long handled nets can be very useful to catch wild animals in medium to large enclosures

most animals calm once their eyes are covered and they are securely confined (e.g., in a bag)

the more forcefully a stressed animal is held the more it will panic and struggle

always check the pouch of adult female marsupials for young which often can be reared if the mother dies.

Most small to medium sized marsupials should be wrapped in a towel or placed in a bag or plastic rescue box for examination or carrying. Most marsupials feel secure and calm when confined in a bag that resembles a pouch. Elliot traps can be used to trap small marsupials and very small animals can be held in one hand

Unwrap the relevant part for examination

2.1 Small Marsupials (dasyurid, bandicoots, small gliders, joeys)

dasyurids have very sharp teeth and bite (also chew plastic and cardboard)

they all try to escape quickly

bandicoots are prone to stress

arboreal species tend to try and climb/run to a high point

furless young can chill very quickly - within minutes or less

Catching Principles:

holding:

best wrapped in a towel or holding bag (pouch)

some can be restrained by holding the scruff in one hand and supporting the rump with the other

can be held by the hand but they may bite when they feel threatened or constrained

hold young, particularly furless, in warm cloths or cloth bags on a hot pack.

2.2 Possums and Large Gliders

they defend themselves with very sharp front and back claws and try to escape

when they bite they often grab and hold

most can climb up their own tails to reach the handler's hand if allowed

they will try to run/climb to the highest point (including you)

they can jump and are very agile

Catching Principles:

most possums and gliders can be scooped up in a towel and placed in a large bag or plastic rescue box

possum traps can be used to trap possums and gliders

can use long handled nets

holding:

best kept wrapped in a towel or holding bag (or artificial pouch)

to assess gait and agility it is best to remove a possum from the box, bag or towel by grasping the tail about ¾ from the base and lift it on to the floor – use the tail to manipulate the possum and allow it to move around under control

stroking the possum with the free hand can calm some possums enough to allow close examination

can also restrain by holding the scruff in one hand and the rump with the other – can be carried this way for a short time

more rigid restraint can be effected by holding the possum by the neck and shoulders by one hand and the tail base by the other, taking care to avoid being raked by the hind paws

Holding grip for larger possums and gliders

2.3 Koalas and Wombats

have very strong, sharp front and back claws

can bite very hard

have very strong legs

can be surprisingly fast

can jump.

Catching Principles:

joeys, juveniles and small adults can be restrained by lifting under the shoulders and forelegs

holding:

constrain in a large garbage bin

koalas can be restrained and carried a short distance by holding the scruff with one hand and supporting the rump with the other

2.4 Macropods

they can stress very quickly and suffer capture myopathy which can be fatal

they can deliver very powerful kicks or gouge with their very strong hind legs

they can bite, jump and are very agile

use large bags with round corners as macropods can jam their heads into a corner and suffocate – the bag should be large enough to allow the macropod to stretch out fully

Catching Principles:

macropods often run into fences, especially corners, when trying to escape and can become entangled or break their legs and/or necks

macropods are more easily caught by driving them along a fence line and catching them in a hoop net

it is usually most efficient to net macropods of mass up to 35 kg

the diameter of the hoop should be appropriate for the size of the animal and the material should provide darkness but allow efficient air flow

Minimise the number of people entering an enclosure when capturing macropods. It is most efficient to have two to three catchers with hoop nets strategically placed in a large enclosure.

if a macropod cannot be caught in a net within a reasonable time, the attempt should be postponed to avoid hyperthermia or trauma (physical and physiological)

captures should always be attempted during the cooler months and the cooler times of the day.

do not lift an anaesthetised macropod by the scruff of the neck as it may cause severe laryngospasm

licking the forepaws is an early sign of stress and/or hyperthermia in a macropod

prolonged stress and/or severe physical exertion can lead to capture myopathy which can be fatal acutely (within hours) or chronically (up to weeks later)

holding:

small or medium macropods can be picked up near the base of the tail

macropods are usually held in a pouch-like open weave bag (e.g., hessian bag, wool sack) which allows air circulation to avoid hyperthermia and suffocation

hanging the bags facilitates air circulation and prevents them hopping away in the bag

sedate with diazepam before prolonged examination/transportation to minimise the risk of capture myopathy

always control the hind legs during handling to avoid being kicked

never restrain or lift a macropod by the front paws

Euthanasia

Commercial barbiturate euthanasia solutions are highly concentrated and strongly alkaline, both characteristics causing significant tissue damage, hence pain and discomfort, when injected intravenously and even more severe pain and discomfort if any of the solution leaks peri-vascularly.

Using solutions at room temperature add to this pain and discomfort.

Undiluted euthanasia solutions also damage distant tissues including the right auricle and right ventricle of the heart.

For these reasons I always dilute euthanasia solutions at least 50:50 with hot water, and up to 75:25 for small mammals and birds.

I also administer the diluted solution using a long small gauge needle through the cranial ventral abdominal wall just caudal to the xiphisternum to try and inject into the liver.

These techniques greatly decrease the pain and discomfort associated with the procedure which makes it much easier for the animal and handlers.

In many cases using this technique allows the procedure to be performed successfully single handed. If the liver is missed and the solution is injected intraperitoneally there is no added discomfort but the drug is absorbed more slowly so that it can take up to 15 minutes for the animal to lose consciousness.

If the solution is injected into the liver the animals normally lose consciousness within 10-30 seconds so if the animal doesn't, simply return it to its cage or container and allow it to relax until the drug is absorbed and takes effect.

Injecting a tranquiliser intramuscularly prior to administering the euthanasia solution is more painful and attempting to do so intravenously requires a much greater level of restraint and force, significantly increasing the levels of stress and discomfort. The same disadvantages occur if the animal is administered gaseous anaesthetics via face mask to facilitate delivery of the euthanasia solution.