

The Principles of Care and Rehabilitation of Orphaned Wild Mammals

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Introduction

Hand-raising a wildlife orphan is one of the most challenging and specialised aspects of wildlife rehabilitation. It requires commitment and needs to be approached ethically and responsibly, taking into account the longer-term implications and special needs of young animals. Hand-raised wild animals can become imprinted and develop behavioural problems if not handled correctly. Young and neo-natal animals undergo very rapid development and growth; correct handling, nutrition and facilities are critically important.

Four kinds of wildlife 'orphans'

Orphans can be broadly divided into four categories:

1. Animals that have been rejected or are unable to cope due to genetic problems. Such animals have a low chance of survival and ethical questions exist about hand-raising and rehabilitating such 'genetically compromised' animals. Humane euthanasia would be the most ethical option in this case.
2. Animals that have been removed intentionally (and often illegally) for live wildlife trade (pet keeping). These 'orphans' are usually compromised by inadequate nutrition and husbandry, poor disease control, taming and humanising, or may have been injured during capture and handling.

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Chances of survival of such animals are dependant on circumstances and the individual.

3. 'Orphans' that are injured, ill or weakened but not genetically deficient, or have been compromised by human interference, weather, good 'intentioned' rescues. With good handling these animals have a good chance of survival and release.

4. A genuine orphan where the parent has been killed, or injured and is unable to care for the orphan. Many of these have temporary setbacks, but again with suitable handling, have a good chance of full release.

Neonatal characteristics

Newborn or young animals differ from an adult of the same species in a number of ways. The blood–brain barrier is poorly developed and the neonate is more susceptible to toxins and infectious agents. Due to the surface to body ratio, neonates are more susceptible to changes in environmental temperature changes. Thermoregulation is poorly developed and thus the neonate needs to be monitored carefully to prevent overheating or chilling. Artificial heat should be provided as neonates are unable to generate heat. Foetal haemoglobin in neonates is different to adults. Kidney, liver function and enzyme system function are poorly developed: pharmacokinetic parameters are different and thus choice of drugs needs to be specific for neonatal requirements. Neonates do not initially develop a fever in response to infection, ironically this can change rapidly and there is the danger that fever can climb exceptionally high resulting in febrile convulsions. The gut wall is more permeable than in adults and toxins from gastro-intestinal tract infection seep through and lead to systemic toxemia or generalised infection. Body water constitutes a higher percentage of body weight in neonates.

Colostrum

Colostrum is the first milk produced by the dam. It is high in proteins, maternal antibodies and active phagocytes. Neonates that do not receive colostrum are immune-compromised and at risk. The gut wall is permeable to the large protein molecules for only a limited period. Colostrum is doubly important in ungulates, marsupials and mink as the sole source of passive immune transfer is through colostrum—there is no transfer of immunoglobins in the uterus. Canids, felids and rodents acquire maternal immunoglobins both *in-utero* and after birth, from colostrum. Primates and lagomorphs receive maternal immunoglobins *in-utero* but get a vital boost from colostrum proteins. Whilst the immunoglobulin transfer can only occur while the gastro-intestinal tract wall is permeable, the colostrum still provides protection against gastro-intestinal infections and the protein gives an additional boost. Orphans that have not received colostrum need extra special care in terms of hygiene and han-

dling. Serum from the mother can be injected or given orally whilst the gut is still permeable. Bovine colostrum is biologically transferable to other mammals, and can be frozen. Bovine colostrum can occasionally cause allergic reactions in other species.

Stabilizing the orphan

A newly arrived orphan should be stabilised first. Do not feed a chilled or dehydrated orphan. Warm it gently with an artificial heat source and offer an electrolyte and glucose solution. If hypoglycaemia is suspected, glucose powder or syrup can be rubbed onto the membranes of the mouth. In severe cases, and with experienced veterinary, and advanced rehabilitation assistance, fluids can be given intra-peritoneal, but this should only be a last resort due to the risks of infection, injury and stress. Experienced rehabilitators may also be able to gastric-tube a weak, or 'difficult to feed' orphan. (There are a number of risks involved with gastric tubing a neonate and this should only be done by an experienced person, with the correct techniques, tubes and precautions!)

The wildlife rescue and rehabilitation adage of 'the least invasive technique first' applies especially to wildlife orphans.

Umbilicus

This is a source of infection, which travels directly into the blood stream. The umbilicus should be dabbed (not rubbed) with an iodine or betadine solution and kept clean and dry. Do not handle a wet, inflamed or 'open' umbilicus except with 'sterile' hands or gloves.

Hygiene

Hygiene is critical in hand-raising. Young animals have undeveloped immune systems and in a rehabilitation situation, are further compromised. Husbandry and handling must be strictly controlled and managed in terms of hygiene and disease control. Facilities and equipment should be sterilised between cases. All bottles and teats should be boiled or steam-sterilised. Candidal overgrowth and irritation of the gastric tract can occur with chlorine-based sterilising fluids and steam sterilisation has proved to be more effective. Towels and blankets should be kept separate and washed at high temperatures or sterilised with nappy sterilising preparations. Keep separate towels for orphans and sick animals; it is further advisable to keep separate towels and blankets for carnivores and herbivores.

Handling

The neonate is delicate and can be easily injured. Handling must be gentle and by

experienced people only—do not allow children and visitors to handle or feed neonates. It is advisable to utilise a single keeper or handler with a back-up person. The advantages of this is that the animal associates only with these specific handlers and excessive taming is prevented. By having consistent handling and feeding, any changes or problems can be picked up easily; the orphan eats better and is more secure and with better weight gain. No fighting games or teasing should be allowed during hand-raising—this could develop into behavioural problems. Feeding and handling should be carried out in a quiet undisturbed area.

Comfort, security and appropriate 'mothering'

Neonates and young animals respond to and need comfort and physical contact appropriate for that species. Use of soft towels or rolled up blankets can increase comfort, security and hand-raising success.

Milk formulation and feeding

Diet is the biggest challenge in hand-raising and is critical, as this is the rapid growth and development phase. The milk-replacement formula should be as close as possible to the natural milk composition (Table 1). Excesses of sugars and fats cause osmotic diarrhoea. Lactose is a problem when using cow's milk as a replacer. When lactase is absent, for example in seal pups, osmotic diarrhoea occurs due to high levels of undigested sugars. There is also a danger of the build up of galactose and cataracts can develop. Household sugar should not be used. Too much protein causes bacterial overgrowth and kidney problems. Fat globule size should be considered in selecting milk formulations.

Neonates are unable to regulate intake of milk and therefore the volume and frequency of milk need to be carefully monitored and calculated. The general rule of thumb is 15% of the body weight over a 24 hour period but this varies with the species and condition of orphan.

Milk must be warmed to blood or body temperature as cold milk chills the orphan and can cause cramps. Small amounts and volumes should be fed frequently. Prolonged periods without milk will weaken the animal and increase the risk of bacterial overgrowth. Carnivores are prone to *E. Coli* overgrowth when the gut remains empty for prolonged periods. The size of the teat, of the teat's hole and shape are important and need to be species specific. Probiotics should be used wherever possible but never in excess.

Vitamin and mineral supplementation

Supplementation should be handled with extreme care. Too much is as bad as too little. This too must be species specific and given only when a deficiency or require-

ment has been confirmed.

Ano-genital stimulation

This is necessary in many species up to about three weeks of age. The muscles and control of the gastric tract are relatively undeveloped in many neonates. Stimulation of the lower abdomen and ano-genital area with a wet, warm cloth after every feed is essential to encourage urination and defecation. Failure to stimulate can result in constipation, bladder problems, uraemia, toxemia and megacolon. Ano-genital stimulation is especially important in weakened animals or animals with calcium deficiencies. The ano-genital area needs to be kept clean and a barrier cream applied to prevent urine burn.

Exercise, sunlight and play

Young orphans need time and a secure place to exercise and get sunlight. Inadequate exposure to sunlight results in rickets. Exercise and play are necessary for good muscle development, co-ordination, gastro-intestinal tract functioning, temperature regulation and learning. Play and exercise should not be forced but should be encouraged by having suitable outdoor facilities and stimulation of natural behaviours and exploration.

Vaccinations

This is a controversial aspect in hand-raising baby animals and needs to be very carefully considered with wide consultation. Vaccinations should be specific for species and circumstances. Live vaccines should be used with extreme care in wild species that are usually vaccine naive and can die from use of live-killed vaccine.

De-worming

Only paediatric anthelmintics and parasiticides should be used for de-worming baby animals. These should be used with extreme care. Doses should be divided and spread over a five-day period for weakened heavily parasitised animals as a sudden die-off of parasites can cause toxemia.

Weaning

A baby animal should never be weaned too early. Milk is an ideal source of protein and calcium. Early weaning can compromise growth and development. Bottle-feeding should not be extended beyond the time that an animal would normally suckle in the wild. Extended bottle-feeding will result in humanised animals. Weaning is the time that the human foster mother should start withdrawing and allowing the animal to 'wild' up. Natural foods should be offered from an early age. Many ruminants and

ungulates will chew roughage from as early as the second day—some are born with teeth and this helps to develop rumen function. Carnivores start taking small amounts of meat from the parent from a young age, e.g. a cheetah will start taking meat as early as three weeks; wild dog pups will solicit regurgitated meat.

Ruminants need to have access to roughage from as early as day two in order to facilitate rumen development. Many ungulates are born with teeth and naturally start nibbling on grass and leaves within a day or two of birth. Milk temperature and consistency are very important in bottle-feeding ruminants—milk that is too hot, cold, acidic or thick results in the oesophageal groove failing to close and milk goes into the rumen and ferments. Care needs to be taken with tubing ruminants for the same reason.

Socialising

Orphans should be socialised with others of the same or similar species. This helps to develop social skills and reduces taming.

Aspiration pneumonia

Aspiration pneumonia is one of the most common causes of mortality in hand-raised neonates. This is due to foreign substances, usually milk in the lungs. Every precaution needs to be taken to prevent milk going into the lungs. Correct teat and teat hole size, careful, consistent and gentle handling, correct feeding position, correct milk temperature and avoiding overfeeding or force feeding can help to prevent aspiration pneumonia. If one suspects that milk has gone into the lungs e.g. if the orphan sneezes up milk or coughs following a feed, preventive treatment should be given with antibiotics, anti-inflammatory and nebulisation immediately.

Monitoring and record keeping

Careful monitoring and record keeping contributes to successful hand-raising with regular recording of weights, respiration, habits etc. Every feed should be recorded – including amount fed, urine, defecation, etc.

Rehabilitation and release

A 'soft' or gradual release is always better for a hand-raised orphan, where the animal is support-fed and protected as it learns how to adapt and fend for itself.

Table 1: Milk compositions of some mammalian species

| Animal | % Fat | % Protein | % Carbohydrates | % Ash | % Dry solids | % Water |
|----------------------|---------------|--------------|--------------------|-----------|-----------------|------------|
| Ant eater | 20 | 11 | 0.3 | - | - | - |
| Antelope | 9 -20 | 8 -10 | 2 - 4 | - | - | - |
| Ass, Asiatic Wild | 0.6 | 1.4 | 6.1 | 0.4 | - | 91.5 |
| Baboon | 3.4 - | 1.5 | 7.7 | 0.3 | - | 86.0 |
| | 4.6 | | | | | |
| Bear | 18.5 | 8.5 | 2.3 | 1.5 | - | 66.4 |
| Beaver | 16 | 11.2 | 1.7 | 1.0 | - | 65.9 |
| Bison | 1.7 | 4.8 | 5.7 | 0.9 | 13.1 | - |
| Buffalo, Asian water | 6.5 | 4.3 | 4.9 | 0.8 | - | 83.2 |
| Camel, Bactrian | 5.4 | 3.8 | 5.1 | 0.7 | 15.0 | - |
| Camel, Dromedary | 4.5 | 3.5 | 5.0 | 0.7 | 13.7 | - |
| Cat | 4.95 - | 7.15 | 3.7 | 1.0 | - | - |
| | 9.7 | - 9.6 | - 4.9 | | | |
| Chimpanzee | 3.7 | 1.2 | 7.0 | 0.2 | 12.1 | - |
| Chinchilla | 11.2 | 7.3 | 1.7 | 1.0 | - | - |
| Cotton-tail | 14.4 | 15.8 | 2.7 | 2.1 | - | 64.8 |
| Cow, domestic | 3.7 | 3.2 - 3.3 | 4.6 - 4.8 | 0.7 | 12.5 | 87.6 |
| Deer, red | 8.5 | 7.1 | 4.5 | 1.4 | - | 78.9 |
| Deer, white-tailed | 7.7 | 8.2 | 4.6 | 1.5 | - | 77.5 |
| Dog | 11.1- 11.8 | 7.7- 8.65 | 3.2 | 1.1 | - | 78.00 |
| Donkey | 0.9 | 1.7 | 6.5 | 0.5 | 9.6 | - |
| Eland | 9.9 | 6.3 | 4.4 | 1.1 | - | 78.1 |
| Elephant, African | 5 ? | 4 | 5.3 | 0.7 | - | 82.7 |
| Elephant, Asian | 7.3 | 4.5 | 5.2 | 0.6 | - | 82.3 |
| Elk | 6.7 | 5.7 | 4.2 | 1.3 | - | 81.0 |
| Fox, Arctic | 13.5 | 11.1 | 3.0 | 1.0 | - | 71.4 |
| Fox, silver | 6.3 | 6.25 | 4.65 | - | - | - |
| Fox, red | 5.8 | 6.7 | 4.6 | 0.9 | - | 81.9 |
| Giraffe | 4.8 | 4.0 | 4.9 | 0.8 | - | 85.5 |
| Goat, domestic | 3.8 - 4.08 | 3.71- 3.8 | 2.9 - 4.3 | 0.8 | - | 88 |
| Gorilla | 2.2 | - | - | - | - | - |
| Guinea pig | 5.3 | 6-.1 | 4.6 | 0.8 | - | - |
| Hare | 10.5 | 19.5 | 0.9 | - | - | - |
| Hedgehog | 10.1 | 7.2 | 2 | - | - | - |
| Horse | 1.6 | 2.2 - | 6.2 - 6.4 | 0.4 - 0.5 | 11.0 | 89.1 |
| | | 2.7 | | | | |

| | | | | | | |
|-------------------------|-------------|-------------|------------|-----------|--------------|------|
| Human | 3.8 - 4 | 0.7 - 1.3 | 6.5 - 7.0 | 0.2 | 11.7 - 12.00 | - |
| Jackal | 13.2 | 10 | 3 | - | - | - |
| Kangaroo | 4.0 - 4.9 | 3.9 - 6.7 | 4.7 - 2.0 | 0.8 - 1.4 | 13.4 | 77.2 |
| Lama | 3.2 | 3.9 | 5.6 | 0.8 | 13.5 | - |
| Lemur | 2.3 | 1.9 | 6.7 | 0.3 | 25.8 | - |
| Lynx | 6.8 | 10.2 | 4.5 | - | - | - |
| Mink | 8.6 | 8.7 | 5.5 | 1.0 | - | 74.9 |
| Monkey, rhesus | 3.9 | 2.1 | 5.9 | 0.3 | 12.2 | - |
| Monkey, tamarin | 3.0 | 2.1 | 7.2 | 0.3 | - | 87.7 |
| Moose | 10 | 8.4 | 3.0 | 1.5 | - | 78.9 |
| Mouse | 13.1 | 9.0 | 3.0 | 1.5 | - | 70.7 |
| Opposum | 4.7-7 | 4.0-4.9 | 4.1-4.5 | 0.8 | 14.00 | - |
| Orangutang | 3.5 | 1.4 | 6.0 | 0.3 | 11.2 | - |
| Pig, domestic | 5.3 | 4.9 | 5.3 | 0.9 | 16.4 | - |
| Porcupine | 12.6 | 12.4 | 1.8 | - | - | - |
| Possum | 6.1 | 9.2 | 3.2 | 1.6 | - | 75.6 |
| Otter | 24 | 11 | 0.1 | - | - | - |
| Rabbit | 15.2 - 19.3 | 10.3 - 15.2 | 1.8 - 1.95 | 1.8 | - | 68.8 |
| Raccoon | 3.4 | 7.8 | - | 1.1 | - | 81.4 |
| Rat | 8.8 | 8.1 | 3.8 | 1.2 | - | 77.9 |
| Reindeer | 10.9 | 9.5 | 3.4 | 1.3 | - | 73.7 |
| Rhino, black | Trace | 1.4 -1.5 | 6.1 - 6.6 | 0.3- 0.4 | 7.9 | 91.2 |
| Rhino | 0.1 | - | 7.2 | 0.4 | - | - |
| Seal, harp | 42.2 | 8.7 | 0.1 | 0.7 | - | 48.3 |
| Seal, northern elephant | 35.5 | 48.8 | 7.6 | 8.7 | - | 35.5 |
| Sheep, Dall | 9.5 | 7.2 | 5.3 | 0.9 | - | 77.1 |
| Sheep, domestic | 7.1 - 9.0 | 4.7 - 5.0 | 4.9 - 5.8 | 0.8 - 1.0 | 20.5 | 81.8 |
| Squirrel | 10.45 | 9.2 | 3.4 | - | - | - |
| Tahr | 9.8 | 5.8 | 3.3 | - | - | - |
| Wallaby | 4.6 | 4.0 | 4.5 | 0.8 | 13-9 | - |
| Warthog | 8 | 12.2 | 4.8 | - | - | - |
| Whale | 33.2 | 12.2 | 1.4 | - | - | - |
| Wolf | 9.6 | 9.2 | 3.35 | - | - | - |
| Zebra | 3.5 | 2.4 -3.0 | 5.3 - 6.1 | 0.7 | 13.8 | - |