Summary of Husbandry Guidelines for the Eurasian Otter in Captivity

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Eurasian Otter Cubs; Chestnut Centre, UK.
Photographer: Nicole Duplaix.

I Aims and Objectives

These guidelines have been written by an international body of professionals to provide for institutions and individuals a basic standard of care required when keeping the Eurasian Otter (EO), *Lutra lutra*, in captivity. The following recommendations have either a sound scientific basis or are the result of experience gained over many years of working with this species.

II Natural History

Currently, there are thirteen species of otters recognized within the Mustelidae family. The Eurasian Otter (EO) also is known as the European Otter, the Common Otter and the Old World Otter. Over its global range the EO is listed in the IUCN/SSC Red Lists as "Near Threatened" with declining numbers. Increasing population levels now mean this species is classified, in some countries, as locally of "Least Concern" as of 2010.

EO's have the largest distribution of all otters and are found throughout Europe extending as far north as the Arctic Circle, into northern Africa and across most of Asia; many subspecies are identified throughout its range. Typical EO habitat is varied, incorporating many different ecosystems and climatic zones, due to its widespread distribution. EO's can be found in saltwater (although fresh water must be available for drinking and to wash their coats), brackish and freshwater wetlands, rivers, coastal waters, fjords, swamps, or ditches. The bank vegetation and shorelines are used for resting, grooming, breeding, playing, eating, and travelling. The EO is an opportunistic hunter foraging both on land and in water. They primarily consume fish, supplemented with amphibians, small mammals, insects, birds, eggs, and crustaceans. EOs are predominantly solitary animals (except for females with cubs and temporary associations of breeding pairs) and are active nocturnally in freshwater areas. In coastal areas they are active on and off throughout both day and night.

A major threat to EOs is water pollution due to oil spills; chemicals such as mercury, DDT, PCB's; and chemical run off from agricultural land. An increase in the number of fish farms has brought conflict with humans and there is still some illegal hunting and trapping, and accidental drownings in fyke nets and creels. A continuing threat to these otters is loss of habitat in part due to an increase in human populations. Increasingly, for example in the UK, France, and Germany where otter numbers are slowly increasing, EOs have been sighted in more urban areas and consequently a rise in road traffic accidents have resulted. Traffic fatalities also have been reported in more rural areas where otters must transit roads to reach other water systems. Some countries are attempting to address these road hazards for otters but they continue to be an increasing problem in many areas.

III Morphology

EO's, like most otters, are designed for a semi-aquatic life. They have a long sinuous body ending in a strong tapering tail. Their pelt, consisting of roughly 50,000 hairs per cm^2 (de Jongh 1986, Kruuk 1995), is double layered with an undercoat of fine hairs which traps air insulating the body, and a longer, waterproof outer coat. Using electron, scanning, and polarizing light microscopy de Jongh (1986) and Weisel et al. (2005) determined that both guard hairs and under-hairs have fins, petals, and grooves that allow adjacent hairs to lock together, trapping a sheet of air to form an insulating layer between the skin and water. The otter's head is flattened with ears, eyes and nostrils positioned in line to allow the otter to

surface swim whilst using these senses. The many whiskers (vibrissae), on the head and behind the elbows, are sense organs used especially underwater to locate their prey.

An adult male typically weighs between 7 and 10 kg, an adult female between 4 to 8 kg, but much heavier animals are regularly recorded. In the wild otters average a life span of 4 to 5 years; in captivity life expectancy can be up to 18 years of age.

IV Social Groupings

Eurasian otters are not a social species of otter preferring to live a solitary life. A male otter's range will encompass one or two females' territories. The size of territories varies depending on habitat and productivity. Any small groups of otters are likely to be a mother with her cubs who remain with her for up to a year. Except for mating, the male usually maintains a solitary existence, although on occasion family groups comprised of a male, female, and cubs may be seen.

Recommended captive groupings:

- Two males together - the best results are sibling brothers who have never been separated, see below regarding same sex pairings.
- One male and one female for breeding purposes; it is most often considered necessary for the male to be removed in the later stages of pregnancy and during cub rearing. Some facilities (zoos in Nürnberg and Lohberg, Germany, and Innsbruck, Austria) have successfully left the male in the same enclosure while the female reared the cubs. This should only be attempted with input from professionals with experience in this management practice.
- Mother and cubs; keepers must look out for signs of rejection or fighting as the cubs mature, this usually occurs after cubs are 6 months old.
- Single male or female; some EO's will never settle with any grouping and therefore should be kept as single animal exhibits. This is considered acceptable as by nature they are not a very sociable species.
- Same sex pairings; 2 males, or 2 females together should only be tried by very experienced otter keepers. Single sex pairs should be monitored closely as aggression can quickly escalate leading to death of one of the animals.
- Family groups; these groups, e.g. sire, dam, and adult offspring should not be kept together.

EO's are medium size predators and should not be kept with other species in mixed-species enclosures.

V Diet and Feeding Habits

In most studies of EOs in the wild their primary prey is fish. Other prey may include frogs, small mammals, insects, eggs, crustaceans, and birds (from the size of song birds to as large as geese or herons; aquatic birds are caught from below when swimming). In some parts of Europe their primary prey, up to 80 – 90 %, could be frogs or crayfish. Small prey is eaten on the water surface with larger prey taken ashore for consumption.

EO's have a high metabolic rate and an efficient, fast digestive tract. Food can be processed in 1 to 4 hours. They are believed to consume about 15% of their body mass per day in the wild. Captive EO's will not use as much energy and typically, 10% of their body weight consumed daily is sufficient to maintain a healthy weight. Diets should be adjusted based on an individual's activity level, age, health, etc. A pregnant or lactating female should have her diet increased by roughly 30% (see below). In the wild the otter would forage at least 3 or 4 times daily, therefore in captivity, they should be fed 2 to 3 times daily not including scatter or enrichment feedings.

Eurasian Otter Diet

Ingredients

It is important to check each country's legal position before feeding live prey to captive animals. It is not necessary to feed live prey for the well-being of the captive otter, but if it is permitted, allowing otters to engage in natural foraging activities is highly enriching for the animals. All fish or meat products fed should be considered fit for human consumption and obtained from known, reliable vendors. Check with vendors to ensure fish comes from areas with low/no micropollutants (e.g. PCB) concentrations.

Captive EO's often experience problems with kidney stones (Capber 2007, Weber et al. 1998). The cause of this problem appears diet related, but is not yet understood. A varied diet with the right supplements might prevent the formation of kidney stones. Kidney stones can lead to great pain and eventually death so they should be monitored for and addressed by a veterinarian and nutritionist when first detected.

Spoiled food should never be fed. The daily diet should be divided into 2 to 4 meals per day. Any remains from previous meals should be removed to prevent spoilage. Below are suggested ingredients for a nutritionally balanced otter diet.

- Fish products:
    - Freshwater fish; trout, salmon, roach etc.
    - Seawater fish: cod, haddock, whiting, crayfish and mussels. Herring and mackerel can be fed occasionally but should be very fresh.
    - If the fish is frozen it must be well thawed out in air or under running water.
    - If the otter is less than 6 months old score the fish skin, remove bones and cut it into chunks.
- Meat products:
    - Freshly killed small animals e.g. rabbit, rats, duck, chicken, frogs, mice.
    - Ground beef or horse meat and ox-heart (cut into large pieces to prevent asphyxiation).
    - Pork is not recommended due to the risk of Aujesky-disease.
    - No more than 3 to 4 day old chicks per day per otter (some institutions remove the yolk sac due to salmonella concerns.)

- Fruit and vegetables: Grated carrots, apples, pears etc. approx. 20 gm per day per otter.

Whole food can be given as enrichment - melons, squash, carrots, etc. - some will be eaten but some will just be played with. These foods can increase bulk to the diet without adding extra fat. Oats and bran added to the meat and vitamin mix can be very palatable for sick or old otters.

- Vitamin and mineral supplements: these are important when frozen food is fed to the otters.

The process of fish storage (freezing), thawing, and preparation, can lead to fish nutrient loss, particularly vitamins B_1 and E; this is particularly true in fish with high fat and/or high thiaminase content (Merck 1986, Crissey 1998). Vitamin supplements, including vitamin B_1 (thiamin), vitamin E, and a multivitamin, should be added when fish is the main diet. The recommended vitamin supplementation regime for fish eating animals is as follows:

- Thiamin: 25-30mg/kg fish fed, fresh weight as fed basis (Bernard & Allen 1997)
- Vitamin E: 400 IU/kg dry weight basis (Engelhardt & Geraci 1978)
- In cold weather and to improve coat condition suet or olive oil can be added to their meat meal but no more than 5 ml per day.
- Vionate, or a similar product, (approx 2.5 mg per otter daily.) has been used successfully as a multivitamin supplement. (Vionate: Arc Laboratories, 4280 Northeast Expressway, Atlanta, GA 30340 USA prets@gimborn.com). Mazuri Fish-eater tablets also have been used successfully as a supplement.

Quantities of Food

An adult male of approximately 8kg typically requires about 750g of food per day in summer and about 100g more in winter. Of this 750g of food, roughly 500g should be fish; a minimum of 150g meat, and the remainder a mixture of the above. The daily amount fed to an animal should be based on a number of considerations, to include:

- Young otters require more food.
- Large males will require more food than smaller females.
- Pregnant or lactating females should be offered as much food as they can consume.
- Sick and injured animals should be fed small amounts and often (tripe can be very acceptable to a sick animal.)
- Seasonal changes may affect the quantity required by each otter.

Care always should be taken not to over-feed individuals. This can result in fat or obese otters. Reduction in food can lead to aggression so it is important when reducing calories to add more bulk (vegetables and fruit) and water to the diet. From our experiences we have found EOs tend to ignore food when full and obesity is usually not a common problem in this species. Any uneaten food should be removed after one hour to prevent the otter from eating tainted food, particularly in warm climates and summer months.

Fresh drinking water must be available and sited away from their swimming water. Drinking water should be provided in a clean, regularly disinfected bowl. The disinfectant should be washed out before use and must be safe to use in food and water bowls.

Scatter Feeding for Enrichment

Throughout much of its range the EO is nocturnal or crepuscular, but those occupying coastal areas are documented as being active on and off throughout the day and night. In captivity, scatter feeding and enrichment can encourage the otter to be more active at certain times during the day. Any extra food that is offered must be included as part of its basic diet to prevent the otter becoming fat and unhealthy. As always, uneaten food that may spoil must be removed after one hour.

Scatter foods include mealworms, snails, crayfish, raisins, fruit, and vegetables. Soft boiled eggs can be used as a treat and also for medicating a sick animal. Some foods can be frozen into blocks of ice for enrichment purposes.

When and Where to Feed

Each otter should have its own dish, placed so the animals are not close together when eating. It is good practice for the keepers to watch the otters eating to ensure they all get a balanced diet. Training can help individuals to eat in specific locations. At the Chestnut Centre UK, EOs are fed twice a day - morning and evening with an additional 2 scatter feeds during the day. Accustoming the otters to being fed, occasionally by hand (tongs can be used for timid or aggressive animals), by an experienced keeper, enables supplemental feeding for underweight animals and as a means of medicating.

VI Introductions

Introductions can be attempted at any age in the social groupings mentioned above. However, it is always easier and more successful with young animals. Experienced keepers may be able to suggest the best pairings but some EOs will never accept another otter. Each introduction will differ depending on the characters of the otters; the enclosure design/size; and the ability of the otter keepers.

Initial Introduction

Initially, both otters should be familiarized with all enclosure and holding spaces. This can be accomplished by allowing one otter into the outdoor pen for a few hours during which time the other otter will be in night quarters. After a few hours, without any problems, move the indoor otter outdoors and bring the outdoor otter indoors. This can be repeated over several days so the otters become used to the procedure and are able to investigate each other's territory safely.

1. Visual, auditory, and olfactory contact

Initially, the otters should be housed in adjacent pens without physical contact so they have visual, auditory, and olfactory contact. This may only take a few days but can take many weeks. A hand-reared animal may not have much confidence and will require close monitoring and plenty of keeper time to reassure it.

It is typically best to introduce the male into the female enclosure. If both the animals are going into a new enclosure, allow each otter to become familiar with its surroundings

before starting an introduction. If the otters are in adjacent pens ensure they are not able to bite each other's feet and tails through the mesh. Separate them with Plexiglas or doubled fine mesh. In addition, exchanging used bedding between the otters will allow them to more closely inspect the other's scent. Once the keepers are certain the animals are comfortable with each other slowly progress to the next stage.

2. Limited contact

"Howdy" or "Meeting" gates allow the otters to touch each other through limited fencing or mesh. If this is not possible in the enclosure, or off-exhibit holding area, then keep one otter in a kennel with a mesh front and allow the other otter freedom to come up to the mesh. If there is any aggression, separate the otters. This may have to be carried out daily until the keepers are confident neither animal is frightened or aggressive.

Consult the IUCN Otter Specialist Group website, Otters in Captivity Task Force (OCT) link for the OCT training document and advice on feeding without competition and in close proximity to other otters.

3. Full Contact

Only when all involved staff is satisfied that the two previous steps have been accomplished should full contact between the animals be considered. This is usually carried out outdoors where there is plenty of space and hiding places including the pool. Sufficient keepers must be present should a fight develop and the otters need separating. Lower the water level so it is shallow enough for the keepers to wade in to separate the otters.

EOs are shy and elusive by nature so this initial meeting stage can take time as they may both hide for hours before deciding to check on the newcomer. There may be vocal aggression, stand-offs, physical aggression, or in extreme cases, attempted drowning. During initial physical introductions it may be advisable to separate the animals after they have had some affiliative interactions and gradually lengthen the time they are allowed together. They should not be left alone at any time during this period. Do not leave the otters together over night until staff is comfortable that the otters are compatible.

It is difficult to describe at what point you should separate the otters - experience counts at this time. However, always err on the side of caution as the whole procedure can be halted and repeated another day. If an otter requires veterinary care then human intervention has been left too late.

Never rush the process of introduction. Never use tranquilizers, etc. as these may affect the otter's ability to swim, hide, or defend itself.

Aggression

If a serious fight develops the otters must be separated. Keepers will need to have close to hand - long handled brushes; a large net on a long, strong handle; portable kennels; and push boards. Also useful is a loud hooter to startle the otters for a moment.
Remember some Eurasian Otters are destined to live alone and that this mimics their typical social setting.

VII Housing and Enclosures.

Always build the enclosure as large as possible for the benefit of the otters. Appropriate land to water ratios and a complex physical environment are as important as adequate

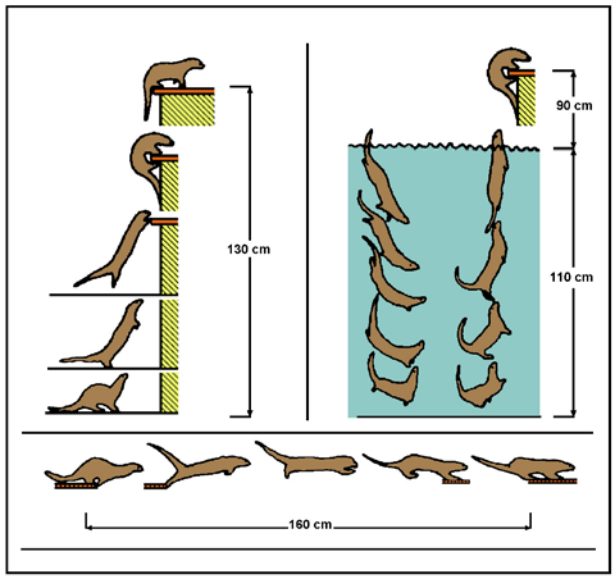
space. The OCT recommends that enclosures have a land to water ratio of 4:1 and a minimum of 100m^2 for one animal and 250m^2 for a breeding pair. Breeding pairs should be housed in two adjacent enclosures, or one large one that can be divided to allow for separation when needed. A female with cubs should be held in enclosures of 250m^2 or larger.

Many national regulatory agencies have enclosure size guidelines, (e.g. Germany and Austria have national animal protection acts that require at least 50m^2) that should be consulted. Otter enclosures smaller in size than 100m^2 recommended by the OCT have been very successful in many cases. The key to success for these facilities is design of the enclosure and management policies. In all enclosures, but particularly smaller ones, important elements are furnishings and enrichment - long shorelines with a lot of natural structures (roots, trees, stumps, etc.) both on the land and submerged within the near-shore water are key components of a properly complex environment for EOs. When properly designed enclosures of smaller size, including those with lower land/water ratios (2:1) can be successful for this otter species.

Land Area

Naturalistic enclosures allow more natural, species-specific behaviour as well as prevent animal injury due to rough, artificial surfaces. A substrate of soil covered with vegetation, plants, trees, and bushes would provide a basic enclosure. The addition of more plants, hollow logs, tree stumps, rocks and other substrates such as pebbles, sand, leaf litter, and bark for "drying off areas" will enhance the exhibit for otters and visitors. This elusive otter requires hiding and resting places away from both adverse weather conditions and public view so all enclosures should provide hiding places or denning sites for each animal.

Ensure all possible climbing platforms and otter view point platforms are well away from the perimeter fencing as the EO is an accomplished jumper and climber; EOs have been documented to jump 1.3m in height and at least 1.6m horizontally.



Water Area

A pool with water depth varying between 0.5 and 1.5m should be offered. The banks should be convoluted as opposed to straight and as natural as possible. Pool/stream banks should

offer gentle slopes, areas of sand, small and large rocks for exploring, and patches of leaf litter for resting and grooming. To minimize transfer of soil, etc. into the water the land/water interface can be reinforced with logs or rocks. Ensure the containment wall along the pool is high enough (2m) as otters can use the pool base as a launching pad to jump over the external fence. They have been known to jump 0.9m from within a pool to a platform. Running water, fountains, underwater rocks with gaps, rafts, islands, or floating logs all provide behavioural enrichment.

Water quality is important as EOs both defecate and wash their food in the same water. Clean water is vital to ensure good health and fur condition; therefore water must be renewed regularly or filtered. Fresh drinking water should always be available in a clean, regularly disinfected bowls.

Winter Provisions

Care must be taken that the water does not freeze during the winter. Should surface ice form, it must be broken up immediately so the adults or cubs do not become trapped underneath. A pump or air bubbler can be used to keep the water moving and prevent icing over.

Perimeter Fence

Consideration must be given to the fact EOs climb, jump and dig. The perimeter fence or containment wall should be at least 2m high topped with a 90° non-climbable (galvanized metal or plastic) inward overhang if there is a question whether or not the otters may be able to climb the enclosure containment. The overhang should extend at least 0.5m from the fence. The height and design of the enclosure containment also must take into consideration the likelihood of winter snow depths on the ground. EO's have demonstrated they can jump 1.3m in height, 1.6m from one platform to another and if they can push off from the base they can jump out of the water to a platform 0.9m above the water level. They are strong, intelligent, fearless climbers who will test any structure in the enclosure.

Chain link fences (galvanised or stainless steel) should be sunk into the ground at least 80cm depending on the substrate. Additional mesh needs to be laid horizontally 15cm under the ground, inward into the enclosure to at least 1.0m from the perimeter fence; this prevents digging out of an area. This ground mesh should be wired to the perimeter fence. Twelve volt electric fencing can be used but must be sited so the otters cannot have contact with the water and the wire at the same time. Two or three strands approx 1 to 1.5m above the ground will suffice.

Trees and structures close to this fence should be fitted with a smooth, 1m deep collar (aluminum or galvanized metal) about 1 to 1.5m off the ground to deter climbing and jumping over the perimeter fence.

Nest Boxes

Otters will require individual night nest boxes as well as several denning boxes/locations both on and off view for day time resting. Placement of boxes should take into account the otters' private nature, physical comfort, and the need for easy access by animal care staff for cleaning and removal of soiled bedding. Day boxes can take the form of hollow logs, tree roots, bushes, or dens under rocks.

A combination of individual and communal boxes should be available. The nest boxes need to be large enough for two animals and/or a mother and cubs. Individual boxes should be large enough for the otter to turn and curl up comfortably. A compartment must not be less than 45x42x43cm and built of wood or other non-heating material. Plywood should be at least 18mm WBP. If an otter can be closed in the box, a second wire mesh lid, under the solid lid will permit use of a blow pipe for anaesthesia or administration of hand injections. An entrance tunnel should have an inspection door in case a sick animal hides within. Place the nest box as far as possible away from the water to allow the otter to shake off excess water before entering.

Bedding of hay, wood wool, leaves, pine needles, cotton bathroom towels, wood shavings, etc. should be offered and replaced when wet or soiled. The boxes must be adequately ventilated to avoid the bedding becoming too wet and musty. A sliding door to the nest box will allow the otter to be caught or kept out whilst cleaning. It is more convenient if the sliding door can be operated from a distance as otters are extremely fast.

All otters will sleep at times, thus the provision of sleeping quarters for public viewing is an option. If one side of the nest box is one way glass or Plexiglas, the otter will be able to exhibit normal behaviour whilst satisfying the visitor requirement. Clever use of mirrors can allow the public to see the sleeping otter. Strategically placed log jams, over-hanging banks, islands, or similar features will encourage the otters to rest within public view.

Ensure visitors cannot touch or bang on den glass and disturb the otter. The addition of an overhead heat lamp may encourage the otter to take up residence in cooler weather and will also help in drying the otter. Care must be taken that the otter cannot reach the lamp, electric cable, or its electrical supply. If lamps are used it is important they are monitored and maintained regularly to ensure they are not too hot.

Safety Note
Adult otters are more than capable of demolishing a nest box; thick wood and glass is not a deterrent. For this reason nest boxes should be placed where there is a secondary containment perimeter.

Extra Enclosure Features

- Infra-red cameras, built in scales and squeeze boxes are all convenient features allowing animal care givers the ability to monitor otter behavior without influencing it, regularly weighing animals by training them to stand on scales, and training the otters to station in squeeze boxes for hand injections (e.g. vaccinations).
- Under-floor heating of dens can provide warmth for sick and older otters and also prevents the boxes from becoming damp and musty.
- An off-exhibit holding area which includes nest boxes, an area of land and a pool for use as sick quarters or a new arrival. This is particularly important for enclosures housing breeding females.

Cleaning Routines
EOs are usually very clean animals and tend to spraint in one or two places around the enclosure; these should be cleaned daily during extremely high temperatures and at least twice a week during cooler temperatures. Because scent is important to otters, sprainting locations, marking posts, or other exhibit features should not be disinfected regularly.

However, they should be cleaned periodically. Thorough cleaning of the entire enclosure at one time may cause stress to the occupant. It is wiser to clean sections of the enclosure on different days leaving areas with the otter's scent intact.

Daily cleaning should include spot cleaning as well as disinfecting and cleaning water and feed bowls. Substrates will need daily raking and turning and should be renewed regularly. Indoor quarters will require weekly cleaning with a safe disinfectant e.g. Virkon or F10. Nest boxes should be checked daily as some otters will defecate in a corner of a box. If this is a regular occurrence move some of the spraint (faeces) outside to encourage them to use outdoor latrines. Soiled or damp bedding should be changed daily. Some boxes will need weekly cleaning while others can last 3 or 4 weeks depending on box use and an individual's habits. Nest box material must always smell sweet and not dusty. When replacing nest box bedding it is suggested that some of the old be maintained to retain the otter's scent.

VIII Enrichment

Development of enrichment ideas should be goal-oriented, proactive, based upon the animal's natural history, individual history and exhibit constraints, and should be integrated into all aspects of their *ex-situ* population management. Providing the appropriate enclosure designs (e.g., land/water ratios, pool/land designs), substrates, and furnishings for EOs are essential components of any enrichment program. Enrichment should encourage otters to behave as they would in the wild, as closely as possible. Successful enrichment techniques include variation of exhibit schedule, re-arranging of exhibit furniture/features, complete change of furniture (some of the old should always be retained to maintain the animal's scent and an element of the familiar), scents, sounds, toys (natural and artificial), herbs, spices, different substrates for digging/rolling, food items, and novel presentation of food items. It is important that enrichment items are not merely thrown in an exhibit and allowed to stay for extended periods – an enrichment program is only successful and useful if actively managed and constantly reviewed to ensure it encourages natural behaviors. Enrichment should be part of the daily husbandry routine.

EO's can be encouraged to be more active during the day by creating a varied enrichment programme altering times when enrichment is offered. Including more than one enrichment activity a day may assist in encouraging otters to stay active and scatter feeding will encourage foraging (see section on feeding). Placing logs, floating rafts, etc. in the pool (these should be anchored so they do not float into glass or near enclosure edges allowing the otter egress) keeps the otters active for their own benefit and visitor interest, as well as providing resting or sleeping locations that may encourage the otters to remain more visible.

A large sand pit, leaf piles, floating rafts/islands, large logs or log piles are important activity centres for captive otters. If floating rafts/logs are used these should be anchored to the pool side/bottom and kept from damaging glass or drifting near the perimeter containment. Examine all items of enrichment before use and remove any loose, sharp, or edible parts. Good keepers will soon get to know their animals' preferences and routines. New enrichment items should always be monitored to ensure the otters are not eating non-edible items or become entangled in items.

Husbandry training sessions are becoming a useful part of enrichment. They also reduce stress in everyday otter care such as standing on scales, entering squeeze boxes, and medical examinations of feet, etc. See OCT website for more details.

Natural Items	Non-natural Items
Ice blocks/cubes with frozen fish, etc	Balls (with/without holes and food placed inside
Logs, branches, driftwood, stumps	Jugs (may have live fish/crayfish inside)
Live foods (goldfish, crayfish, shellfish, crabs, crickets, etc.)	Puzzle feeders (can be made out of PVC)
Bedding (pine straw, wood wool, hay, etc.)	Floating dock
Scents (animal urine, herbs, catnip, etc)	Play slide
Rocks, varying sizes	Sheets, towels, blankets (secured so that cannot be dragged into pools)
Snow, ice piles	Hammocks
Leaf piles	Broom heads, natural grass , astro-turf for grooming stations
Pine cones (may have food stuffed inside)	Empty buckets, (remove the handles so they do not get caught)
Vines	Burlap
Clamshells	Buckets or tubs of water
Showers, waterfalls	Heavy duty dog toys such as “kongs”
Sand box	Tyres
Tunnels	
Hollowed out coconuts, melons, etc. with food placed inside	
Ledges, climbing areas	
Substrate (bark, sand, dirt, straw, etc.)	

IX Catching-up Animals

Hand catching must not be attempted with otters, if netting is required it should only be attempted by experienced personnel - they are too quick and will inflict nasty bites; even cubs need to be approached with care.

Keep Calm; as with movement of all animals the calmer you are the better the result. Once the otter becomes distressed or suspicious, postpone catching up for another day. The box can be left open in the enclosure so the otter can become more familiar with it. The following methods of capture are not listed in any specific order of recommendation.

Methods

- **Nets**: These must be long enough to twist when the otter is caught. The net edge should be soft and well padded to prevent injury to the otter. The keeper needs to be quick and accurate to keep stress to a minimum. Once the individual is caught twist the net several times to prevent the otter climbing out. Keepers must wear gloves and boots. Otters can be injured by keepers unfamiliar with netting this quick, agile species.
- **Grasper**: These are the devices used by the RSPCA for dangerous dogs. It is a metal pole with a strong thick cable loop at the end, which can be tightened once the animal is caught. If this is to be used on an otter it is essential that the loop is placed behind the front legs as otherwise it will slip off as otters don't really have a neck. Otters should obviously not be carried in the grasper but it can be used to catch the animal and lift quickly into a carrying box. Having the loop behind the front legs is also better from this point of view as you don't want to lift an animal with it round the neck! Like the use of nets it is essential that the keeper is experienced in using such a device.

- **Blow darts for sedation**: The otter must not have access to the pool during this process and a veterinarian must be present (a veterinarian always should be present when anesthetics are used).

    - Safety note: When otters require sedation by a vet, but are highly stressed, the combination of Domitor and Ketamine, with Antisedan as the antidote should not be used. In case of stress there is a high risk of complications and consequently death! These drugs should only be administered when otters are relaxed (e.g. use of blow pipe in enclosure). A good alternative to these drugs (in cases where the animal may be experiencing some stress) is the combination of Ketamine and Diazepam or Midazolam. There is no antidote for these drugs. (de Jongh personal communication)

- **Push boards**: These can be used if the keepers are experienced and familiar with the otter. A stressful situation can soon develop so this should not be the method of choice.

- **Direct from nest box**: The transport box should be strong with adequate ventilation. The sliding door should be the same size as the opening to the tunnel. Place the box up to the tunnel opening with a keeper ready to close the slider when the otter is in the box. A second keeper can now lift the lid to the nest box a few centimeters, carefully, and the otter usually will run into the tunnel to get away from the light. If the otter does not enter the box it may be encouraged by the keeper's voice or using a soft brush (the size and shape of the tunnel) to ease the otter gently into the transport box from the tunnel. This may work well for experienced personnel providing everyone is quiet and calm and the otter does not become alarmed.

- **Voluntary crate training**: All otters are excellent candidates for crate training. This process familiarizes the otter with a crate/squeeze cage and acclimatises the animal to having the door closed. This is the preferred method of capture for all otters and can be accomplished using only protected contact (i.e. the keeper does not need to enter the enclosure with the otter). The benefits of crate training include reduced stress for the animal and reduced risk of injury to animal and staff. See below for basic crate training technique.

Transport

Short distance transport of otters, i.e. from enclosure to enclosure, can be accomplished using a nest box that can be shut and fastened. In these cases, the keeper will only need to close the external door and lift the box out of its position. The otter has the advantage of having its own surroundings whilst in transit and can be acclimated to being closed in the box during regular enclosure maintenance routines.

Otters must be transported separately; a mother with a cub under 6 months can travel together for very short distances provided the box is large enough. However, it is not recommended that females with young under 6 months be moved. EOs should not be transported between institutions or held in crates for more than 15 minutes if temperatures are over 21 - 23°C. Animals held in crates should never be left in the sun, in areas of high human traffic, or areas exposed to loud noises.

Crate Training

The least stressful form of catching up otters for keepers and animals is by basic crate training. EOs have been trained to voluntarily enter crates for transport and weighing; they also have been trained to swim into and through submerged "crates" allowing for photographic research on swimming propulsion (de Jongh personal communication).

The otters must first be taught the basic training techniques.

1. **"Establish a bridge"** - the otter learns to associate a reward with a sound. The sound can be a word, whistle, or clicker (small hand-held metal piece that clicks when pushed). The reward should be a favorite food item but only a small amount that can be eaten quickly. Part of the animal's normal, most favored dietary items should be used.

2. **"Targeting"** - the otter learns to touch nose to a target shape (may be a ball, buoy, or shape fastened on a stick) on command and stand until bridged and rewarded. Animals may be trained to target to different locations in their enclosure.

3. **"Stationing"** - the otter goes to its target, stops, and stays in position; then they are rewarded.

4. Once the animal has learned the bridge sound means a reward and has accomplished the behavior being asked for, the reward should be randomized, e.g. given every 2^{nd}, 3^{rd}, 4^{th}, etc. time. This keeps the animal interested in the "game".

5. If the otter becomes distracted, bored, or stops paying attention cease training for a few minutes. Try to stop training after a positive experience. Typically, otters enjoy and pay attention to short training sessions, i.e. 10 to 15 minutes or less.

Basic Crate Training

- Acclimatize the otter to the box or crate by requiring them to move through the box on a regular basis without fear. If they cannot move through the box, the otter can be fed in the box allowing it to acclimate to staying in the box.
- Once the otter is going in and out of the box freely, using a "target" the otter should be guided to the box entrance and rewarded. Repeat on a regular basis and the otter will stay at the station for a short time for his reward. To accomplish this, slowly increase the length of time before giving the reward. Gradually move the target further into the box and reward the otter for stationing at each new distance inside the box. The "target" can be placed through holes/bars to encourage the otter to move into the box.
- Alternately, when an otter enters its box bridge the animal and reward it by throwing the food into the box; gradually lengthen the amount of time the otter must stay in the box to receive the reward. When each new step is accomplished offer a "jack pot" which is an extra large food reward.
- Once the otter is comfortable sitting in the box the next step is to accustom the otter to having the door shut. Initially moving the door a little and over time closing it further and further. During the initial phase of this process the animal should be offered small food rewards continuously. Once the otter is accustomed to having the door closed extend the amount of time the door is kept closed; during this phase the animal should still be rewarded frequently with small pieces of food. Gradually extend the length of time the door is left closed and the time between rewards. Once the otter is accustomed to having the door closed begin acclimatising it to having the box moved.

This method is used successfully in North American river otters, Asian short-clawed otters, spotted-necked otters, and giant otters. These species have been trained to allow hand injections of vaccines and anesthesia; stand on scales for regular weighing, allow physical exams of feet and tails, and permit the taking of sonograms.

X Breeding

EOs are polyoestrus with oestrus occurring every 4 to 6 weeks lasting roughly 2 weeks. Sexual maturity is reached between 2 to 3 years although some males are mature at 18 months. Copulation takes place most frequently in water but can take place on land. Successful copulatory bouts may last up to 50 minutes. Before any breeding is considered the *Lutra lutra* studbook keeper should be consulted.

Parturition

Typically, female EOs are very secretive when parturition occurs; she will hide the cubs and, many females have been known to become aggressive towards even well-known caretakers. These behavioural changes coupled with obvious nipple extension are often the only indications of birth.

At least two natal boxes must be placed well away from any disturbance, including keepers and visitors. This otter is shy and reclusive by nature. Gestation is about 63 days and the litter size is usually 2 to 3 cubs. The female should be left alone at this stage - previous cubs and her mate should be removed at least one week before the birth. However, it is very difficult in some cases to be certain the dam is pregnant and the first sign may be the arrival of cubs; in which case immediately remove all other otters.

Do not keep checking: leave mother and cubs alone. Disturbance frequently causes the mother to move the litter elsewhere, often, to an inappropriate place. Primaparous females are particularly nervous.

Post-parturition guidelines

- First quick check at about 2 weeks; weigh the cubs.
- Second check at 6 to 7 weeks; weigh, sex, quickly veterinary check and microchip each cub.
- Do not clean the natal box - only offer fresh bedding material outside the box.
- Cubs can be handled without gloves up to 10 weeks old - after that they can, and do bite.
- Cubs should not be separated from their mother until they are at least 6 months old but in the wild they would stay with her for the first year. Once separated the female should be given 3 months on her own before breeding again.
- Body weight at birth is 70 to 120 gm; eyes open from 15 to 40 days; first teeth appear 13 to 29 days

XI Orphans or rejected cubs

Hand rearing is best avoided as the resultant cub usually ends up imprinted on humans and unable to be placed with other otters. If it is unavoidable, a cat milk replacement can be used (Esbalic, Cimicat); 30/55 Milk Substitute from PetAg, which is lactose free, has been used successfully by many rehabilitators working with EOs. Cubs must be kept in a dry, warm, quiet place and fed every 2 to 3 hours round the clock. Only experienced keepers should hand rear, and ideally the same keeper all the time. Use of the same blanket at each feed can help the cub feel secure if there has to be a change of keeper. Wearing the same jacket as the primary care giver also will reassure frightened cubs. Record keeping is vital and should include times of feed, daily weight before morning feed, amount of milk taken, urination and defecation. Cubs reared in a group fare better and have more natural skills so if at all possible this should be arranged.

The milk should be warmed to slightly higher than human body temperature (it should feel a little warm when tested on the inside of the wrist). The cub should be fed while laying on its stomach, never on its back. Cubs should be fed about 30% of their body weight per day divided over the number of daily feeds. Do not over-feed the cubs as this may cause stomach bloating and pain. If diarrhea or other problems develop change only one thing at a time (e.g. dilute formula, amount fed, etc.) and consult a veterinarian.

After a feeding the cub should look a little pot-bellied. If a cub refuses to feed it may be dehydrated therefore replace the next one or two feeds with a dilute mix of rehydration fluid (Lectade). If the situation persists, call the veterinarian. After feeding, stimulate gently around the anus to encourage the cub to urinate and defecate. Once a day, or as necessary, after feeding, clean the cub using a soft cloth wrung out in warm water and gently stroke the cub all over simulating the dam licking her offspring. Offer a small soft toy for comfort as the cub may suck this rather than its own body parts. Males in particular have been known to suck their penis. The application of a little orange oil has been helpful in stopping this behavior but it must be applied prior to any soreness developing or it will sting.

Weaning

- First Stage.
    - Weaning can commence at about 6 weeks old. Initially, thicken the milk formula by adding a little "fish soup" which has been used for many years for both wild and captive orphans.

Fish Soup Recipe:

- 250 g of fresh white fish (cod, haddock, and whiting); skinned, boned.
- 1 tablespoon of milk powder
- 1 tablespoon cod liver oil (if the cub refuses the soup delete this item and re-introduce later)
- Vitamins/minerals (2 Mazuri fish eater tablets or 2.5mg Vionate)

Thoroughly liquidize the mixture adding sufficient boiled, cooled water to produce the smooth consistency required to go through a 10ml syringe. The remainder can be kept in fridge or frozen (if fish is fresh caught) for up to 24 hours.

The soup must be warmed to body temperature before feeding. Slowly introducing the fish soup into the diet will allow the cubs to accommodate the new diet without stomach upsets. Be careful, the cub's mouth does not become overfilled with food, as this may enter the trachea causing pneumonia and possible death.

- Second stage.
    - Each cub weans at different times, usually at 8 to 10 weeks; typically, the cub weighs approximately 750gm.
    - The fish soup can be offered more coarsely liquidized in a dish.
    - Slowly, add strips of fish, or finely chopped fish along with the fish soup.
    - Some cubs never drink the fish soup from a dish and go straight on to strips of fish while others take up to 2 weeks to wean on to solids. Weaning will be different for all cubs. Sometimes they wean easily, others require more patience and persuasion. In some cases initially weaning onto trout and salmon, which easily breakup, may be helpful as these are easier for young cubs to eat. Once the cub is eating fish well they can be introduced to other fish species.
    - At this stage, a fat healthy cub can miss food for a day providing water and Lectade are available and this may encourage it to take solid food at the next feed.

Natural behaviour such as swimming and foraging can be taught from 2 months. Swimming lessons can begin in small amounts of lukewarm water. After swimming the cubs must be dried off on clean towels. Increase the depth of the water as the cub grows in confidence. Foraging can be encouraged by hiding the food around the enclosure.

XII References

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