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Management Techniques of Saguinus Oedipus in Captivity IntroductionCotton-top Tamarins are one of the mostcritically endangered primate species on the planet, they were announcedcritically endangered in 2008 by the ICUN (IUCN, 2008). Their numbers are declining rapidly due to deforestation, logging and theillegal pet trade (Savage, et al., 2016). To combat thedecline in numbers and to ensure survival of the species, zoos are now tryingto conserve this threatened species.  An ex situ population has theopportunity to conserve and restore populations in the wild, zoos withendangered animals in captivity can raise awareness and funding to help try andprevent the wild species from becoming extinct in the future (Kleiman, Thomson, & Baer, 2010).

The correct guidelines should befollowed when housing callitrichids, it is important to give cotton-toptamarins the correct diet, enrichment and housing materials which allow them toperform natural behaviours (National Research Council, 1998).  Socialstructure and captive groupingsCaptive cotton-top tamarins live ingroups of 2-14 individuals in the wild and are very social animals, it isimportant that they interact well together to survive. In captivity bothtamarin parents will play an active role in rearing their infants, along withother male members of the group, who will also have their own roles to play inlooking after the youngster.

They will take part in carrying the infant aroundand will help with the raising of them//\* (Price E. , Solitaire: Issue 23 , 2002). It is important to have the right socialstructure when housing cotton-top tamarins, there should be two or moreindividuals placed inside an enclosure, there may be a bonded pair in a groupwho will dominate over the rest of the group, these will also be thereproducing pair. It is essential to house all related individuals in a group, as cotton-tops don’t interact well and show aggression towards non-relatedindividuals (National Research Council, 1998). If housing non-relatedindividuals together, prior to mixing it is important that the individualsbecome familiar with each other and their surroundings, enabling them toestablish dominance.  Nutritionand diet (wild and captive)The cotton-top tamarin is an omnivorousprimate, in captivity they will make up most of their diet with fruit, insectsand small reptiles & eggs wherever possible. They will eat gum and sap, producedfrom the trees of the Colombian forest.

Cotton-tops get most of their waterfrom the fruit that they consume, however will also lick moisture from leavesto keep themselves hydrated (Burton & Burton, 2002). There are various different fruits inthe tropical forest that the cotton-top has access to, these including banana, starfruit, sugar apple, and papaya just to name a few, most of these fruits arenot available to them in captivity (Jeff, 2017). In captivity their diet differs entirelythan that of their wild diet.

They have very little fruit in captivity comparedto what they would consume in the wild, their diet is made up mostly ofvegetables. At the Rodbaston Animal Unit their diet is split into three stages, AM, Midday and PM. They are fed solely on pellets during their AM feed, themidday feed consists of 40g of green veg, 25g of brassica and 20g of live food. Their PM meal consists of 25g of root vegetables and 30g of fruit. The root vegcan be steamed for 8-10 minutes, making it more palatable for the animal, steamingalso breaks down starch, making it easier to digest. (Rodbaston, 2017). It is essential to give captive animalssupplements to make up part of a healthy diet, D3 is added into their diet, helping support healthy bones, heart and the nervous system.

Vitamin D3 is madeup when the body is exposed to ultraviolet rays from the sun (Warren, 2002). As captive animals don’t get enoughnatural sunlight to produce enough D3 in their bodies, they are given a D3 supplementweekly. Cotton top tamarins are gumnivores, theynaturally feed on gum and sap from the trees of the forest in the wild. Robastonwill make up gum from a powder form and add it into the animals’ diet, it isalso used as part of their enrichment.

Adding gum into their captive diet enablesthem to perform similar behaviours as they naturally would. By placing the guminto logs or a gum feeder, this recreates the tamarins collecting gum frominside trees in the wild (Price E. , 1996).  Housingand exhibitIt is essential that all zoos have basichousing requirements for their animals, such as the right temperature, correctlighting and allow the animal to express natural behaviours. Cotton-toptamarins naturally live in humid temperatures, so it is important to try andrecreate this as best as possible for them in captivity. The housing for thecotton-tops on the Rodbaston animal unit consists of a small enclosure which iscovered in logs and ropes for the cotton tops to utilise, hanging baskets, aplant in the middle of the room, woodchips on the floor and a nest box high upin one corner. The wood chips can help protect a cotton-top if they fall from ahigh branch or from their nest box.

The branches and ropes inside theirenclosure enable the cotton-tops to scent mark, which is a big part of theircommunication (Ph. D & Fite, Ph. D., 2005). To allow the tamarins to express naturalbehaviours, the branches inside their enclosure should be placed so that theycan make pathways to their nest box. The nest box should be placed high upinside the enclosure as cotton-tops have a tendency to sleep all together atnight.

Water should be readily available to the tamarins and food should bescattered around the enclosure to allow them to forage (National Research Council, 1998). Various different zoos will set outtheir enclosures differently, some will have an enriched enclosure, providingthe animal with a realistic environment covered in high trees and plenty offoliage, enabling the tamarins to climb and jump through their enclosure asthey would in the wild. Whereas other zoos will focus more on providing theanimals with enrichment devices and having a more basic enclosure (Price E.

, Solitaire: Issue 23 , 2002).  EnrichmentFood is used as part of enrichmentprogrammes for most captive species. Food enrichment can keep an animaloccupied and enhance their mental health by providing the animal with activitiesto do (Price, 2008). As cotton-top tamarins are very socialanimals and use scent marking as a communication method, it is important not toremove all of their scents when cleaning their enclosure.

A branch that has beenscent marked could be left without cleaning, so that some of the tamarins’natural odours remain inside the enclosure.  Environmental enrichment can have greatbenefits for the cotton-tops by keeping them occupied and prompting naturalbehaviours. Popular devices such as gum logs, filled bottles or boxes withtheir favourite food or toilet roll cardboard can all be useful enrichment tools(Wolfe-Coote, 2005). Food can be a great enrichment device, it is scattered inside the cotton-tops enclosure as part of their enrichmentprogramme on the Rodbaston Animal Unit.

18g of eggs are scattered twice a week, 10g of seeds twice a week, and 10g of nuts twice a week (Rodbaston, 2017).  Capture, restraint and transportCapturing callitrichids can be adifficult task, it needs to be done as gently as possible and with care. Theyare caught for many different reasons, they need to be caught for healthchecks, for weigh-ins, or for the transportation to the vets for example or ifthey are moving from one zoo to another. Any animal may get stressed out whentrying to restrain and capture them, so the capture and restraint needs to bedone quickly and efficiently to make sure that they are stressed for as littletime as possible.

At Rodbaston some students are given theopportunity to capture and restrain various different animals on the unit. Callitrichids are captured every year by staff and some students for a fullhealth examination and a weight check. Capturing the cotton-top tamarins needsto be done using thick protective gloves and a net. The net is placed over thecotton-top tamarins head, he is then held around his neck and rear area tosupport the animal, but this also gives the student/keeper a good grip of theanimal. Once the cotton-top is held securely, their microchip is scanned tofind out which animal they are, and then they are weighed. They are placedinside a cat box whilst the other tamarins are caught and weighed, and are thenall released once each animal has been health examined and weighed.

It is veryimportant that these checks are done extremely carefully and as quickly aspossible as stressing an animal out too much can have detrimental effects andcan even cause death in an animal (Wolfensohn & Lloyd, 2008).   Reproductionand hand rearingCotton top tamarins are usuallymonogamous animals, the dominant pair will be the mating pair of a singlegroup. Mothers will give birth to one or two non-identical twins. The fatherand siblings will assist in the raising of the infant/s and will do a lot ofthe handling and carrying of the young, handing them back to the mother whenthey are ready to be fed (Kostan & Snowdon, 2002). The mother needsplenty of help when it comes to looking after her infant, due to the infantbeing 25% of her body weight (ANGIER, 1994). Hand-rearing cotton-tops is sometimesnecessary in captivity for various different reasons. For example the mothercould be ill, she could reject the infant or may not be able to cope if she hasa twin birth. Hand rearing is the last resort and is not encouraged due to infantsneeding to bond with their mother and the rest of the group, however sometimeshand-rearing is the only option for the health and safety of the infant.

Hand-rearingtakes a lot of time and the infant needs to be reintroduced to the family assoon as possible. It is always advised to try and keep the infant within thegroup, even if it means removing them to feed them and returning them to theirenclosure. Whichever way hand-rearing is done, it needs to be done with extremecare and needs to be monitored closely as callitrichids who are hand reared canshow aggression and behavioural abnormalities (Anderson, Otto, Pritchett-Corning, & Whary, 2015). If it is not possible for a youngcotton-top to be fed by its mother, formula feed should be made up and fed tothe infant. They should be held as much as possible to feel secure and shouldbe stimulated in order to urinate and defecate (Ruppenthal, 2013).   Breedingand CareIn the wild there is usually a singlemating pair of a group of cotton-top tamarins, in captivity a mate is usuallyfound for an individual to maintain genetic diversity within the captivespecies. Female cotton-tops will secrete a pheromone which will stop otherfemales mating by suppressing ovulation, ensuring that she is the only femalereproducing (Lang, 2005). Cotton-tops will give birth to a singleindividual or twins, and most members of a group will help raise the infants.

In captivity a cotton-top tamarins’ gestation period is around 180 days, thereis a possibility of them having up to four individuals per year in captivity asthey are able to give birth every 6-7 months. With the right conditions and thecorrect care cotton-top tamarins can breed well, and tend to have rapidreproduction rates (Rollin, 1995). Most zoos will have a breeding programmewhich breeds endangered species to try and help maintain a population of acertain species. The zoo will also assist in preventing the species from goingextinct by ensuring that the population in captivity is thriving. Captivebreeding can boost numbers of an endangered species, with the goal ofreintroducing them and replenish numbers back into the wild and into theirnatural habitat.

However reintroducing a species back into the wild is a veryexpensive and long winded process which doesn’t always work as the species hasbecome so used to its life in captivity, they rarely survive when reintroduced (MAESTAS, 2011). Populationand breeding controlThere are only three cotton-top tamarinhoused on the Rodbaston animal unit. Breeding in captivity has to be managed, to prevent inbreeding and any genetic disorders. It is essential that there isas much genetic diversity as possible when it comes to the breeding of captiveanimals. A studbook is used which keeps a record of each captive individual, such as their sex and ancestry (Bell, 2001).

Many zoos will captive breed animalsto try and prevent the species from becoming extinct, especially if they have acritically endangered status such as the cotton-top tamarin. A genetically healthy population needsto be maintained and if the same group of animals were to mate for long periodsof time it would lead to inbreeding and a genetically unhealthy population(Kleiman, Thomson, & Baer, 2010). Zoos all work together to maintain ahealthy population of animals, so breeding has to be managed carefully. Manyzoos will place all female or all males in one enclosure rather than mixingsexes, this is one way a zoo can manage the population of their animals. Ifbreeding were to take place a mate would be selected from a stud book, ensuringthat the offspring has genetic diversity. Another way to control a population isby using contraception, this can be administered via injection or an implant, this way the zoo can manage and decide when the female is to have her offspring(Asa & Porton , 2005).

Rather than usingcontraception in the female she can have an ovariectomy or males can becastrated to prevent them from having any offspring. A more severe way of population controlin zoos is euthanasia, zoos will often use this method on animals who are nolonger fit to breed and there is no space for them in captivity and they arenot fit to be released into the wild. Euthanasia can be used as a way ofpopulation control and healthy, surplus animals are often killed, especially ifthey are no longer fit for mating purposes (Ruivo, 2010). Preventativemedicine All keepers should be educated aboutpreventative medicine and should know the signs of unusual behaviour in anyanimal that could mean they are unwell. The cotton-top tamarins on theRodbaston Animal unit are worm checked regularly and are only wormed ifnecessary.

It is important that thecotton-tops are examined yearly and vaccinated against any diseases. Staff whoare ill, have cold sores or have come into contact with anyone with measles shouldnot go near the cotton-tops as they are very prone to pick up human disease andcan become extremely ill (Rees, 2011). It is important that infant cotton-top tamarins are touched as little aspossible and don’t come into contact with humans often, due to being able topick up human diseases and illnesses easily. The cotton-top tamarins should bemonitored closely for signs of illness or disease, keepers at Rodbaston shouldbe able to recognise if an animal is not displaying its usual behaviours or isacting out of the ordinary. Should this be the case a keeper should continuemonitoring the animal closely and should capture the animal to undertake a fullinspection to try and detect what is wrong with the animal. If the animal has acontagious illness/disease, all other animals inside the same enclosure shouldalso be treated. During their yearly examination thecotton-top tamarins should have a full body health check. It is important thattheir teeth are checked as dental issues can lead to other problems such asabscesses and can cause an animal to be in a great deal of pain, they also maystruggle to eat.

If any animal has signs of any dental problems, they should betaken to a vet to get them examined as soon as possible (Abee, 2012). A tetanus and rabies vaccination is recommended for captive callitrichids andshould be administered around every two years. Pest control should be done regularly asmost zoos have pests such as cockroaches and mice inhabiting some of theirenclosures. As cockroaches and mice can transmit disease, it is important tomake sure that enclosures are rid of any vermin as mice are particularly knownto carry diseases that affect callitrichids (Gad, 2006).