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The WAZA Decade on Biodiversity Project – how institutions can maximize visitor impact

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Abstract: Most of our 700 million visitors to zoos and aquariums worldwide come from cities, reaching out to as many of them as possible and getting them to act is our primary goal as a community. The presentation will focus on the tools WAZA has developed in order to fascinate and get people to act and change their behavior in favour of biodiversity.

WAZA wants to showcase their project in support of the Decade on Biodiversity (esp. Aichi Target 1), focusing on modern technology. In addition to posters and films these include modern technologies aimed at global youths such as a social media campaign and a smart phone/tablet application in five languages. It includes species profiles and IUCN Red List status and distribution maps as well as having a strong component on simple actions everyone can do to help preserve biodiversity. A recent survey undertaken by WAZA clearly highlights the positive impact of zoo visits on visitors’ knowledge of biodiversity and actions to conserve it. The free Decade on Biodiversity tools enable zoos and aquariums around the world to further their impact and work as a community to help biodiversity.

Key words: education, education and marketing, tools, biodiversity, global
Husbandry and Management of Common Marmoset (*Callithrix jacchus*) in Captivity in Underwater World Langkawi, Malaysia


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**Abstract:** A good husbandry practice is a key factor to the success of Underwater World Langkawi (UWL) in keeping captive Common marmoset (*Callithrix jacchus*). The basic practices to the success of good husbandry in UWL are including good enclosure environments, training, enrichments and good sanitation procedures. They are also been monitor on veterinary aspect as nutrition, de-worming (endo and ecto parasite control) and general checkup. Each of the marmosets was identified with individual microchip. Record must be kept on any observed changes in behavior, feeding, excretions, husbandry or diet in management of common marmoset in UWL. The diet are come from variety kind of feed such as fresh fruits, vegetables, honey or nectar, pasta or rice, chicken or meat, and cricket or meal worm. The supplements are given such as vitamin b complex, multivitamin, and calcium with vitamin D added and omega 3 fatty acid. Currently we have 17 of Common marmosets with young triplets with three separate groups of colonies. Here in UWL we are practicing in rotating group for display or exhibit purposes. The marmosets were trained to stand on weighing scale to monitor their monthly weight. Excellent commitment of the animal keepers helps in sustaining the livability of the captive marmoset through the good husbandry.

**Key words:** Husbandry, Marmoset, UWL
BUWAYA PROJECT
AVILON WCF Conservation Research and Breeding Program focusing on the Philippine Crocodile (*Crocodylus mindorensis*)

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**Abstract:** The Philippine Crocodile (*Crocodylus mindorensis*) is a CRITICALLY ENDANGERED species of crocodilian that is endemic to the islands of the Philippines. It is estimated that less than a hundred individuals remain in the wild. *C. mindorensis* was used to be found in rivers and streams throughout the Philippines, but are now restricted to only three remaining stronghold: Northern Sierra Madre National Park in Luzon and Agusan Marsh and Liguasan Marsh in Mindanao. AVILON ZOO in Rizal, Philippines has been successful in breeding *C. mindorensis* in captivity. AVILON WCF has partnered with the MABUWAYA Foundation, a Philippine Crocodile conservation oriented organization working in Northern Sierra Madre National Park, to collaborate on the BUWAYA PROJECT, an in situ - ex situ crocodile research project under the AVILON Wild.C.A.R.E. Program. One of the goals of the BUWAYA PROJECT is to establish new crocodile sanctuaries in other parts of Luzon and adjacent islands which were previously known to be inhabited by *C. mindorensis* in the hope of giving this true Philippine treasure a chance to survive in its natural habitat.
Genetic diversity and population genetic structure for management of the Siberian roe deer, *Capreolus pygargus* (Artiodactyla: Cervidae) in Asia

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Abstract: The roe deer, *Capreolus* sp., is one of the most widespread meso-mammals that has a Palearctic distribution and includes two species. Although basic genetics studies for management of European roe deer have been reported, Siberian roe deer is comparatively less studied. Natural process and human influence have led to the formation of genetic structure and reduced gene flow in wild populations of many deer species including European roe deer. To understand how these factors have affected population genetic structure and genetic connectivity among Siberian roe deer, we investigated variability at microsatellite loci for Siberian roe deer collected throughout Asia. Also, the present status of genetic structure and the level of genetic diversity will shed light on designing the proper management and conservation of local Siberian roe deer in Eurasia. Microsatellite variability revealed moderate levels of genetic diversity ($H_E = 0.53$ to $0.62$) for geographic Siberian roe deer populations except Jeju Island, Korea, and is consistently high in roe deer populations from the East and Central Asia, but relatively low in West Siberia and North-Eastern most of Asia. Siberian roe deer inhabiting Eurasia revealed distinct genetic structuring in vast geographic area, displaying the East-West cline in genetic structure. On the other hand, ongoing migration (gene flow) among roe deer in regional scales may facilitate admixture among adjacent regions. The result implies that there are at least three distinct management units for the Siberian roe deer populations in Eurasia

Key words: population structure, genetic diversity, population management, Siberian roe deer
Characterization of 28S Ribosomal RNA in Capsalid Monogenea from Marine Fish Kept in Bangsaen Aquarium, Thailand

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Abstract: The capsalid monogenea are seriously pathogens in marine fish around the world. In eastern part of Thailand, Bangsean aquarium has many different species of marine fish, kept in 40 display tanks. In this study, the specimens were isolated from marine fish in our tanks. For identification, the molecular analysis was examined using 28S ribosomal RNA sequences. Then, the sequences were compared with those of capsalid monogenea available from the DNA Data Bank of Japan (DDBJ). This result showed the length of 28S ribosomal RNA were 900 bps. The nucleotide sequences between Bangsaen Aquarium capsalid, Neobenedenia sp. (OLH-2001), Neobenedenia sp.(1-AHC 28432-3), Neobenedenia melleni from Vietnam, Neobenedenia sp. (M07-2296-04), and Neobenedenia melleni (ZhHGS20020517) from China showed 99.76, 99.63, 99.27, 99.06, 99.01% identity, respectively.
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A 20-Year Disease Survey of Captive Formosan Serows (Capricornis swinhoei) at the Taipei Zoo (1991-2011)

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Abstract: The Formosan serow (Capricornis swinhoei) is endemic to Taiwan. The wild population has declined dramatically over the past few decades and the species is listed as a "precious and rare species" protected under law in Taiwan. Disease investigations have been rare except for sporadic observations of wild individuals and no long-term disease survey has been performed on this species. The objective of this study was to identify and report on the most common diseases in captive Formosan serows and determine the potential causes. Medical records of Formosan serows \((n = 62)\) housed at the Taipei Zoo over a 20 year period (1991-2011) were collected and analyzed for this study. The most common diseases affected the gastrointestinal system and the skin. Parasitic etiologies accounted for greater than 85% of these diseases, and co-infection was common. Coccidia and lice were the most common endo- and ectoparasites, respectively. High mortality was noted in serows less than one year old associated with parasitism. The results from this study could provide vital information on disease prevention and species management, which may greatly help in rehabilitation of captive and wild populations.

Key words: Formosan serow, \textit{Capricornis swinhoei}, parasites, coccidiosis, lice
Goral Re-introduction at MaeLao-MaeSae Wildlife Sanctuary, Chiang Mai Province, Thailand

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Abstract: Goral (Naemorhedus griseus) is one of Thailand’s endangered and protected animal. It is listed in IUCN Red List of Species as vulnerable (VU) and is listed in Appendix I according to CITES. The wild populations of goral in northern Thailand have been greatly reduced by human impact such as deforestation and illegal hunting with potential infectious disease threats from livestock sector. In 1994, Omkoi Wildlife Breeding Station had successfully bred 6 pairs of goral from the wild caught parent stocks. The population of goral in the breeding program has been growing steadily. Currently, the conservation breeding program has successfully produced 65 goral calves (Omkoi Wildlife Breeding station, 2014). With the goral’s captive breeding program well established, the goral conversation project has diversified its focus to the conservation of goral habitat and the re-introduction of the population to their natural habitat sites. There are three main steps to goral re-introduction: 1) Pre-reintroduction 2) Re-introduction 3) Post-reintroduction process. Routine observation and radio telemetry were the method used in the follow-up process for released gorals. In 2011-2012, 18 gorals were released in soft release pen (32 ha/plot). A total of 12 gorals survived (66.67%) and 6 were lost due to infection and trauma from fighting and accidents (33.33%). The habitat used by goral are areas with qualities of coniferous forest, mixed deciduous forest and dry...
dipterocarp forest. Forage plants selected as feeding source are *Imperata cylindrica*, *Panicum notatum*, *Bambusa arundinacea*, *Sterculia thorelii*, Aristolochia sp., *Phyllanthus emblica*, Cyperus sp., *Pouzolzia pentandra*, *Centotheca lappacea*, *Shorea obtusa*, *Shorea siamensis*, and plant in family Fagaceae and Gramineae. The observation gorals in soft release revealed that the main behaviors are; standing, resting and ruminating which are comparable to those of their behaviors observed in captivity. The gorals that survived are healthy and fully adapted to their natural habitat. The main factors that affected the survival rate of gorals in the Goral-Reintroduction project includes rainfall, humidity, and the amount of predators in the released area. Thus, the release of goral should start early in winter, right after the season with high level of rainfall, in order to reduce death rate.

**Key words:** Naemorhedus griseus, Re-introduction
Does Size Matter?

Do bigger enclosures mean better for captive tigers?

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Abstract: Stereotypic pacing is common in zoo carnivores, such as bears and tigers, which might be due to spatial constraint and long-term adaptation to the facilities. This study was conducted on 4 tigers kept solitarily in adjacent enclosures at Taipei Zoo. We provided 3 different-sized exercise yards (5.2 x 9 m, 9.5 x 9 m and 14.7 x 9 m) for tigers to rotate, and observed the differences among their behavior patterns. The results showed that their activity increased corresponding to the enclosure size (respectively 10.2%, 10.7%, and 20.4%). On the other hand, stereotypic pacing was 16.6%, 8.6% and 6.9%, as the enclosure size was enlarged. The above data are not significant statistically, probably due to small sample size and the sequence of enclosure rotation bringing new stimulation to the tigers, which exceeds the influences of the enclosure size. In addition, the results showed that tigers preferred using concrete floor and artificial facility (especially the platform) than natural substrate, no matter what kind of enclosure size they were in. Considering the hygienic problems of concrete floor, it is advisable to provide tigers with platforms in different locations and heights, which could encourage them to use more of the available space. Under circumstances where there is limited space for captive tigers, the flexibility for regular enclosure rotation and enclosure complexity are also important concerns as well as enclosure size when designing the exhibits.

Key words: Panthera tigris, stereotypic pacing, enclosure size, enclosure rotation, enclosure complexity
Development of Eld’s deer embryos derived by in vitro fertilization and nuclear transfer

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Abstract: Eld’s deer or brow-antlered deer is a medium sized deer localized to small areas in Southeast Asia. The species is considered endangered due to IUCN Redlist based on estimated rates of decline which primarily due to hunting (for local consumption of meat and traditional medicinal products). Due to small population and few founders, inbreeding is a major risk of extinction. The use of reproductive technologies i.e. in vitro fertilization (IVF), nuclear transfer (cloning) and embryo transfer (ET) would serve a tool to maintain genetic diversity of these small populations. The objectives of the study were to investigate 1) the development of Eld’s deer embryos derived by IVF and nuclear transfer and 2) the developmental competence of IVF embryo after transferred to recipients. Over two breeding seasons (2010-2011), oocyte donors were synchronized for IVF/ET. Percentage of cleaved IVF embryos was 63\% (51/81) at 36 hours post insemination (hpi), percentage of morula was 6.2\% at 144 hpi and percentage of blastocyst was 5\% at 192 hpi. Pregnancies (6/11, 55.5\%) were diagnosed by EIA analysis of progesterone metabolite in feces (>1,000 ng/g). Two pregnancies failed prior to 90 days of gestation and two fawns died shortly after spontaneous preterm
births at days 215 and 224 of gestation. A healthy female fawn was born unassisted with no complications at day 234 of gestation. For interspecies somatic cell nuclear transfer has been developed to observe the feasibility to produce Siamensis embryos. Because collection of amount number of Eld’s deer oocytes is a limitation for research, bovine and swamp buffalo oocyte collected from slaughterhouse was used instead as a recipient cytoplasm. The quality of swamp buffalo oocytes was poor compared to those of bovine (maturation success was 46 vs. 80%, respectively). The fusion successes of Siamensis cell- bovine and swamp buffalo oocyte couplets were 91 and 77%. The couplets derived from bovine and swamp buffalo oocytes could developed to cleavage 80 vs. 36%, morula 23 vs. 9% and blastocyst 13 vs. 2%, respectively. The results show the possibility to produce Siamensis embryos from bovine and swamp buffalo oocytes. However, the competence of the embryo derived from interspecies cloning after transferred to recipients need to be more fully study because many factors ie. epigenetic abnormality may limit the development of embryos to term. In conclusions, the present study indicates that innovative reproductive technologies are useful tools for fundamental science investigation and offspring propagation. Application of these technologies with intensive population management would bring hope for sustain genetic diversity of endangered Eld’s deers.

**Key words:** artificial insemination, in vitro fertilization, nuclear transfer, Eld’s deer
Spondylosis with kidney yang deficiency in a Bengal tiger

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Abstract: Xinma was a 24-year-old female Bengal tiger who was captive in Taipei zoo, Taiwan. The tiger’s keeper noticed that she was reluctant to move and its hind limbs appeared injured. And the condition of the tiger’s hind limbs continued to worsen. And keeper also noticed that the tiger needed assistance walking, sitting, and turning over. She panted when lying down and was unable to exercise. Poor appetite and weakness was also noted. An X-ray observation found that her liver was swollen and showed suspected prolapsed disc plate on thoracic vertebra and between the lumber and sacrum. And her kidney was abnormally small also found in X-ray. Neurological examination found that pain reflex had normal results, but knee jerk reflex and Achilles tendon reflex were disappeared, and she could not reach a recumbent position without assistance. CBC and serum chemistry tests showed that she might be suffered from liver, kidney and pancreas problems. The tiger was very affectionate and liked approaching keepers. She also liked sunshine and warm places. Traditional Chinese Medicine (TCM) examination found that her tongue was pale and dry with a slight white coating. Pulse was deep and thin, especially on the right side. Sensitivity was noticed at the spleen shu point (BL 19) and kidney shu point (BL 23). Local sensitivity was noticed on the pelvis. Based on the TCM diagnosis, the tiger was defined as a spondylosis with kidney yang deficiency patient. A combination of aqua puncture (AP) using dilute B12 (0.5 ml. B12 dilute with normal saline to 1 ml, per acupoint), and electrical acupuncture (EA) were used. Daily treatments were planned. In addition, yunnanbaiyao powder was used for healing bedsores. After nearly 2 months treatment, the tiger can sit and stand up by herself and bedsore was totally cured. This case suspected to be intervertebral disc disease, however, because of
myelographic examination was not performed, this case can just be diagnosed as spondylosis. The patient had a poor response to Western medical treatment and dyskinesia problem still unresolved. However, the related surgery was not suggested because the patient was seemed too old to withstand anesthesia. Acupuncture treatment offered an alternative to other treatment options. The patient seemed to be a good candidate, because the TCM diagnosis explained her symptoms so well. Most of the tiger’s problems could be traced to kidney deficiency, which was evident in the long-term spondylosis. After receiving TCM therapy, she seemed to desire reaching a recumbent position without assistance from keepers. Although the patient died on 2012/5/2, acupuncture treatment obviously offered a better quality of life for the tiger. In conclusion, this case could be referred to for clinical TCM application in wildlife which showed that TCM therapy can be used in conjunction with Western medicine to achieve the best results for the patient.

**Key words:** spondylosis, kidney yang deficiency, Traditional Chinese Veterinary Medicine (TCVM), acupuncture
Abstract: Hepatitis B is the important disease in public health that can infect non-human primates. This study aimed to survey the seroprevalence of Hepatitis B in 113 non-human primates of the Zoological Park Organization collection throughout Thailand. Total of 93 gibbons, 8 chimpanzees and 12 orangutans were tested by commercial ELISA assay for hepatitis B surface antigen (HBsAg), hepatitis B core antibody (anti-HBc) and hepatitis B surface antibody (anti-HBs). The seroprevalence of hepatitis B virus infection was 16.13% in gibbons. None of infected chimpanzee and orangutan was found. The immuned gibbons, chimpanzees and orangutans were 20.43%, 12.50% and 33.33%, respectively. The susceptible animals were 44.09% in gibbon, 75.00% in chimpanzee and 50.00% in orangutan. The unidentified hepatitis B status of were gibbons, chimpanzees and orangutans were 19.35%, 12.50% and 16.67%, respectively. All of infected gibbons were infected with gibbon hepatitis B virus (GiHBV). The biochemistry values of hepatic enzymes including aspartate aminotransferase
(AST), alanine aminotransferase (ALT) and alkaline phosphatase (ALP) in infected, immuned and susceptible animal of each species were not significant (p>0.05). Hepatitis B vaccination (Hepavax-Gene®TFinj) was provided for all susceptible animals. The monitoring of vaccine effectiveness in vaccinated animals is ongoing.

**Key words:** Hepatitis B, Non-human primate, Hepatitis B vaccine
Environment-friendly, Handmade Fruit Peel Detergent in Taipei Zoo

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Abstract: In order to reduce the utilization of chemical detergents in Taipei Zoo and to recycle use of the sewage from captive animal daily alimentary fruit or vegetable, the staff of the Environmental Maintenance Section of Taipei Zoo has been elaborating toxic-free enzyme and detergents by the fruit peel sewage such as pineapple (Ananas comosus), limon (Citrus limon) and pomelo (Citrus grandi), etc. By so doing, the toxic-free detergent products have been used in several public restroom of this Zoo step by step, with remarkable fragrant smell and significant cleaning effect. Great response comes from visitors and cleaning staff recently.

Sodium hypochlorite has been widely used on cleaning and disinfectant for a long time due to reasonable price and ease availability. But sodium hypochlorite is a strong oxidizer, and oxidation reactions are corrosive, solutions burn skin and cause eye damage. Furthermore, the use of sodium hypochlorite in a Zoo could probably be harmful to the captive animals in different aspect. Since the year of 2010, fruit enzyme has been developed in Taipei Zoo on the purpose of reducing the use of chemical detergents such as sodium hypochlorite. Although the process of fruit enzyme takes as long as 3 months, the Zoo staff develops faster process of fruit peel detergent which just takes 3 days.

Key words: Fruit peel detergent; Environment-friendly detergent; toxic-free detergent
A New Haplotype of Serow (Capricornis sumatraensis) in Zoological Park Organization of Thailand based on the Mitochondrial DNA Control Region Sequences

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\textbf{Abstract:} Serow (Capricornis sumatraensis) is a medium size goat-like wildlife and listed as an vulnerable species by IUCN, 2009. In Thailand, population of wild serow is decreasing due to the impacts of illegal hunting and hunting. Due to the small populations, little chance of mating has occurred. These reasons might be effect to increase genetic diversity losing and inbreeding opportunity. The study of mitochondrial DNA diversity is one of important tool for wildlife conservation. Then, the objective of this study was to analyze the sequence variation of the 831-bp of control region sequence on mitochondrial DNA. Twenty samples of blood and ear tissue were collected from zoo under The Zoological Park Organization of Thailand. Genetic distances were calculated by Neighbor-joining method. The results revealed 15 haplotypes of 831 basepair on control region among all samples. All of the haplotypes in our study are new report to Genbank. The haplotypes can be divided Thai Serow in to 5 groups. The reliability (bootstrap) was 100, 100, 82.4, 100, 99.6, respectively, indicating the reliability or the possibility are high level. Insertion of the base Adenosine(A) at position 475 of Serow number KKOZ2 was founded. This study is the first report of Genetic study on mitochondrial in Thai Serow. Genetic analysis of endangered species may provide a strong basis for a development of conservation programs for the vulnerable and threatened species.

\textbf{Key words :} Serow Haplotype, Mitochondrial DNA, Control Region

Hsin-Chieh Tang, Szu-Lung Chen, and Chih-Peng Chiu

Taipei Zoo

Abstract: The Spot-legged Tree Frog (*Polypedates megacephalus*) is an exotic species in Taipei Zoo recorded in 2011. The working group for removing this species was established in 2012, and removed two days per week, from April to September every year. Totally 2989 males, 618 females, 486 froglets, and 378 egg masses were collected. Taipei Zoo also held education trainings, campaigns, workshops, and lecture courses for staffs, zoo volunteers and the public. This project not only successfully controlled the populations of the spot-legged tree frog within Taipei Zoo, but also increased the identifying abilities of amphibians and reptiles.
Biodiversity of “Dong FahHuan” national preserved forest, Plant Genetic Conservation Project (RSPG –Ubonratchathani zoo)

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Abstract: Ubonratchathani zoo is an implementing partner under the Plant Genetic Conservation Project Initiatives Under the Royal Initiation of Her Royal Highness Princess Maha Chakri Sirindhorn (RSPG). Ubon Zoo is located on the forested area of 481.2 acres. Of which, 47.4 acres designated for Plant Genetic Protection. There are 8 activities implemented including 3 learning plans for visitors. Biological diversity survey in area 47.4 acres expenditure took place since 2013 by multiple partners including Plant Genetic Conservation Project (RSPG), Ubonratchathani University (RSPG-UBU) and the Ubonratchathani Zoo (RSPG-UBZ). Survey of vegetation, herbal trees, fungi, reptiles, insects, birds and mammals were conducted regularly. Long-term survey of natural resource within the natural habitats within the zoo would provide valuable information for the conservation and use of herbal medicine for human and animals and to disseminate knowledge and local wisdoms to the next generations. In addition to RSPG Project focuses on applying effective biodiversity conservation to raise awareness, to keep natural balances to mantain forest habitat against potential natural disasters. Example of dominant biodiversity of “Dong Fah Huan” areas within the Unon Zoo includes;

1. Yang Na tree (*Dipterocarpus alatus*). This is a plant with many uses. Whether the latex utilized as a fuel to leak of the ship.

2. Rose Wood (*Dalbergia cochinchinesis*). The plant is considered to be present. The plants are worth preserving for posterity.
3. Eight-Spotted Crab Spider (*Platythomisus octomaculatus*). The spider is endangered (EN).

4. Large Ground Beetle (*Mouhotia batesi*). It is a rare insects that provides plenty of space to the challengers.

In the future Ubonratchathani zoo would invite institution survey the Biodiversity and Physical in area for the purpose of Learning center Biodiversity Physical Herb Insects in Southern Isan, in Thailand for AEC(Asean Economic Community) standard have knowledge reciprocity Implantation, Breeding rare insects, Herbs and In developing awareness to conservation natural balances maintain in forest. In order to the important database Biodiversity Physical Herbs and Insects.
Ovarian Interstitial Cell Tumor in a Bobcat

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Abstract: A 12-years-old female bobcat Lynx rufus was kept in Taipei zoo, Taiwan (25.03 ° N, 121.30 ° E) who was presented for long-standing infertility, poor appetite for several days and recent development of abdominal distention. Abdominal ultrasonography and radiography demonstrated abnormal enlargement of uterus and ovaries and ascites existed. After examination, The ovariohystectomy was performed. In the right side of ovary, an ovarian neoplasm was found and characterized microscopically by replacement of the stroma by a population of large polyhedral cells, which are irregularly shaped cells with abundant, finely vacuolated cytoplasm. The nuclei were uniformly small and round to oval. Based on these histopathological characteristics, the ovarian neoplasm was diagnosed as an ovarian interstitial cell tumor. The prognosis of the animal is well after the surgery underwent. To our knowledge, this report is a rare case of ovarian tumors in Lynx rufus. This is the first case of ovarian interstitial cell tumor of bobcat in Taipei zoo, and this is also a rare case in this species.

Key words: Ascites, interstitial cell tumor, Lynx rufus, ovary.
A Conceptual Facility Design for the Disabled Zoo Visitors

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Abstract: The purpose of this study is to assess the element of needed facilities for the disabled zoo visitors. The findings of the study will be used as feedback to plan and develop service environment within the zoo in the future. One of the examples of the results of such studies is to the design and construct functional universal toilets for all. Details of the study were divided into 3 topics including; 1) elements of the facility universally collected and the elements of a standard basis for the disabled. 2) design patterns of universal facilities and the environment that affect its use and barriers for the disabled; and 3) general information about the case study. The internal documents domestic and foreign research sought to improve pedestrian.

The study's results are as follows:

1. Dusit Zoo with elements of facilities to accommodate the disabled.

2. Zoo developments arising from the use of the process involved in developing the area by establishing a working group to improve care facilities for the disabled are universal.

3. To improve the area by creating a boundary for the disabled using the barrier-free path from the tree planting or placement street furniture to define their territory pathway from road traffic.

Key words: Facilities, universal design, disabled, zoo visitors
Releasing Captive Indo-Pacific bottlenose dolphins into the sea in Korea

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Abstract: There are 114-120 individuals of Indo-Pacific bottlenose (Tursiops aduncus) vulnerable to problems associated with local fisheries in Jeju island in Korea. Jedol is a 14 year-old dolphin who was illegally traded after being caught in a fishnet off the coast of Jeju Island. Jedol has been at the city-run Seoul zoo since 2009. In March 12 2012, the City Mayor of Seoul, Wonsoon Park announced a plan that one of captive dolphins, called ‘Jedol’ would be released back into the wild. Seoul Zoo set up the Citizen committee comprised of 14 members with researchers, professors and NGO groups for releasing Jedol in April. Seoul City support not only expert participation but also year budget, $660,000 (750 million won) for Jedol’s rehabilitation and release. In a separate development in March 28, 2013, the Supreme Court of Korea upheld the decision of releasing 4 captive dolphins of a private company due to illegal trading. However, 2 individuals of them with inborn defect and injury were sent to Seoul zoo. Three captive dolphins including Jedol have been undergone rehabilitation program at the sea pen off the coast of Jeju island. After releasing in 16th July, they will be monitored for at least 6 month. This releasing project of captive dolphins has a significant value in collaboration between government, Citizen and NGO groups. Now, they are living freely with their colleague in the sea in Jeju island in Korea.

Key words: dolphins, Indo-Pacific bottlenose, citizen committee, NGO, Jeju island
The Pattern of The Animal Exhibit Area Composition on The Number of Zoo Visitors and Viewing Time in 5 Zoos in Thailand

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Abstract: Complacency of the visitors to the specific exhibit, including the strengths and weaknesses, that can motivate visitors to spend longer time viewing wild animals in exhibit areas. Collected and analyzed data from individuals involved in the 5 zoos including Dusit Zoo, KhaoKheow Open Zoo, Chiangmai Zoo, Nakhonratchasima Zoo and Songkhla Zoo. The results showed that the majority of visitors were female, with education level of a bachelor’s degree, age 15-30 years old and students. The only exception in KhaoKheow Open Zoo visitors that the age of visitors ranges between 30-60 years of age and were work employees. Most visitors are relatives or family 3-5 persons per groups. There was no difference between groups with children and without children. The longest mean of viewing time at the reptile house exhibit, followed by the elephant, tiger, giraffe, penguin, hippopotamus, pileated gibbon, chimpanzees, tapir, and flamingo exhibit were 16.47 ± 11.15, 5.60 ± 3.90, 3.79 ± 5.19, 3.72 ± 2.72, 3.18 ± 2.38, 2.54 ± 2.14, 2.51 ± 2.46, 2.30 ± 2.11, and 2.10 ± 2.02 minutes, respectively. Visitors, zoo keepers and veterinarians satisfaction with elephants, tapirs, pileated gibbon, tiger, penguin, flamingo, giraffe, hippopotamus, chimpanzees and reptiles house exhibit were differences (p <0.05).

The mean of visitor satisfaction were 3.69±0.84, 3.71±0.85, 3.55±0.90, 3.36±1.01, 3.52±0.90,
3.64±0.90, 3.57±0.84, 3.48±0.90, 3.45±0.89 and 3.58±0.91 point, respectively. The mean of the zookeepers satisfaction were 2.91±0.72, 3.12±0.91, 3.42±0.98, 3.48±0.67, 2.93±0.73, 3.18±0.69, 3.40±0.94, 2.93±0.78, 2.93±0.69 and 2.83±0.95 point respectively. The mean of the veterinarians satisfaction were 3.39±0.88, 3.37±0.76, 3.22±0.91, 3.42±0.79, 3.38±0.88, 3.25±0.83, 3.29±0.88, 3.24±0.83, 3.34±0.82 and 3.35±0.79 point respectively. However, the composition of the animal exhibit for complacency of zoo visitors, zoo veterinarians and zoo keeper that exhibit and barrier were resemble habitat of each species, the visitors can find animals easily and contribute to the activity of animals in the exhibit.

**Key words**: Pattern; Composition, Animal exhibit, Viewing time, ZPO
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Change, it works!

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Abstract: In 2009, Ocean Park Hong Kong imported four (2.2) Red pandas (*Ailurus fulgens*) from the ChengDu Zoo. The habitat for these pandas is located at the Amazing Asian Animals exhibit, situated below an adjacent guest walkway. The red pandas were sensitive to this environment and the animal care staff initiated a reconstruction project that would provide additional natural foliage and arboreal living space for the pandas. This change occurred in 2011, as the exhibit was enhanced with nest boxes, wooden climbing structures, ropeways, and ground covers. The behaviour of the pandas changed as they spent less time on the ground, more time interacting with each other and accessed more areas in the exhibit. In 2014, the exhibit was restructured again with several new nest boxes, dense planting with trees and foliage, and a platform for daily feeding demonstrations. These additional renovations provide improved viewing of the animals by guests at eye level, while the pandas are able to be camouflaged within the additional foliage.

Key words: red panda, *Ailurus fulgens*, exhibit enhancement, nest box, wood structure, plantation
Small Indian Civet farming: Knowledge Transfer from H.M. the Queen’s demonstrated farm to agricultural sector

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\textbf{Abstract:} The objective of the project was to transfer knowledge of small Indian civet husbandry, captive breeding, health management and farm sanitation to the farmers. The practical target of the project is that the farmers learned from the “Best Practices” and can produce captive-bred civet kittens by themselves. Ultimately, we hope that the long-term impact would result in the reduction of wild civet hunting/trapping for farming. In addition, the project emphasized on raising awareness about proper use and conservation of civets. Farmers were divided into 4 target groups; 1) small Indian civet farmers at Ban Dong Yen (H. M. the Queen’s demonstrated farm), Chiang Mai, 2) small Indian civet farmers at Phetchaburi Province; 3) farmers who were interested in small Indian civet and palm civet propagation at Lampang and Chiang Rai Provinces; and 4) other farmers who were interested in civet propagation. Basic information such as farm construction and management, need of training and participating in captive breeding project and basic knowledge about civet farming was collected randomly from questionnaires and interview of individual farmers. Results from 211 surveys showed that no farm could propagate civet successfully. However, 150 farmers were interested in civet captive breeding. Evaluation from 2 training courses showed that 94.4 \% of 200 farmers were satisfied in the
results of technical training provided by ZPO. Total of 16 farms were selected to participate in the project and 5 of them needed and readied to establish civet propagation (breeding group). Farmers in the project were provided consultation and how to improve their farm management, sanitation, disease protection and breeding management. From on-site evaluation, 80 % of participated farms had improved their farm management. In breeding group, all farms had started breeding program by applied knowledge from training and suggestion from the project. Recently, 3 farms were successful in producing healthy civet kittens, which can be a replacement stock for future breeding. This preliminary success demonstrated that good farm model of civet propagation can be implemented. Farm limitations of captive breeding such as farmers had no record about data of the farms, farmers lacked of understanding about law of wildlife propagation, lack of marketing support of civet musk. In conclusion, our research project shows the basic information of civet farming in the main locations of Thailand. The project transferred knowledge of civet captive breeding from research to agricultural sector sucessfully. Many farms have started improvement of their husbandry practice after being supported by our project. The project would help to compromise between the economic use of wildlife and sustainable conservation.

**Key words:** Small Indian Civet, propagation, breeding, farming