ASPECTS OF VETERINARY CARE AND MANAGEMENT OF THE PHILIPPINE SPOTTED DEER (*CERVUS ALFREDI, SCLATER*) IN CAPTIVITY

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ABSTRACT. For the past four years the Silliman University Philippine spotted deer captive breeding facility has successfully pursued its program of breeding *Cervus alfredi* in captivity. It has adapted a general management procedure similar to that of deer stock farming while at the same time developed basic techniques on various aspects of care and management of the endangered species under captive conditions.

History

Since the review of the taxonomy of Philippine deer by Grubb and Groves (1983), *Cervus alfredi* has been recognized as a species distinct from its closest relative, the sambar deer (*Cervus mariannus*). Its notable characteristic of retaining spots until maturity makes it distinct among Philippine cervids, thus its name, Philippine spotted deer.

In 1988, the species was accorded endangered status by the world conservation union (IUCN) after an initial survey by Cox (1987) and others (Oliver, 1991) revealed that the population in the wild has been decimated as a result of forest destruction and uncontrolled hunting. To date the species is found in the Negros- Panay biogeographical region.

In 1990, a conservation program on the Philippine spotted deer was set up and shortly after, the first memorandum of agreement was signed between the Philippine government (DENR) and Mulhouse Zoo, France. The program involved the setting up of the first Philippine spotted deer captive breeding facility in Silliman University for the purpose of propagating, rehabilitating, and studying the species. The program also envisioned the deer project as the flagship species that would lead the way in the promotion of wildlife conservation in the region.

By 1993 and 1994, two sister facilities were setup in Bacolod and Panay, respectively. Silliman University together with these two facilities collaborate closely to carry out the conservation programs.

Deer Management Procedures

Rationale

This paper will discuss various aspects of captive breeding including applied techniques and strategies based on our experience and recommendations from commercial deer farms. The importance of a sound captive breeding program cannot be overstressed considering the complexities involved in raising wild animals under captive conditions. However, it is generally agreed that many of the techniques used in raising domestic animals may be applicable with some degree of modification to wild animals. These techniques encompass all aspects that support the well-being of wild animals kept under captive conditions (Fowler, 1986).

Quarantine

Prequarantine procedures involving movement and transfer of animals should be carried out under the supervision of the project leader and with the help of a veterinarian. The latter provides assistance to the needs of the animals while at the same time advises the project leader on decisions such as those involving immobilization procedures. Because some chemical immobilizing agents have adverse effects on the animals, certain immobilization procedures, physical or chemical, have to be approved by both the project leader and the veterinarian. Drug tables found in vet medical manuals and other similar wildlife medical references should be consulted for the appropriate choice and dosage of drug. For this particular species, Xylazine, a powerful muscle relaxant, has been used on several occasions in conjunction with the antidote, antisedan@ at dosages of 0.1 ml/kg body weight and 1 ml/kg body weight, respectively.

As a conservative rule, no chemical immobilizing agents should be used on a wild animal if an antidote, particularly for such drug, is not available. Prolonged effects of immobilizing drugs, especially anesthetics, can retard the normal respiration and circulation of the animal, causing respiratory arrest or other complications associated with immobilization (Fowler, 1986).

A simple way of catching deer inside the barn is to drive the animal through the narrow doorway with a crate positioned at the opposite end (refer to indoor barn design in Appendices V and VI and crate design in Appendix IV). This procedure usually requires two people, one to drive the animal towards the positioned crate, and the other to shut the door of the crate. An alternate way of catching deer in confined areas is to round up the animal into a corner and catch it with bare hands. A snare or net can also be used to drive and catch the animal.

This particular deer species is best handled and moved during the coolest time of the day/night inside a crate (refer to Appendix V). Unless an airconditioned transport vehicle or a covered vehicle is provided for, animals should not be moved until the day becomes cooler.

Quarantine involves the screening of all animals entering the facility. A newly arrived animal is isolated in a designated quarantine area which is separate from the resident herd for at least 30 days. During this period, physical examination, blood examination, fecal examination (for parasites and digested food analysis), and other necessary tests (e.g. tuberculin test in T.B. endemic areas) are carried out to make sure that the animals are not carrying any form of infectious disease. This procedure also involves physical separation of animals during times of stress and sickness to prevent the spread of infection in the facility.

Stock selection

This aspect of the program recognizes the importance of maintaining a stable genetic stock. Lacy and others (1992) recommend breeding programs to start with as many founder animals (i.e. at least 20-30 effective individuals). However, in our case this may not hold true for the Philippine spotted deer whose population in the wild has been decimated to a group of hundreds of individuals. Instead it has been suggested that a herd of not less than 12 individuals (e.g. 1:1 breeding ratio of male and female) should suffice to carry out the objective of retaining heterozygosity over the period of years (Oliver, pers comm.). There is reason to believe that the number of founder animals is closely associated with effective population size, among other factors. This will entail consideration of the quality of breeding animals rather than of quantity.

Perhaps a practical way of selecting good breeders is to give gross visual merits to the animals (e.g. superior built, resistance to disease, calf yield and maternal care) and optimize their use as main breeding animals. However, it has been noted that some breeding females select their mate and may usually accept mature and experienced bucks and reject the younger ones. Another consideration is avoidance of inbreeding. Physical separation among related individuals is recommended to prevent inbreeding and the ill effects of inbreeding depression (McLaren and Rotundo, 1985). Hybrids (mix breed of spotted and brown deer) should not be introduced to the herd of pure spotted deer since these are potential genetic "contaminants". Karyotyping may be carried out periodically on each animal to determine its genetic composition and to trace its pedigree.

Animals may be marked and individually identified using ear tags or by taking note of unique features of individuals (e.g. coat color pattern, deformity). All animal record

should be entered into an individual file which contains all pertinent information (refer to Appendix III samples of animal record). Supporting records such as breeding record and daily behavioral records should also be maintained by the facility. As a basic tool of research, records are indispensable in providing necessary information and basis for determining which individuals to breed and not to breed.

Wild-caught, sick and injured animals may be taken in and rehabilitated in conjunction with the rescue and rehabilitation objectives of the program, provided that it passes quarantine procedures.

Feeding and Nutrition

A good nutritional regimen is one which meets the optimum feed and behavioral requirements of the animal. This can usually be gauged by the capacity of the animal to grow and develop normally and more often by its ability to reproduce at an early age (Denholm, 1984).

In many deer farms quantitative use of feed is empirically applied in cognizance with the understanding of the biology and adaptability of certain species to a wide variety of foodstuff (Denholm, 1984). Such adaptability stems from the result of seasonal availability of plants, their variety, and the stage of plant growth and development which may affect the palatability of different parts of the plant (Chaplin 1977). The Philippine spotted deer has been observed to accept a wide variety of foodstuff under captive conditions. Even in their natural habitat, wild deer have been observed to venture into clearings and opportunistically feed on agricultural crops such as corn and newly fallen ripe avocados and mangoes (Barte, pers comm).

A captive group kept in woody environs had been observed to feed on freshly fallen dehisced leaves of *Sandoricum koedjapi, Sweetenia sp.* (Mahogany) and *Mangifera indica*. This observation contrasts with Sinha's 1987 feeding experiments on Philippine rusa (*Cervus unicolor,* Smith) which showed the species to be otherwise selective. Since species vary from one another, and captive conditions do not usually provide as many varieties of food (as compared in the wilds), feed experimentation becomes critical when ideal quantity and quality of food are to be considered. Some of the foodstuff that have been tried and eaten by the Philippine spotted deer includes a wide variety of fruits, improved grasses, and concentrate (see Appendix I).

As a matter of preventive measure, feed should come from clean and reputable sources. Ideally, forage intended for deer feed should be harvested from areas away from grazing domestic animals since these are potential sources of parasites and diseases. All foodstuff such as fruit, concentrate, and feed supplement should be monitored for fecal

contamination, molds, and dirt and should immediately be discarded upon contamination. It should also be noted that young animals tend to suckle and gulp down fruits. Therefore, fruits with large seeds such as mango should not be given in order to avoid choking and gastrointestinal impaction. Needless to say, it is important for the facility to maintain feeding manuals and feed inventory records.

Husbandry and Care of Adult Deer

Female deer reach maturity in less than two years under ideal captive conditions. Average maturity is 17 months but some individuals may show signs of estrus as early as 10 months of age. Adults regularly go into estrus during the months of April and May but may breed anytime in the year. Estrus and receptivity range from 10 to 30 hours. Gestation averages 217 days or roughly 7 months and calving interval ranges from 10 to 12 months giving the average dam a potential of bearing two calves in one year. Some individuals have been observed to go into estrus two months after giving birth. Fawns are usually weaned within six months of age. However, the mother will normally allow its young to hang around until maturity. To facilitate close monitoring, females close to term are usually separated from the rest of the herd and remixed with other individuals after the calf has been weaned.

Male deer, on the other hand, reach maturity at a later age (at least 2 years). Buttons develop on their forehead within six months and may proceed to fully develop into a single tine antler within the end of the year. Two or three tine antlers usually grow on individuals above two years of age. Mature deer usually shed their antlers at least once a year, between the months of June to September and immediately grow them the following month. There is a strong indication that antler development is associated with the health condition of the individual. As yet, this needs to be confirmed by further studies.

Adult males in full antlers use the appendages to their full advantage, often in an aggressive way. Males can become extremely aggressive and dangerous to anyone venturing inside the paddocks especially during breeding season (April-May) and in times when a female is in heat. Constant rubbing of antlers against inanimate objects is consistently observed among male individuals in full antlers. It is for this reason that fence bases need to be reinforced to prevent the stag from uprooting them. Likewise, movable structures such as doorways need to be locked in place to prevent stags from playing with them with their antlers. Attempts to diffuse the animals' destructive behavior by setting up antler rubs made of bamboo and wood have been tried with little effect.

Since mature males are almost always incompatible, they need to be separated to prevent them from fighting. Notably aggressive individuals are kept in separate paddocks or enclosures away from each other's sight. As a precautionary measure, mature animals

in full antler are not mixed with adult males in velvet or with individuals who have recently dropped their antlers. Although serious fighting between males can be minimized in larger areas (since this gives the subordinate the option to flee) close monitoring and supervision should still be maintained for record purposes.

Design of facilities

Based on their wide distribution and their ability to thrive under various habitat conditions, deer are also considered to be a highly adaptable animal (Anderson, 1984). Some species actually adapt to confined habitats and to human care (English, 1984). The Philippine spotted deer under captive conditions show more or less predictable behavioral characteristics which provide significantly important hints on how to design the facility. For example, they do not usually stay long under the sun and at certain times of the day (mornings and noon) immerse themselves in water thus necessitating the need for shade and water.

An ideal deer facility is one located on flat land with good drainage to allow ease in monitoring and servicing of animals. The area should have relatively good vegetation cover in the form of shrubs and trees. Clean pools should be provided in each paddock to serve as wallow and alternate source of drinking water. On the other hand, mud wallows created by the animals themselves provide relief from insects and heat. Sheds may be built to provide shelter and security for the animals. The area should be enclosed by a deer proof fence high enough (3 m) to prevent the animals from jumping out and strong enough to withstand the onslaught of a butting stag. A heavy duty mesh of interlinked or wielded wire with its underends anchored or fixed in concrete should prevent the animal from lifting the bottom of the fence with its pair of antlers. A secondary outer fence may be constructed to prevent stray animals from venturing close to the deer enclosure. In our case, the space provided for between the inner and outer fences has been utilized as planting area for deer forage (see Appendices IV and VI).

Stocking density in some New Zealand deer farms with improved pasture has been approximated to that of domestic sheep which accommodates around 24 stags per hectare all year round (Wilson, 1984). In cases wherein pasture is limited or when the paddock falls below its carrying capacity to provide forage, cut-and-carry method or the practice of supplying forage from outside sources must be employed. In general, designing a deer facility becomes a practical undertaking.

Management and Control of Diseases

This aspect of the program presents many challenges for Philippine wild life captive breeding practitioners mainly because few studies are being done on Philippine wild

animals especially those with ungulates. Selected blood parameters (refer to Appendix II) have been established for the species and have provided limited clues on the clinical condition of the animal. Much of the management techniques and procedures used on the species are patterned and or modified after **Deer Refresher Courses** developed and periodically updated by veterinarians involved in deer farming in New Zealand, Australia, and Europe.

Some of the diseases encountered in our facility include sporadic cases of Eimeriasis and enterotoxemia of undetermined origin. These are characterized by foul smelling diarrhea which may or may not be tinged with blood, accompanied by lethargy, and sometimes with bloat. Both cases have been treated using a combined antibiotic preparation of sulpha and trimethoprime. Response to medication varies from 3 to 6 days and treatment may last from 1 to 2 weeks.

A frequent procedure done on animals caught by snares and on individuals that have dislocated their fetlock joint, is external fixation. The procedure employs either coaptation splint or Robert Jones bandage, or a combination of both. Supportive care is done throughout the duration of the treatment allowing minimal movement on the animal. Exercise may be facilitated by moving the animal out to the paddocks after the injured leg shows signs of capability to carry weight. Complete recovery ranges within 1 to 3 weeks.

External wounds resulting from fights should be gauged and treated conservatively. Minor wounds can be treated using wound spray or powder that promotes tissue granulation while at the same time prevents fly infestation (e.g. Negasunt@). Otherwise, deep wounds should be surgically fixed. External (tick infestation) and internal parasites (round worm) can be controlled using Ivermectin. However, Albendazole is used periodically for routine deworming.

Conclusion

Captive breeding of the Philippine spotted deer presents a promising future for the species. This species is potentially adaptable and settles down very quickly to captive conditions. Management problems are minimal and problems requiring veterinary attention can be consulted in deer management handbooks. Experience gained along the line can be used to modify traditional methods of managing deer in captivity. Studies on feeding preference, behavior of the animal, and others should be promoted in the interest of the species and should be used to develop and improve their management. Offhand, a complementary program should also be initiated to ensure protection of remaining wildlife population through the establishment of protected areas. These areas will in time serve as release sites for the animals through a restocking or animal reintroduction program. In

conjunction with this, conservation awareness programs should be promoted for the benefit of the species.

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References

Alcala, E. L. 1993. "Blood Values of the endangered Philippine spotted deer (*Cervus alfredi,* Sclater)," *Asia Life Sciences.* Philippines: Rushing Water Publishers Ltd., 2(2): 235-240.

Anderson, R. 1984. December 10-14. "Deer Farming in Australia," *Proceed. Deer Refresher Course,* No. 72. Sydney: Deer Research Unit, University of Sydney, pp.55-71.

Chaplin, R.E. 1977. *Deer.* London: Butler and Tanner Ltd.

Denholm, L.J. 1984. December 10-14. "The Nutrition of Farmed Deer," *Proceed. Deer Refresher Course,* No. 72. Sydney: Deer Research Unit, University of Sydney, pp. 662-703.

English, A.W. 1984. December 10-14. "Rusa and Chital Deer in Australia: Their Biology and Management," *Proceed. Deer Refresher Course,* No. 72, Sydney: Deer Research Unit, University of Sydney, pp. 407-459.

Fowler, M.E. 1986. *Zoo and Wild Animal Medicine.* 2nd Ed. W.B. Saunders Company, pp. 9-29.

Grubb, P. and C.P. Groves. 1983. "Notes on the Taxonomy of the Deer (Mammalia, *Cervidae)* of the Philippines," *Zool Anz. Jena* 210 (12S): 119-144.

Heany, L.R., P.C. Gonzales, and A.C. Alcala. 1987. "An annotated checklist of the taxonomic and conservation status of land mammals in the Philippines," *Silliman Journal,* 34(1-4): 32-66.

IUCN. 1990 *IUCN Red List of Threatened Animals,* IUCN, Cambridge and Gland.

Lacey, R. T. Foose, J. Ballou and J. Eldridge, 1992, January. "Small Population Biology and Population and Habitat Viability Assessment." *Paper presented at the Population and Habitat Viability Analysis Workshop,* pp. 1-14.

McLaren and Rotundo. (eds). 1985. *Heath Biology.* D.C. Heath and Company, p. 179.

Merrill, E.D. 1976. "A Flora of Manila," Department of the Interior, Bureau of Science, no. 5. Manila Bureau of Printing.

Oliver, W.,R.C. Cox, and L. L. Oliver. 1991. "The Philippine Spotted Deer Conservation Project," *Oryx,* 25(4): 199-205.

"The Philippines Recommends for Livestock Feed Formulation." 1987. *PCARRD Technical Bulletin,* Series No. 64, Los Baños, Laguna.

Sinha, C.C. 1992. "The Philippine Deer." *The Philippine Wildlife,* Series No. 1.

Wilson, P.R. 1984, December 10-14. "Nutrition and Reproduction of Farmed Deer," *Proceed. Deer Refresher Course* No. 72. Sydney: Deer Research Unit, University of Sydney, pp. 95-103.

APPENDIX I:

List of common feedstuff given to the Philippine spotted deer

Description	Species	Common name
Grass	*Brachiaria mutica*	paragrass
	Cynodon plectostachyus	star grass
	Imperata cylindrica	cogon
	Pennisetum purpureum	napier
Legume	*Centrosema pubescens*	centro
	Leucaena leucocephala	ipil-ipil
Fruits	*Persea americana*	avocado
	Mangifera spp.	mango
	Averrhoa carambola	balimbing
	Musa spp.	banana
	Spondia purpurea	seniguelas
	Achras sapota	chico
	Eugenia javanica	macopa
	Diospyros discolor	mabolo
	Carica papaya	papaya
	Ananas sativus	pineapple
Concentrate		
	Swine Base Mix	
	Crude protein	15%
	Crude fiber	14%
	Crude fat	4%
	Crude ash	15%
	Moisture	13%
	Calf Manna	
	Growth Nutrient Pellet	
	Pollard	
	Pullet Development Pellet	
Mineral Supplement	Calcium, Phosphate (powder) Potassium, Manganese, Zinc	(salt lick)
Vitamin	B complex, A, C, D, E,	(powder or liquid)

APPENDIX II: Philippine spotted deer blood values*

Sex-Age (Year)	RBC M/ cumm	WBC T/ cumm	PCV %	Seg (Neut) %	Lymp %	Eos %	Baso %	Mono %
M-7.0	4	6	38	88	12	0	0	0
M-9.0	6	6	35	91	9	0	0	0
M-8.0	6	4	32	69	27	3	0	0
M-4.0	10	6	48	70	30	0	0	0
M-0.6	10	4	35	77	22	1	0	0
F-7.0	7	6	32	73	27	0	0	0
F-5.0	6	4	25	76	22	0	0	0
F-0.1	11	8	41	69	28	1	0	0
F-6.0	10	5	38	58	40	2	0	0
F-2.0	8	7	34	78	22	0	0	0
Ave.	7.8	5.6	35.8	74.9	23.9	0.7	0	0

*After Alcala, E.L. (1993)

APPENDIX III: Record samples

a. Individual record file

Ind. no.: M00191
Stdbk no.:
Name: Bambi
Sex: Male
Eartag no.: 39 left
Natality: 01/13/91
Acquistn. Captive bred
Remarks:
Forced weaned after 3 months

Dam: Pinna
Sire: M00990 (Vincent)

Eartag col. Black
Mortality:
Origin: SU CenTrop, Dgte.
Siblings: Vicky
Leah
Roberta

b. Breeding Record file

Legend: X-estrous N-natural breeding
y-gestation A-artificial breeding
Z-parturition

Ind. no.: _____
Name: _____
Breeder: _____

Entry date _____

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
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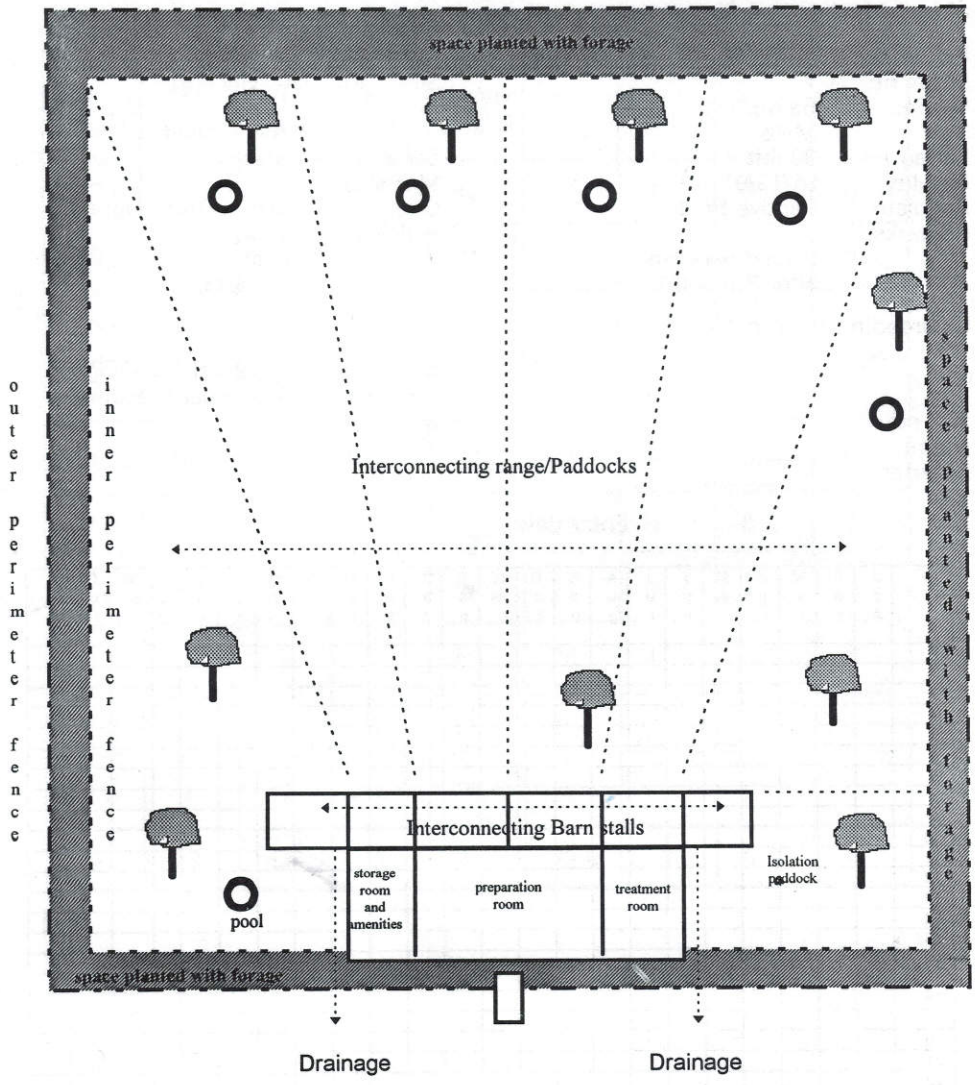
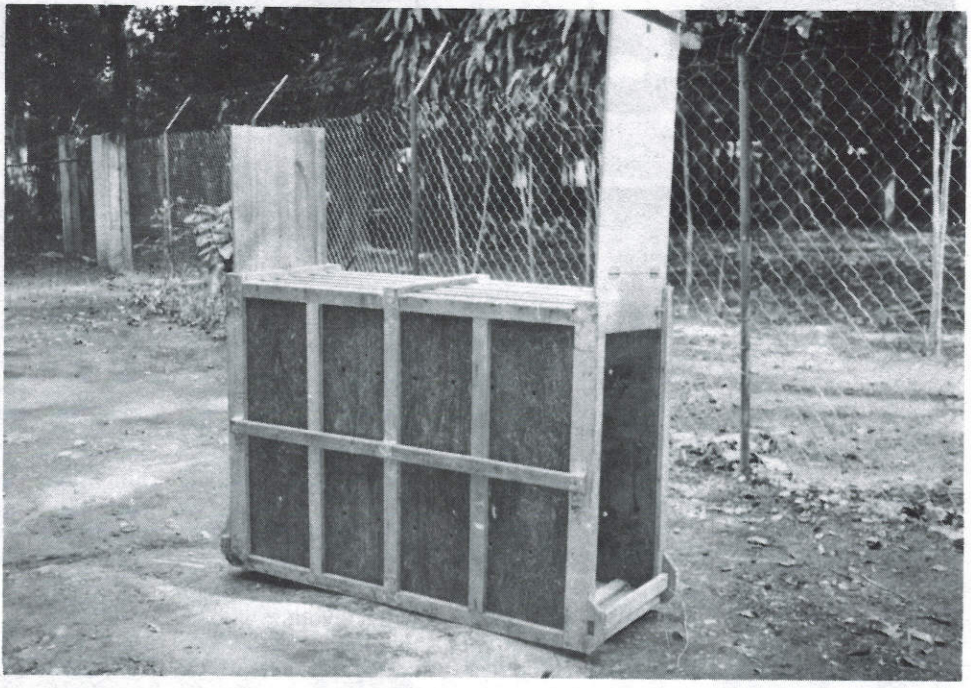
APPENDIX IV: Design of facility

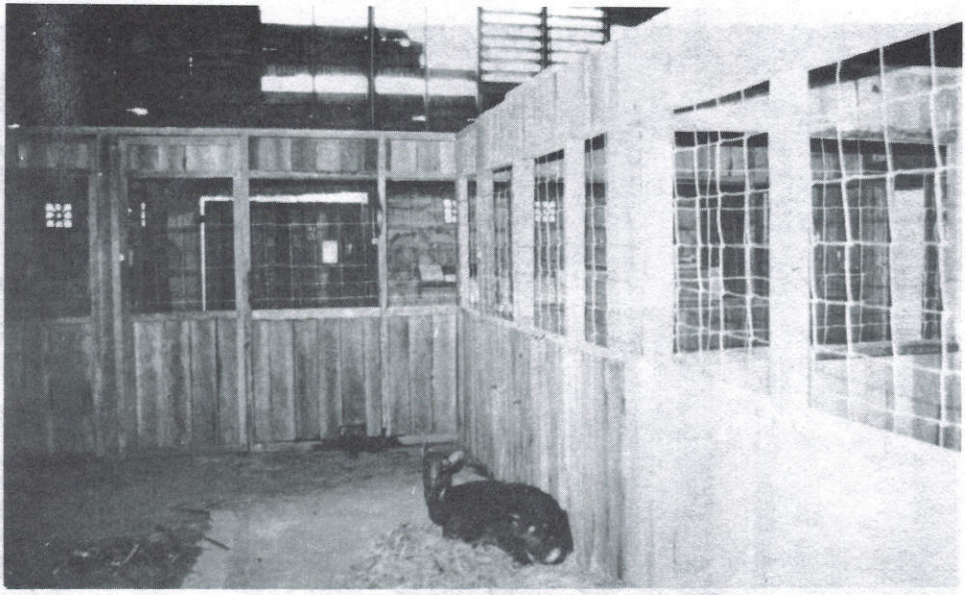


APPENDIX V: Design of crate (photograph)



	Measurement (cms)	Materials
Length	130	Marine plywood
Width	35	wood framing
Height	95	nails and bolt

APPENDIX VI: Selected Views of the Facility (photograph)



Barn subdivision and internal layout.

Field paddocks and external view of facility

APPENDIX VII: Photographs of two species of Philippine deer

Adult male Philippine spotted deer *(Cervus alfredi)*

Juvenile female Philippine deer *(C. mariannus)*