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ARTICLES

SOUTH AMERICA

Characterization of the genetic variability of Pampas deer in the state of Paraná

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Resumen

El venado de campo es una especie amenazada en el Estado de Paraná en el sur de Brasil. Realizamos un estudio genético para analizar la variación poblacional de individuos del distrito de Pirai do Sul, en el cual se encuentra la población más grande del sur de Brasil de 71 individuos. Se analizaron con marcadores mitocondriales 11 ejemplares y se encontraron 4 haplotipos nuevos en el D loop y dos nuevos haplotipos en el gen del citocromo b. Las secuencias fueron comparadas con otras secuencias de venado de campo de nuestro banco de secuencias que contiene haplotipos representativos de poblaciones de Brasil, Argentina, Paraguay y Uruguay. Esta población de Paraná muestra un grado diferenciación genética significativo mostrando la importancia de la misma como unidad genética para la conservación.

Keywords pampas deer, mitochondrial marker, conservation genetic unit

The pampas deer is an endangered species in the state of Paraná in southern Brazil (Margarido & Braga, 2004). In the past, this species was widespread in this state and inhabited the open grasslands and the Brazilian cerrado. However, in recent times, destruction of their habitat has caused populations to decline in numbers and the few populations that remain are fragmented and isolated. We performed a genetic study to analyze the genetic variability of a population from Piraí do Sul District, which is the largest known population of pampas deer in southern Brazil with an estimated population size of 71 individuals (Braga, 2004).

Samples from tissues were extracted from dead animals found in the field (17) and from skulls kept by ranchers and poachers (34) in this area. Tissue samples (50 mg or 100 µl) were transferred to 1.7 ml eppendorf tubes containing 95% ethanol. Procedures for DNA extraction from tissue samples were modified from those described in Medrano *et al*. (1990). DNA extraction was done with sterile materials and filtered pipette tips in a separate room utilized for that purpose only. Extraction controls and no-template polymerase chain reaction (PCR) controls were used in each amplification.

Universal primers Thr-L15910 and DL-H16498 (Kocher *et al.* 1989) were used in PCR reactions to amplify a 601 bp fragment, following protocols described by González *et al*. (1998). In addition, a 486 bp fragment of cytochrome b gene was amplified for 4 using primers L14724 and H15149, as described in Maldonado *et al*. (1995). DNA extractions and

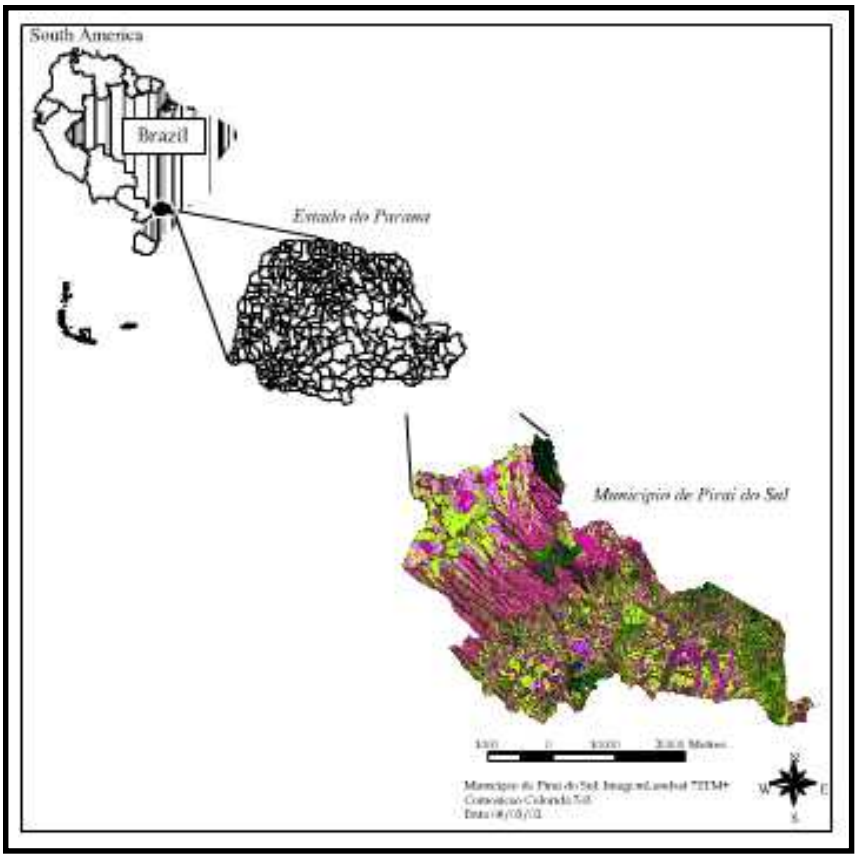

Fig. 1. Map showing Paraná State and the core area studied "Piraí do Sul"

PCR reaction were performed at the genetic facilities at IIBCE (Uruguay). Purified PCR products were shipped to the Smithsonian's Genetics Program (USDA Import Permit #46747) and sequenced using the ABI Big Dye ready reaction kit and ran on an automated sequencer ABI 377 (Applied Biosystems). Sequences were aligned using Clustal X (Thompson *et al.* 1997).

Of the 51 samples that were extracted, 11 samples were successfully amplified and sequenced for the D loop region and 8 for the cytochrome b gene region. The 11 D loop sequences resulted in 4 different haplotypes and the 8 cytochrome b sequences resulted in 2 different haplotypes. We compared these haplotypes with previously published D loop sequences (Gonzalez *et al.* 1998) and from unpublished cytochrome b sequences (Pampas deer sequence bank at IIBCE) from Brazil, Argentina, Paraguay and Uruguay. The results of our analysis revealed that all 4 D loop and the 2 cytochrome b haplotypes were different from all the mitochondrial haplotypes reported to date from Brazilian populations from Pantanal and Emas National Park and from those in Argentina, Paraguay and Uruguay. Furthermore, our results suggest that this small remnant population of pampas deer in the state of Paraná may be genetically differentiated from other pampas deer populations and should be carefully managed as a separate conservation genetic unit.

Fig. 2 *Pampas deer from Paraná Population: male, female and juvenile.*

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Acknowledgments

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Depredación de venados de campo *Ozotoceros bezoarticus* (L., 1758) por Puma *Puma concolor* (L., 1751) en el estado de Paraná.

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Abstract

Between February of 2001 and May of 2002, some information was recorded on predation pampas deer by cougar. Typical signals of predation appeared in 15 death animals in field, including three males, 11 females, and a newborn. 68, 75% of female's predation had occurred in the birth season, indicating that the female's isolation during the parturition and parental cares becomes more vulnerable to the attack of predators.

Key words: Carnivora, Cervidae, cougar, pampas deer, predation.

El venado de campo, *Ozotoceros bezoarticus* (Linnaeus, 1758), es una especie que habita exclusivamente áreas abiertas de América del Sur entre las latitudes 5º e 41º S (GONZALEZ *et al*., 1998). Los machos adultos pueden alcanzar cerca de 1,20 a 1,50 m de largo; 0,7 a 0,75 m de altura y cerca de 30 a 40 Kg (MACHADO, 1994), siendo mayores y mas corpulentos que las hembras. Las informaciones sobre incidentes de predación en venado de campo son escasas. Los principales depredadores naturales del venado de campo

son *Panthera onca* (jaguar) y *Puma concolor* (puma), sin embargo, *Pseudalopex gymnocercus* (zorro gris), *Leopardus pardalis* (ocelote) y *Sus scrofa* (jabalí) pueden ser también responsables por la mortalidad de recién-nacidos y animales debilitados (JACKSON & LANGGUTH, 1987). BESTELMEYER & WESTBROOK (1998) obtuvieron registros de venados de campo depredados por *Chrysocyon brachyurus* (aguará-guazú) en el Parque Nacional das Emas, donde también hay registros de depredación por *Eunectes murinus* (sicurí) (PEREIRA & DUARTE, no prelo). Los perros domésticos pueden también impactar la especie de varias formas, sea por la depredación o por el stress de persecución (PARERA & MORENO, 2000).

En el estado de Paraná, la especie comenzó a ser estudiada desde 1996, en el municipio de Lapa. En el año 2000 se inició un estudio de aspectos biológicos (BRAGA, 2004), genéticos (BRAGA *et al*., 2003) y etológicos (BRAGA & COSTA 2002) de una población situada en propiedades particulares del municipio de Piraí do Sul. En esta misma área, entre febrero de 2001 y mayo de 2002, se procuró evaluar el uso del hábitat por el venado de campo en ambientes modificados por actividades agropecuarias, además de observar algunos aspectos poblacionales e identificar los principales factores de impacto sobre la misma, incluyendo predación. Según PEREIRA & DUARTE (*op cit.*) obtener datos sobre los depredadores naturales del venado de campo son importantes para el desarrollo de programas de conservación, considerando que un aumento en el número de estos animales puede causar impactos en poblaciones naturales de venados de campo.

Durante este estudio fueron obtenidos 15 registros de depredación de venados de campo por el puma *Puma concolor* (Linnaeus, 1751) mediante la identificación de carcasas encontradas en campo, con señales típicas de depredación de este felino. El puma mata sus presas por sofocamiento, a través de una mordida en la garganta, dejando muchas veces las marcas de las garras visibles en los hombros y el dorso de las presas (LEITE-PITMAN *et al*., 2002). También es común que esconda carcasas con hojas y ramas secas para volver a alimentarse de la misma al día siguiente. Las carcazas correspondieron a 3 machos, 11 hembras y una cría. Según BEADE *et al*. (2000) la probabilidad de encontrar carcasas de individuos jóvenes es baja debido a la presencia de otras especies que se alimentan de carcasas y además por la rápida degradación de piezas óseas de individuos pequeños.

Los resultados obtenidos indican una pérdida muy acentuada de hembras en un corto espacio de tiempo, lo que puede resultar en un impacto inmediato sobre el tamaño de la población estudiada. Este elevado número de depredación de hembras aparentemente estaría relacionado a su menor tamaño corporal, menor peso y porte cuando comparadas a los machos, así como la ausencia de astas, factores que probablemente disminuyen sus chances de defensa contra depredadores. Mientras, gran parte de hembras (68,75%) fue depredada entre los meses de Octubre y Diciembre, coincidiendo con el período de nacimiento de crías. A pesar de ser los venados gregarios, sus grupos no son fijos (RODRIGUES & MONTEIRO-FILHO, 2000). Las hembras, consideradas mas gregarias que los machos (NETTO *et al*., 2000), se aíslan de los grupos en la época del parto (GONZALEZ-SIERRA, 1985), permaneciendo con la cría después del nacimiento (NETTO *et al*., *op. cit*.). Aunque haya un aumento en la realización de actividades de vigilancia por las hembras (BRAGA & COSTA, 2002) en este período, los resultados sugieren que su aislamiento y los cuidados post-parto las vuelven más vulnerables al ataque de depredadores.

Es sabido que las poblaciones de venados de campo tienen una capacidad bastante limitada de recuperación en caso de depredación frecuente y que la depredación no natural perjudica severamente poblaciones reducidas, debiendo ser tomadas medidas de control (LEEUWENBERG &

LARA-RESENDE, 1994). Así, los resultados muestran que el entendimiento de las relaciones ecológico-comportamentales inter-especies, principalmente en lo que se refiere a relaciones entre presa y depredador es fundamental para el desarrollo de estrategias de conservación de especies, en especial aquellas cuyas poblaciones se encuentran aisladas y reducidas.

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2003 DSG SMALL GRANT REPORT

Molecular characterization of population of *Hippocamelus bisulcus* based on DNA mitocondrial: conservation implications.

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Abstract

Hippocamelus bisulcus representative taxa of Neotropical Cervidae, is considering the most austral and endangerous South American deer. Extant populations are associated to South Andean Region, periglaciar sites and *Nothofagus* austral forest. Historic range has dramatic decrease, this was extended between 34ºand 53º Latitud South (Magellanic Straigh). One exceptional small population in Central Chile, Nevados de Chillán area (36º-37º Lat. S.) are occur.

In this work the variation of the control region and cytochrome b on mitochondrial genomic sequences is analyzed to population characterization on wide range of extant distribution. Extremely low diversity and genetic variabilityis is associated to control region and cytochrome b considering distantly populations. Twenty individuals from four distinct populations on all wide range distribution was analyzed, Nevados de Chillán (VIII Region), Tamango, La Baguala (XI Region) and Península de Brunswick (XII Region). The mean divergence sequences join to southern populatios with respect to Nevados de Chillán population. The intraspecific phylogenetic reconstruction is agreed too (N-J and MP).

These preliminary results suggest that before situation would be explain by drastic and fast socave on genetic diversity, that is directly derived from isolation and fragmentation of populations, high *imbreeding*, and genetic drift. And the other hand, recent expantions from a few glacial refugias in central Chile must be considering. Patagonia region was under ice cover from the Last Glacial Maxima. Further mismatch distribution on assemblages and Tajima Test are necessary for find *bottle neck* recent events by support before hypothesis.

The low diversity founded in the clusters are a demanding for your preservation because the species evolutionary strategy by time survivor it's unknowed. In this way, is strongly recommended an integral Plan that consider maintain and recovery the exiguous variability founded and no deteriorate still more with special attention to the Nevados de Chillán divergency of population.

Picture 1. *Fawn and male Reserva Nacional Tamango, XI Region (Patagonia).*

2003 DSG SMALL GRANT REPORT

Genetic variability and phylogeography of *Mazama gouazoubira*.

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ABSTRACT

The aim of this investigation was to study the genetic diversity and to analyze the phylogenetic and geographical relationships of brocket deer. Levels of genetic flow between differing regions (Uruguay, Brazil, Argentina, Paraguay and Bolivia) were measured using $Ö_{ST}$ values. The mitochondiral control region (D-loop) was used in order to do this.

The *Mazama gouazoubira* species showed high levels of nucleotide (0,024) and gene (0,968) diversity and no correlation between the haplotypes and their localities. However, the localities did have their own haplotypes and each one showed a certain level of differentiation. The levels of genetic flow between localities were high (from 1,9 to 22,29 immigrants per generation). Bolivia had the lowest level of genetic flow (from 1,9 a 3,63 immigrants per generation) and the highest average of pairwise differences between localities. Brasil showed a significant negative value of the Fu & Li neutrality test (Fs= -4,695, P=0,04).

From these results, we can't define genetic units for conservation but we must consider the levels of genetic differentiation shown in the localities and the genetic divergence of the Bolivian animals. To continue in this line of investigation, together with demographic studies will help us to learn more about the history and status of this species, and provide the information necessary for genetic conservation.

Picture 1. Male from Parque Lecocq Zoo Montevideo-Uruguay

2003 DSG SMALL GRANT REPORT

KARYOTYPIC VARIABILITY AMONG SOME CYTOTYPES OF *MAZAMA AMERICANA* (ARTIODACTYLA; CERVIDAE): HOW LARGE ARE THE DIFFERENCES AMONG THEM?

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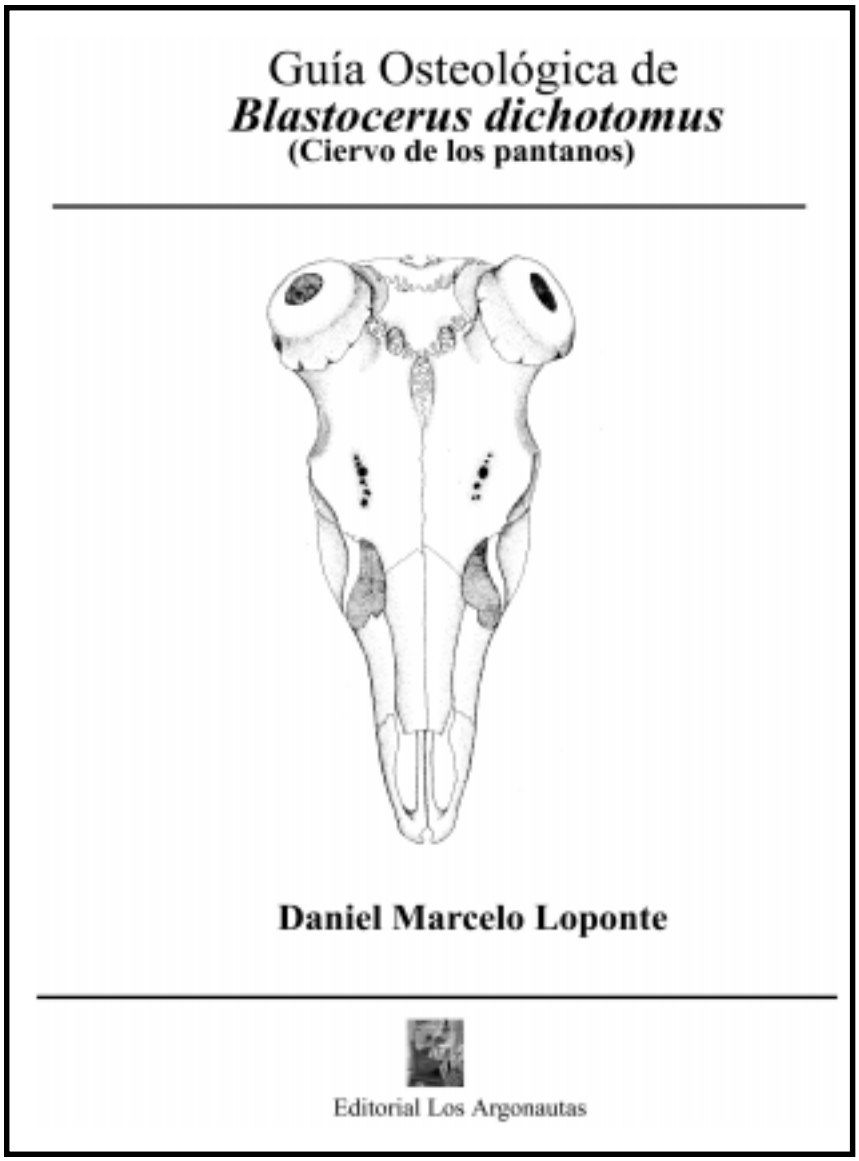
ABSTRACT

Red brocket *Mazama americana* (Artiodactyla; Cervidae), a cervid with an ample distribution in the tropical Rainforests of Central and South America, displays a great chromosomic variability throughout its distribution. The animals of Mexico (M.a. temama) have 2n=49/50 and NF=72, in constrast, in Suramérica there has been identified until now 7 cytotypes, six of them in the Brazilian Amazonia: Rondônia cytotype with 2n=42/45 and NF=47/48, Manaus cytotype with 2n=43/44 and NF=49/50, High Rio Negro cytotype with 2n=44 and NF=51, Acre cytotype 2n=46/47 and NF=48/49, North of Pará cytotype 2n=48/50 and NF=54, Carajás cytotype 2n=48/51 and NF=54/55, and one in Paraguay and southern Brazil (Parana) with 2n=51/53 and NF=56/57. This is due to an intense process of chromosomic evolution, which can be meaning reproductive isolation between cytotypes and therefore the existence of criptic species within the group. The present work was a comparative citogenetic study of Rondônia, Carajás and Parana cytotypes, through the G, C and NOR banding techniques. It was found that Parana cytotype is closest to ancestral and differs of the Carajás cytotype in a single tandem fusion, whereas Rondônia cytotype is considerably distant and differs of the other two in four tandem fusions and one Robertsonian translocation, in addition to several polymorphic characters that can be indicating the existence of more than one cytotype in this region.

The Deer Specialist Group had the small grants program supported by the Wildlife Trust. This program gave the opportunity to fund three small grants of U$S 1,000 each on 2002 and 2003.
The small grant program objective is to support individuals carrying out projects of significant conservation benefit of endangered deer species in South America.
More information at:
http://www.iibce.edu.uy/citogenetica/deer/en9.htm



La guía osteológica de *Blastocerus dichotomus* consta de una reseña bibliográfica sobre las características generales de este cérvido, su distribución histórica y actual, las posibles causas de su retracción geográfica del extremo meridional de su distribución subcontinental, algunos datos referidos a su dieta, incluyendo valores referidos a la dieta isotópica. Asimismo se mencionan ciertos aspectos relacionados con la caza de este ungulado y su explotación por parte de los aborígenes prehispánicos, en función del registro arqueológico del humedal del río Paraná inferior (Argentina). La guía incluye 24 láminas con diferentes vistas de los elementos óseos del ciervo de los pantanos y pequeñas fotografías que detallan algunos aspectos puntuales de diferentes sectores del esqueleto de este cérvido, acompañados por una descripción de los diferentes elementos óseos, su estado de fusión y el sexo al que pertenecen. Esta descripción esta destinada fundamentalmente a reconocer los huesos de este artiodáctilo, sea en el registro arqueológico o en el paisaje actual, su edad relativa y/o la categoría sexual a la que pertencen. Debido a lo limitado de las muestras disponibles para el análisis, esta guía debe ser considerada como una agenda de trabajo para futuros estudios osteológicos de esta especie.

"Atlas osteológico de *Blastocerus dichotomus* (ciervo de los pantanos)". Editorial Los Argonautas. Idioma español, 78 páginas, 24 láminas, papel obra. Solicitar por correo electrónico a losargonautas@fibertel.com.ar o a danloponte@sinectis.com.ar o por correo postal a Marcos Paz 3134 (1417) Ciudad Autónoma de Buenos Aires. República Argentina.

The osteological manual of *Blastocerus dichotomus* contains a general introduction to this South American deer, including distribution, geographical retraction of the southern distribution of the specie, diet, isotopic diet and certain aspects related to modern and prehistoric hunting according to archeological studies carried out in the lower Paraná's wetland (Argentina). The manual include twenty four illustrations with different drawings and small photographs of the bones of this ungulate. Text is focus on metrical differences on postcranial elements between males and females. Fusion stages are also considered in several bones. The information is mainly oriented to recognize marsh deer's bones in the archaeological or in actual landscape and secondary, its age (in relative terms) and sex. Because the small sample analyzed, this work should be seen as an agenda for future osteological studies of this specie.

"Atlas osteológico de *Blastocerus dichotomus* (ciervo de los pantanos)". Edited by Los Argonautas. Spanish language, 78 pages, 24 lamina, paperback. Orders by e-mail: losargonautas@fibertel.com.ar or danloponte@sinectis.com.ar or by mailbox: Marcos Paz 3134 (1417) Ciudad Autónoma de Buenos Aires. República Argentina.

ASIA

Estimating the Persian Fallow Deer (*Dama dama mesopotamica*) Population Size in Dasht-e-Naz Wildlife Refuge Using Pellet Group Counts

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Abstract:

In wildlife management it is often necessary to estimate the size of a population. Developing an index that reflects the status and trends of a given population is one method available to wildlife managers. In this survey, the population size of Persian fallow deer (*Dama dama mesopotamica*) in Dasht-e-Naz was estimated by using the pellet group count method. Numbers of pellet groups in 19 plots (10mx10m) were counted after 82 days. Then using these data and taking into account the defecation rate of fallow deer, the population was estimated to be 7 individuals (95% confidence intervals: 2-11). At the same time the actual number of deer in this population was known to be 28. Several factors could have lead to this discrepancy between the estimated and known population sizes including: a lack of data on the rate of pellet group decomposition; expressed habitat preferences by the deer in the study area; and inadequate information about the rate of pellet group defecation. Therefore, more studies are required in order to better understand the influence of each of these variables.

Keywords: Pellet group count method, Index method, Persian Fallow Deer, *Dama dama mesopotamica*, Dasht-e-Naz Wildlife Refuge.

Introduction:

To manage wildlife populations properly, information about their size and distribution patterns is often needed. Generally, knowing the population size is useful in:

1. Understanding the result of wildlife management treatments, such as: harvest rate changes, habitat security changes, changes in the availability of food resources, protection of migration routes, etc.
2. Determining the conservation status of the population, for example during the viability analyses used by I.U.C.N to assess conservation category status.
3. Making common management decisions such as setting harvest rates or determining how much to supplement a population, etc.

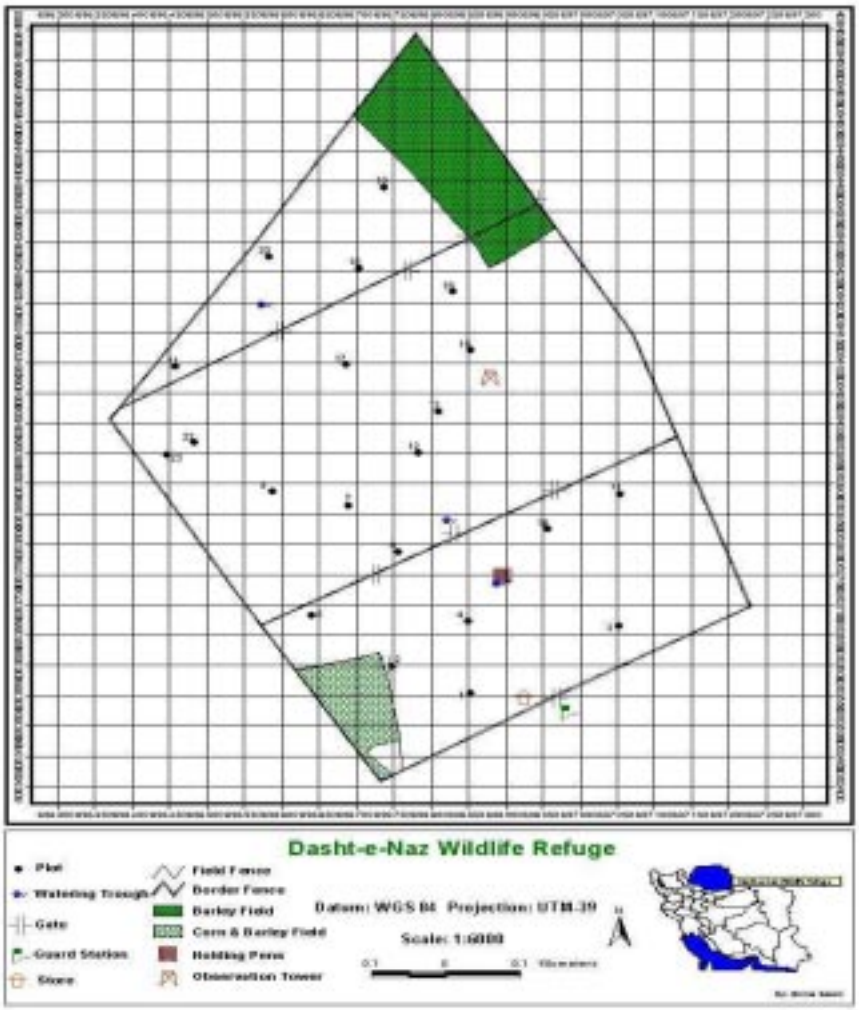
There are two general ways to determine a population's size, census and estimation. A complete population census is often not practical, unless the habitat is small and restricted, therefore managers must often estimate population abundance by sampling a subset of the total population. There are several

Figure1: View of Dasht-e-Naz Wildlife Refuge

methods to estimate populations available to managers. The most appropriate method for a given population should be selected after considering variables such as habitat type, species behavior, seasonal variations, available facilities and etc. Some commonly used estimation methods are:

1- Index methods
2- Capture and recapture methods
3- Catch per effort methods
4- Change in ratio methods
5- Transects and quadrates methods
6- Distance methods

In order to determine the most suitable methods for estimating wildlife populations in Iran, given its variety habitats and the Department of the Environment's available personnel and equipment, these methods should be tested in restricted areas. The Dasht-e-Naz Wildlife Refuge is one suitable test area for such experimentation because it is fenced. The Persian Fallow Deer (*Dama dama mesopotamica*) population of this refuge could be used to compare the efficiency of each of the previously mentioned techniques at estimating population size, when compared to a total population census. We studied the pellet group index method to test its usability as a method to estimate Persian Fallow Deer populations in Iran.



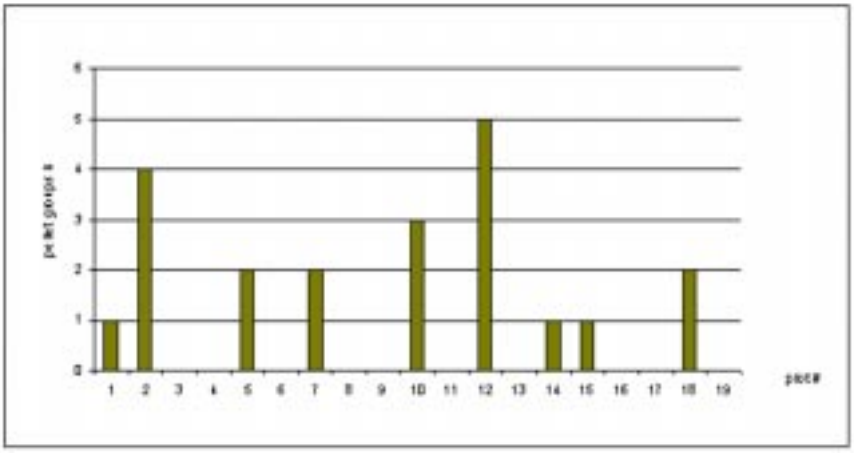
Map1: Plots location in Dasht-e-Naz Wildlife Refuge

Study area:

Dasht-e-Naz is a 55 ha woodland enclosure located at 53° 12' 18''E and 36° 41' 50''N, 25 km of northeast of Sari, the capital of Mazandaran province. This area was formally classified as a wildlife refuge in 1964 in order to conserve Persian fallow deer. It contains suitable habitat for the deer within its long established fenced area (Rabiei 1995, figure1). The vegetation in the area consists of the humid Hyrcanian type, and is a remnant of the once extensive forest of the Caspian Lowlands (Karami 1993). There are dominant trees, including Chestnut-leaved oak (*Quercus castanifolia*), Persian Iron wood (*Parrotia persica*), Siberian elm (*Zelkova carpinifolia*), Mountain elm (*Ulmus glabra*), European hornbeam (*Carpinus Betulus*), Medlar (*Mespilus germanica*) and the heavily grazed ground vegetation includes *Anagallis* sp., *Cirsium* sp., *Geranium* sp., among forbs and *Poa* sp., *Hordeum* sp., *Brachypodium* sp., among grasses (Karami 1993, Rabiei 1995). These food resources aren't enough to feed the deer, therefore their feed is supplemented with corn and barley as well as a mineral stone.

Material and methods:

To estimate the Dasht-e-Naz deer population, 21 permanent 10mx10m plots ($100m^2$) were randomly distributed through out the habitat. To obtain this randomness, the total area was divided into $50x50m^2$ virtual plots using the UTM coordination range of this area (map1). Then each virtual plot was given a number. Finally, 21 plots were selected by using a random number table. Within each of the 21 selected areas a $100m^2$ plot was established and its location was found using G.P.S (figure 2). All pellet groups were removed from within each of the established plots. After 82 days (time was affected by the limitations of services) the number of pellet groups in each plot was counted. Finally, using these data, the expected number of pellet groups in total area was estimated and compared with the deer's estimated defecation rate to obtain the population size (Rabiei, Shams 2003).



Graph1: Counting pellet groups in quadrates

Results:

21 plots were established of which 19 plots were found and the number of pellet groups was counted in these plots (Graph 1). Mean and standard deviation of the number of pellets per plot were calculated (mean=1.11, SD=1.52, 95% confidence interval = 0.375-1.845). There were 1.11 pellet groups per $100m^2$ area so there were and estimated 6105 pellets in total area (N=6105, 95% Confidence Interval = 10147.5-2062.5).

Bailey (1981) estimated the defecation rate of fallow deer to be 11.35 pellet groups per 24-hour period, therefore after 82 days an average deer would expel 931 pellet groups. Based on this information the total number of deer in Dasht-e-Naz Wildlife Refuge would be 7 individuals (95% confidence interval: 2-11, Absolute error equals 4).

Figure2: Establishing plots (10mx10m) with plastic stick

Discussion:

The precision of this estimation was less than 50% (probability of error = 0.57% of mean). To achieve a higher level of precision (for example an error of 2 individuals) the number of plots would need to be increased to 88. This would require substantially more time to establish and there is currently no financial support for this effort. The amount of error found here using the pellet group index method cannot support any management decision, but this does not mean that the survey experience was useless. There

may be several error sources in this study that could conceivably be addressed to improve the accuracy of this method:

1- Sample size: given personnel, equipment and time restrictions, the limited number of plots were the most that could be established during this project.

2- Defecation Rate: the defecation rate used in this research was not calculated for the Persian Fallow Deer at Dasht-e-Naz but rather for European Fallow Deer. Additionally the defecation rate may have been affected by the deer's diet during sampling period (Dasht-e-Naz deer were fed fresh grasses, corn, barley & oak seeds).

3- Pellet Decay: many factors such as pellet decomposition, use of pellet by scarab beetles, etc. may have eliminated pellet groups from plots before they were counted.

4- Distribution Pattern: the distribution of deer in the study areas was assumed to be random since the plants and topography throughout Dasht-e-Naz are fairly homogeneous throughout. If deer distribution is clumped, some other sampling design could be applied instead of the complete random design that was used in this study.

Suggestions:

In order to optimize this method for use in Dasht-e-Naz Wildlife Refuge several recommendations follow:

1- Establish more plots, this will likely result in a higher level of precision. This will require more financial support for this research.

2- Calculate the defecation rate specific to the Persian Fallow Deer at Dasht-e-Naz Wildlife Refuge.

3- Collect samples over different dates and times to permit testing for seasonal variations.

4- Investigate the decomposition rates of pellets groups during different seasons.

5- Study the distribution pattern of deer in Dasht-e-Naz Wildlife Refuge and investigate possible habitat preferences by the deer.

6- Repeating this estimation will make it possible to calculate a regression line equation between the true number of population and estimated number and this equation could be used to decrease the estimation bias.

Acknowledgment:

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SHORT COMMUNICATIONS

Situación actual de la Taruka (*Hippocamelus antisensis)* en Bolivia

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La taruka *(Hippocamelus antisensis)* está incluida en el Libro Rojo de los Vertebrados de Bolivia, debido al importante grado de amenaza que existe sobre ella. Sin embargo, no se han cuantificado sus poblaciones en ninguna de las áreas donde ha sido registrada. Está incluida también en el apéndice I de CITES, dentro de la categoría Datos Indeterminados. Este último estatus perjudica al momento de involucrar a esta especie en proyectos donde se requiere conocer aspectos sobre preferencias de hábitat, distribución, abundancia, rango de acción y rol ecológico. El tiempo requerido para conocer todos estos aspectos sobre cualquier especie es largo, y mientras tanto ésta podría encontrarse en grave peligro de extinción.

La presencia de la especie ha sido confirmada en seis de las cerca de 18 áreas protegidas creadas en el país: Área Natural de Manejo Integrado Nacional Apolobamba, Reserva Nacional y Área Natural de Manejo Integrado Madidi, Parque Nacional y Área Natural de Manejo Integrado Cotapata, Parque Nacional Carrasco, Reserva Biológica Cordillera de Sama y Parque Nacional Sajama, en esta última posiblemente extinta. Todas estas áreas se encuentran distribuidas a lo largo de la cordillera Oriental de los Andes, y a excepción de las dos primeras que se encuentran intercomunicadas, la mayoría de las áreas protegidas están rodeadas por bosque montano. Otras áreas se encuentran comunicadas por valles secos o prepuna, donde aparentemente, desde hace por lo menos 10 años ya no está presente la taruka.

Este trabajo se realizó sobre la base de encuestas que aún se están procesando, sin embargo los resultados preliminares muestran que las vías de comunicación usadas por muchos años por la taruka están siendo cortados debido a que se trata de zonas con alta presión humana. Se hace prioritario verificar este hecho y ver la forma de habilitar estos pasos para ayudar a que se de nuevamente el flujo génico entre las poblaciones. También aún quedan muchos sitios donde se debe confirmar la presencia de la taruka en Bolivia.

A pesar de encontrarse la taruka en áreas protegidas, el hábitat en que se encuentra, está siendo degradado desde hace cientos de años. La mayoría de los pastizales que cubren la cordillera de los Andes eran bosques hasta aproximadamente los 4100 m, pero actualmente toda la región está cubierta de formaciones vegetales secundarias más o menos transformadas debido principalmente a la actividad humana, al pastoreo y la quema. Estos factores sumados al hecho del carácter huidizo que presenta la taruka, debido a la fuerte presión de caza a la que ha sido y aún está siendo sometida, la obligan aparentemente a desplazarse y ocupar hábitat muy hostiles con condiciones climáticas extremas. Actualmente la taruka se encuentra protegida por el Decreto de Veda

General Indefinida (D. S. 22641) que rige desde 1990, sin embargo esta situación no es debidamente controlada y está siendo actualmente cazada con fines de subsistencia.

"Taruka" significa "venado" en aymara y esto provoca mucha confusión sobre la especie a la que los pobladores se refieren en algunas regiones del país como «tarukas con astas ramificadas» que en realidad se trata de *Odocoileus virginianus*, especie que fue confirmada recientemente para Bolivia, después de casi 30 años del último registro. *O. virginianus* comparte con la taruka los hábitats altoandino semi-húmedo y páramo yungueño , pero aún no se conoce nada sobre esta simpatría. Por otro lado también se desconoce el efecto que causa la presencia de ganado vacuno sobre la taruka. Lo que sí se observó es que a diferencia de la taruka, *O. virginianus* está más adaptada a la presencia humana, y al ganado, pues se la ha visto forrajeando en medio de ganado vacuno a distancias hasta de 5 m del observador. Se debe tener mucho cuidado al momento de trabajar con encuestas pues es posible que los comunarios de diferentes zonas afirmen la presencia de la taruka, y se trate más bien de *O. virginianus*.

Se ha determinado que la taruka utiliza de igual forma el páramo yungueño, el altoandino semi-húmedo y el sub nival. No obstante, en una caracterización más fina del hábitat,realizada únicamente en la región biogeográfica alto andina semihúmeda, se determinó que entre las siguientes unidades fito-fisiográficas: ladera escarpada a muy escarpada con pastizal denso-alto y afloramientos rocosos, ladera suavemente inclinada a inclinada con pastizal semidenso-medio y afloramientos rocosos, cima de montaña con manchones de césped de *Plantago tubulosa* y pastizal abierto bajo, pared rocosa intercalada con mesetas cubiertas de césped de *Plantago tubulosa* y pastizales, fondo de valle suavemente inclinado a inclinado con césped de *Plantago tubulosa* y arbustos dispersos y Planicie con bofedal, en este último caso, el estudio se realizó únicamente en el piso altoandino semi-húmedo, la taruka utilizó con mayor intensidad la cima de montaña, que cubría el 20.53% del total del área de estudio. Es importante mencionar este aspecto pues al momento de estimar el hábitat potencial de la especie, este puede llegar a ser mucho mayor al hábitat que realmente está utilizando la especie.

Status of Argentine and Chilean Huemul

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The huemul (Hippocamelus bisulcus) or Southern Andean deer inhabits the southern Andes of Chile and Argentina. Historical accounts suggest that this species used to be abundant between central Chile (34° S) and the Magellan Strait (54° S). However, it is now classified as endangered by the IUCN and by the Red Books of Vertebrates in Chile and Argentina, with a suspected population of no more than 2000 individuals between both countries. For this reason was also included in the Appendix I of CITES and UNEP/CMS Conventions. The huemul is protected in 13 and 12 Chilean and Argentinean national parks and reserves, respectively. All the protected areas in Chile are managed by CONAF (National Forest Service), and five of the Argentine ones by APN (National Park Service). There also exist four private reserves including huemuls.

Conservation of the huemul is considered a high priority for CONAF, but there are concerns that its protection is inadequate due to insufficient habitat within the protected areas and poor connectivity among them. Most huemul subpopulations are located in Chilean Patagonia. Habitat in this area is relatively untouched thanks to extreme weather conditions and rugged landscape that limit human activity. In central Chile there is a small subpopulation, which is totally isolated from the southern ones and presents a high probability of extinction.

The APN created a Conservation Program for Argentina in 1992. In this country there are two main core population, one of them in between Nahuel Huapi and Los Alerces National Parks, and the other one in the Santa Cruz Province, located in the Southern Patagonia. In general, there are good habitat connectivity in both core areas and chances to create an Andean Corridor, but there are also concerns about its real implementation in the field.

The main suspected threats to the species are: habitat loss and degradation due to forest fires (during the 1930-40's), logging and farming, disease transmission from livestock, poaching, exotic species competition (i.e. red deer), disturbance and predation by domestic dogs, as well as natural predation by puma (Puma concolor). The real impact of these threats on the huemul population is still unknown, and their quantification is urgent for the conservation of this species. In order to promote the huemul conservation, the species is protected by law in Chile and Argentina, since 1992 four Binational Workshops for its conservation have been conducted, and during the recent years both countries developed their National Conservation Plans. However there exist funding constraints for its implementation in both countries.

Brazilian deer Action Plans workshop

Susana González & J. Mauricio Barbanti Duarte

Last August 17 to 19 in Flona, Sao Paulo, Brazil IBAMA (Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis) organized a workshop to establish Action Plans for endangered Brazilian deer. Thirty participants involved with Brazilian deer attended the workshop. The main purpose was to analyze and discuss conservation actions for the endangered deer species. The methodology used was to discuss a draft document for each species to propose, set priorities, recommendations and management actions. Dr. Duarte gave a general presentation for all the species, analyzing the past and present range. The strategies and management actions were discussed for four species: the Brazilian dwarf brocket, small red brocket, pampas deer and marsh deer. The biology and ecology of the Brazilian dwarf brocket (*Mazama nana*) are poorly documented, although its distribution is known to overlap that of the red and grey brockets and partly that of *M. bororo*. The species was recently considered as endangered by IBAMA. Vanessa Veltrini Abril prepared and presented the draft Action Plan updating the knowledge and range of this species. The small red brocket *Mazama bororo* draft Action Plan was prepared and presented by Alexandre Vogliotti. The results of the PROBIO project headed by Dr. Duarte were given and the first distribution map for this species was shown. The recommendations for this species focused on obtaining better knowledge about the distributions patterns, habitat use and population dynamics. Fernanda Braga prepared the draft action plan for the Pampas deer *Ozotoceros bezoarticus*. For this species, urgent action is needed, especially for the small populations in the south of the country in Paraná State. Follow up studies using radio tagged animals and monitoring were recommended to assess the basic demographic parameters and the effect of poaching. The marsh deer Blastocerus dichotomus was one of the species most studied by Dr. Duarte's team over the last six years. Hernani G. da Cunha Ramos introduced the draft document. The main actions for the in situ conservation were highlighted by the participants as being the importance of continuing the population follow up, especially those affected by the Sergio Motta Hydroelectric dam, and of monitoring the successfully reintroduced individuals at Estação Ecológica de Jataí, in the Mogi-Guaçu basin. There is a captive breeding program for marsh deer program in Brazil. The studbook information was analyzed. Translocation of some individuals was proposed to assure the viability of the captive stock. The Brazilian Deer Action Plan must be published by IBAMA in 2005 as a document containing the guidelines for conservation and management policies.