



SHORT COMMUNICATION

Serum Biochemistry of Collared Peccaries (*Pecari tajacu*) in Captivity in Northeastern Brazil

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ABSTRACT

This study aimed to determine the metabolic profile of *P. tajacu* and correlate these values with the animals' sex and age. We collected 63 blood samples from a herd of peccaries in Mossoró northeastern of Brazil. The concentrations of total protein, albumin, urea, creatinine, aspartate amino transferase, gamma-glutamyl transferase, alkaline phosphatase, lactate dehydrogenase, creatine kinase, cholesterol, triglycerides, calcium and phosphorus were determined using automated biochemical apparatus and commercial kits. Young animals showed triglyceride, creatinine, AST and GGT levels that were lower ($P < 0.05$) than in adults. Females showed higher ($P < 0.05$) total protein and triglyceride levels than in males and this may have been due to better quality of food and because males presented greater stress during blood sampling. The data presented contributes towards the knowledge of the biochemical profile of this species.

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INTRODUCTION

The collared peccary (*Pecari tajacu*) is an ungulate mammal of the Tayassuidae family, which includes three species: *Pecari tajacu*, *Tayassu pecari* and *Catagonus wagneri*. The species resemble pigs (*Scrofa suis domestica*) because they belong to the same order, Artiodactyla, although the pig belong to the Suidae family (Gongora and Moran, 2005).

Collared peccaries are exclusive to the Americas. They are widely distributed from the south of the United States to Argentina and are found throughout Brazilian territory, occupying the most diverse environments. Currently, these animals are being bred in captivity for economic purposes in some regions of Brazil (Seixas *et al.*, 2009).

Lack of information regarding acceptable physiological metabolic parameters and management strategies for collared peccaries makes clinical medical practice difficult. Consequently, breeding these animals in captivity is also affected, since knowledge of the metabolic profile can be used to monitor the physiological, nutritional and pathological status of a given species in a certain habitat (Sajjad *et al.*, 2011;

Farooq *et al.*, 2012). Thus, the present study had the objectives of determining physiological biochemical values for *Pecari tajacu*, bred in the municipality of Mossoró, Rio Grande do Norte, and correlating these values with the animals' sex and age.

MATERIALS AND METHODS

This research was authorized by the Brazilian Institute for the Environment and Renewable Natural Resources (IBAMA), under license no. 12637-1. A total of 63 blood samples of *Pecari tajacu* were collected from a breeding facility (5°12'48"S, 37°18'36"W), in the municipality of Mossoró-RN, Brazil.

The animals were restrained manually, without using any kind of anesthetic drug. Blood samples were collected from the animals' cephalic vein and serum was harvested which was stored -20°C and shipped in cold packs to the School of Veterinary Medicine, University of São Paulo, where they were stored for six months until serum biochemistry analysis was performed. The serum samples were analyzed for total protein (TP), albumin (ALB), urea (BUN), creatinine, cholesterol (CHO), triglycerides (TG), calcium (Ca) and phosphorus (P), and the serum activities

of aspartate aminotransferase (AST), gamma-glutamyl transferase (GGT), alkaline phosphatase (ALP), lactate dehydrogenase (LDH) and creatine kinase (CK) by means of Randox® commercial kits (Randox Laboratories Ltd, Antrim, UK), using enzymatic colorimetric methods for processing the samples, in accordance with the recommendations described by the manufacturer of the kits in a biochemical analyzer (Daytona, Randox Laboratories Ltd., Antrim, UK). The statistical analysis was carried out by means Student T test comparing the results from each of the biochemical parameters in relation to the animal's sex and age group (adult or young). $P < 0.05$ was considered to be significant.

RESULTS AND DISCUSSION

The mean physiological values for collared peccaries (*Pecari tajacu*) found for each of the variables described can be seen in Table 1. Tables 2 and 3 present the statistical analysis regarding the influence of sex and age on the biochemical parameters.

The values for TP and ALB for collared peccaries in the study were consistent with those found for the same species in Peru (Schettini *et al.*, 2005) and were higher than the reference values for collared peccaries that inhabit the USA (Lochmiller and Grant, 1984). According to Schettini *et al.*, (2005) albumin is the most abundant protein in the blood; it is synthesized in the liver and its concentrations in the blood are used as an indicator for liver function and nutritional state. Kaneko *et al.* (2008) suggested that serum albumin was a useful indicator for protein status. In the study by Guerra-Centeno (2007) on white-lipped peccaries (*Tayassu pecari*), the TG values were greater than those found for collared peccaries in the present study. The same authors also reported that the TG values for males and females were 0.332 ± 0.05 mmol/L and 0.362 ± 0.09 mmol/L respectively. In the present study, we obtain higher triglyceride values for males than for females. Guerra-Centeno (2007) suggested that difference between sexes possibly due to fewer quality food resources, and that increased triglyceride concentrations might indicate prolonged fasting or unbalanced diets.

In Table 3 it was observed that males presented lower protein values than females. The females probably had a diet of greater quality, as illustrated by the total protein and triglyceride values and/or the males probably mobilized their body reserves to a lesser extent, possibly because of the stress at the time of sample collection.

Kidney function as illustrated by Urea and creatinine values are usually indicated for evaluations on domestic animals' kidney function, and these provide support for diagnosing and/or prognosing nephropathies (Kaneko *et al.*, 2008). Zervanos and Hadley (1973) studied the effects of dehydration on the serum levels of urea and electrolytes in collared peccaries in captivity. These authors affirm the majority of the urea is synthesized in the liver, from the ammonia that results from protein catabolism and intestinal absorption. The urea value of the present study (4.97 ± 0.99 mmol/L) was higher than those obtained for collared peccaries by Lochmiller and Grant (1984) and lower than those for the same species in Latin America. This variation could be due to the protein levels in the diet, which influence this variable (Schettini *et al.*, 2005).

Serum creatinine levels have been correlated with animals' muscle mass, physical activity and nutritional factors (Farooq *et al.*, 2012). It was also in line with those obtained in studies on collared peccaries (Lochmiller and Grant, 1984; Schettini *et al.*, 2005), which indicates that this variable is reasonably stable for this species, regardless of environmental variations. The mean serum activity levels of hepatic enzymes in collared peccaries were very subtle and could be attributed to nutrition and management. The serum activities of AST and GGT were diminished in relation to values obtained by Lochmiller *et al.* (1984).

As shown in Table 3, the young animals presented lower triglyceride, creatinine, AST and GGT values than shown by the adults. According to Guerra-Centeno (2007), the triglyceride values found for white-lipped peccaries remained within the interval of 0.332-0.362 mmol/L for the adults and 0.310-0.342 mmol/L for the young. The values found for this metabolite among collared peccaries were 0.92 for the adults and 0.43 for the young, and were thus higher for this species.

The calcium levels can be correlated with the animals' diet, considering that diets rich in energy demonstrate higher calcium levels. The collared peccaries of the present study presented Ca and P values higher than the values found for the species in the USA (Lochmiller and Grant, 1984). As shown in Table 3, males presented higher inorganic phosphorus values than seen among females, but they were very subtle and do not seem to be biologically relevant.

The results obtained from the present study can be used as a reference in veterinary clinical practice for collared peccaries, taking the necessary care with regard

Table 1: Serum biochemistry from collared peccary (n=63) maintained in captivity at Northeast region, Rio Grande do Norte, Brazil

Parameters	Mean	SD	Range	Reference Interval	
				Lochmiller and Grant (1984)	Schettini <i>et al.</i> (2005)
Total Protein (g/L)	80.0	6.0	63.4-89.3	58.5-71.5	71.0-109.0
Albumin (g/L)	43.9	3.9	21.0-49.0	30.2-31.5	32-56
Urea (mmol/L)	4.97	0.99	3.2-8.5	0.88-2.0	6.5-13.4
Creatinin (μ mol/L)	161.8	22.8	115.8-222.8	95.5-163.5	123.8-291.7
Cholesterol (mmol/L)	2.16	0.6	0.97-4.08	2.07-2.93	1.53-3.89
Triglycerides (mmol/L)	0.84	0.7	0.18-3.10	0.46-2.42	NA
Calcium (mmol/L)	2.7	0.2	2.1-3.1	2.36-2.61	NA
Phosphorus (mmol/L)	2.5	0.7	1.5-4.6	1.42-2.02	NA
AST (U/L)	14.3	6.9	6.99-52.61	31.0-96.0	5.0-34.0
GGT (U/L)	3.6	3.2	0.14-12.98	8.50-9.88	NA
FA (U/L)	1.16	1.52	7.3-466.6	51.0-143.0	7.8-62.1
LDH (U/L)	1272.6	401.3	497.6-2723.0	1.765-2.970	NA
CK (U/L)	116.1	132.6	16.6-817.5	NA	NA

NA = Not available.

Table 2: Serum biochemistry with statistical difference in relation to sex among collared peccaries kept in captivity in the Northeast region Rio Grande do Norte, Brazil

Parameters	Male		Female		P*
	N	Mean	N	Mean	
Triglycerides (mmol/L)	24	1.2	39	0.62	0.006
Total Protein (g/L)	23	77.0	39	82.0	0.002
Phosphorus (mmol/L)	23	2.9	39	2.3	0.003

*Statistical analysis carried out by means of Pearson's chi-square test. P<0.05 was taken to be significant.

Table 3: Serum biochemistry with statistical difference in relation to age among collared peccaries kept in captivity in the Northeast region Rio Grande do Norte, Brazil

Parameters	Adults		Juvenile		P*
	N	Mean	N	Mean	
Creatinin (mmol/L)	52	165.3	11	145.5	0.008
Triglycerides (mmol/L)	52	0.92	11	0.43	<0.001
AST (U/L)	50	14.9	11	11.6	0.020
GGT (U/L)	24	3.8	3	1.7	0.030

*Statistical analysis carried out by means of Pearson's chi-square test. P<0.05 was taken to be significant.

to factors relating to age and sex, among others that interfere with physiological biochemical parameters.

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