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DIET OF THE YELLOW-KNOBBED CURASSOW IN THE CENTRAL VENEZUELAN LLANOS

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ABSTRACT.—Curassows (Cracidae) are important components of the avian biomass in neotropical frugivorous bird communities. However, their feeding habits and ecological role remain unclear. We identified the diet of wild Yellow-knobbed Curassow (*Crax daubentoni*) based on analyses of feces and direct observations from November 2001 to July 2002 in a tropical dry forest in central Venezuela. We also analyzed stomach contents from specimens collected in different localities throughout the Llanos region. The diet of curassows included fruits (41 and 49% of dry weight in feces and stomach contents, respectively), seeds (15 and 48%), leaves (39 and 0.7%), minerals (stones, earth; 4.3 and 1.1%), and small proportions of flowers, roots, fungus, seedlings, and invertebrates (insects, Order Coleoptera), each <1% of total dry weight. Curassows fed on 26 plant species from 21 families. When food resources for frugivores are scarce during the dry season (Nov–Apr), 47–50% of the diet was a single species (*Guazuma ulmifolia*, Sterculiaceae) indicating this species can be critical for curassow survival. An increase in consumption of leaves and invertebrates was observed in the rainy season (May–Jul). Most seeds observed in feces (93%; *n* = 5,408; range = 1–10 mm) were intact suggesting that curassows could have an important role as seed dispersers in this tropical ecosystem. *Received 20 November 2007. Accepted 10 April 2008.*

Food is important in the life history of most organisms. Thus, identification of key food resources of a particular species can assist in revealing its habits and behavioral patterns, and its ecological role in the community. This knowledge is also important when selecting conservation areas for endangered species (Jímenez et al. 2001).

Cracids are the most threatened family of birds in the Americas (Brooks and Strahl 2000, Brooks 2006); data on diet and feeding habits of this group have been reported for only a few species. Cracids are considered mainly herbivorous, consuming fruits, seeds, and leaves (Delacour and Amadon 2004). Curassows, in particular, appear to consume mostly fruits and seeds but occasionally feed on flowers, leaves, invertebrates, and soil (*Mitu salvini*, Santamaria and Franco 1994, 2000; Jiménez et al. 1998; Yumoto 1999; *M. mitu*, Torres 1989; *M. tuberosa*, Gutiérrez 1997; *Crax alector*, Érard and Sabatier 1989, Érard et al. 1991, Érard and Théry 1994, Théry et al. 1994; *C. rubra*, Sermeño 1997). The diet of curassows may vary throughout the year but fruit consumption is typically high (Érard et al. 1991, Santamaría and Franco 2000). Variation in consumption of fruits, seeds, and invertebrates has been detected on a daily basis for *Mitu salvini* and *Crax alector* (Jímenez et al. 1998, 2001). Unfortunately, few data are available to describe general patterns.

Identifying curassow food resources is relevant to understanding the role these species have in the dynamics of forest ecosystems. Cracids comprise an important component of the biomass of avian communities in neotropical ecosystems (Terborgh 1986a, Strahl and Grajal 1991). They also may constitute key elements in maintenance of plant communities (Begazo and Bodmer 1998), as many curassow species move considerably while feeding, and defecate or regurgitate intact seeds (Wenny 1993, Caziani and Protomastro 1994, Yumoto 1999, Mamani-F 2001). The decline of many curassow populations has caused concern for possible effects of their extinction on structure and dynamics of neotropical forests (Levey 1994).

The Yellow-knobbed Curassow (*Crax daubentoni*) occurs locally in the Llanos, dry woodlands, and gallery and deciduous forests in northern Venezuela and adjacent Colombia, being one of larger frugivores within its distribution (Schäefer 1953, Strahl and Silva 1997, Hilty 2003, Delacour and Amadon 2004). Buchholz and Bertsch (2006) desig-

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nated the status of *C. daubentoni* as Globally Vulnerable (VU A3a, c, d) due to accelerated urban and agrarian growth in northern Venezuela, and increasing hunting pressure. However, little is known about the status, biology, habitat requirements, and feeding habits of this species (Delacour and Amadon 2004).

Our objectives were to: (1) identify the composition and diversity of the diet of Yellow-knobbed Curassows in central Venezuela, and (2) examine its ecological role as possible dispersers of the plants they consume.

METHODS

Study Area.—The study was conducted on a 75,000-ha private cattle ranch (Hato Piñero, 08° 56′ N, 68° 05′ W) in the central Llanos of Venezuela (State of Cojedes) from November 2001 to July 2002. The study area included savannas, pastures, and deciduous dry and gallery forests. The specific study area was a 30,000-ha dry forest at the center of the ranch. The average annual temperature and precipitation are 27.5° C and 1,469.6 mm, respectively. There is strong seasonality with a rainy season (Apr–Nov) and a dry season (Dec–Mar) (Barreto and Hernández 1988, Hato Piñero 2005). Different conservation practices (closure to hunting, fire control, protection of forested areas, and maintenance of corridors between pastures) have been established at this ranch since 1953. Consequently, healthy populations of many species occur, which has permitted development of an ecotourism program. The only other cracid species in this area is the Rufus-vented Chachalaca (*Ortalis ruficauda*).

Diet Composition and Diversity.—We estimated composition and diversity of curassow diets based on: (1) fecal analyses, and (2) direct observations in the field. Feces were collected and observations were made during eight field trips (15–20 days each) during November 2001 to July 2002 (except Jan). Diversity was estimated by identifying the different species comprising the diet of curassows. We also analyzed contents of 15 stomachs from specimens collected between 1961 and 1980 by personnel of the Estación Biológica de Rancho Grande Museum (Ministry of Environment) in different localities of the central Llanos (Portuguesa, Cojedes, and Guárico states) and northern Venezuela (Falcón State).

Fecal Analyses.—Feces were collected by searching the area around water sources used by curassows, and at feeding and resting sites. Fifteen samples were collected on a monthly basis (90 samples total; 45/season). No samples were collected in July due to extensive flooding which prevented location of intact feces. Fecal samples >2 m apart were selected whenever possible to increase the probability of originating from different individuals. Feces within a 2-m circle were considered one sample as they likely belonged to the same individual.

Samples were oven dried at 70° C for 72 hrs and dry mass was measured to the nearest 0.01 g. We separated and weighed the different items for further identification. Seeds were counted and their status (intact or damaged) recorded. We considered intact seeds as those not showing evident damage (e.g., broken seeds). We also measured the seeds and related their size to their status through regression analyses to test the suggestion by Santamaría and Franco (2000) that fate of consumed seeds (predated or dispersed) depends on their size.

Direct Observations in the Field.—Curassows are elusive and shy; it was rarely possible to track individuals for periods longer than 2 min. Occasionally we could follow individuals while foraging for 10–20 min. We recorded every food the birds consumed whenever possible during these events. We catalogued items as: seeds, leaves, fruits, flowers, and took samples for further identification. Occasionally, we observed curassows eating soil. This was recorded as soil. Monthly composition of the diet was expressed as percent of observations in which every item was recorded in relation to the total number of observations.

Stomach Contents Analyses.—Stomach contents were washed with water and sieved (1 mm). Items in each sample were separated under a stereoscopic microscope and catalogued as seeds, leaves, fruits (only in the case of *Guazuma* sp., the only fruit for which we could separate the seed from the pulp), flowers, animal material, minerals (pebbles of different sizes differing from soil which could not be identified in feces or stomach contents), etc. Both wet and dry mass of every compo-

TABLE 1. Proportion and frequency of foods in Yellow-knobbed Curassow feces (n = 90) and stomachs (n = 15), and proportion of observations in which each food category was recorded (n = 192 feeding bouts).

Food categories	% Total dry weight[a]		Frequency[b]		Field observations % (# of feeding bouts)
	Feces	Stomach contents	Feces	Stomach contents	
Fruits[c]	41.39	49.40	0.57	0.53	57.8 (111)
Seeds	15.35	48.20	0.92	1.00	16.7 (32)
Leaves	38.62	0.65	0.83	0.33	3.1 (6)
Minerals	4.30	1.07	0.59	0.40	8.9 (17)
Flowers	0.00	0.36	0.00	0.27	12.5 (24)
Animals	0.34	0.008	0.11	0.13	0.5 (1)
Seedlings & cotyledons	0.00	0.03	0.00	0.07	0.5 (1)
Roots	0.00	0.07	0.00	0.13	0.0 (0)
Fungi	0.00	0.004	0.00	0.07	0.0 (0)
Other[d]	0.00	0.21	0.00	0.47	0.0 (0)

[a] (Dry weight of each category/total dry weight) × 100.
[b] Proportion of feces or stomachs in which the food occurred (range = 0 to 1).
[c] Including fruits consumed with or without seeds.
[d] Unidentified material.

nent were measured to the nearest 0.01 g; items were identified to the species level whenever possible.

The data are expressed as percent dry weight (mass) of every item (leaves, fruits, seeds, flowers, animal material) in relation to total mass and frequency (proportion of feces or stomachs in which the item was present). We note the amount of fruit may be underestimated due to the difficulty of identifying pulp as a separate component. We correlated these variables (Pearson coefficient with arcsine transformed data) to investigate whether the heaviest components were also the more frequent. We compared proportions in feces with stomachs using a Spearman test. A significant correlation indicates items with higher proportions in feces will also have higher proportions in stomachs (Barreto et al. 1997). Statistical analyses were performed using STATISTICA (V. 5.0) software (Statsoft 1984–2008).

RESULTS

Fecal Analyses.—The diet of Yellow-knobbed Curassows was mostly fruits (41% dry weight), leaves (39%), seeds (15%), minerals (4%), and small proportions of flowers, roots, fungus, seedlings, and invertebrates (insects, Order Coleoptera), each <1% of total dry weight (Table 1). Fruits (mainly *Guazuma ulmifolia*) and leaves were abundant in the diet. *G. ulmifolia* seeds and minerals, although not important in terms of weight, were frequent in the diet.

Guazuma ulmifolia fruits were the most important item from December to April (dry season) and accounted for 45–82% of the total dry weight. Leaves became the main part of the diet (48–89% dry weight) with an increase in consumption of minerals in June (rainy season) (Fig. 1). We found 12 different seed morphotypes in feces of which four could be identified to species and one to Family. We found 5,815 seeds in the 90 feces analyzed with size ranging from 1 to 10 mm. Ninety-three percent (n = 5,408) were intact and the remainder were partially damaged. We did not find a relationship between damaged seeds and their size (R^2 = 0.2476; P = 0.15; n = 12); however, small seeds (1–5 mm) had a low percent of damage or no damage at all.

Direct Observations in the Field.—One hundred and ninety-two observations of foraging curassows were made from November 2001 to July 2002. Fruits (dry and fleshy) and seeds were consumed most frequently (Table 1). Dry fruits were mainly *G. ulmifolia* (26.6% of observations) and *Samanea saman* (7.8%). Fleshy fruits most frequently consumed were *Mangifera indica* (9.9%) and *Thalia geniculata* (9.4%) (Table 2). Most fleshy fruits were indehiscent (the seeds remain in the fruit after it has been shed from the parent plant). Curassows consumed a wide array of fruit shapes (round, ellipsoidal, cylin-

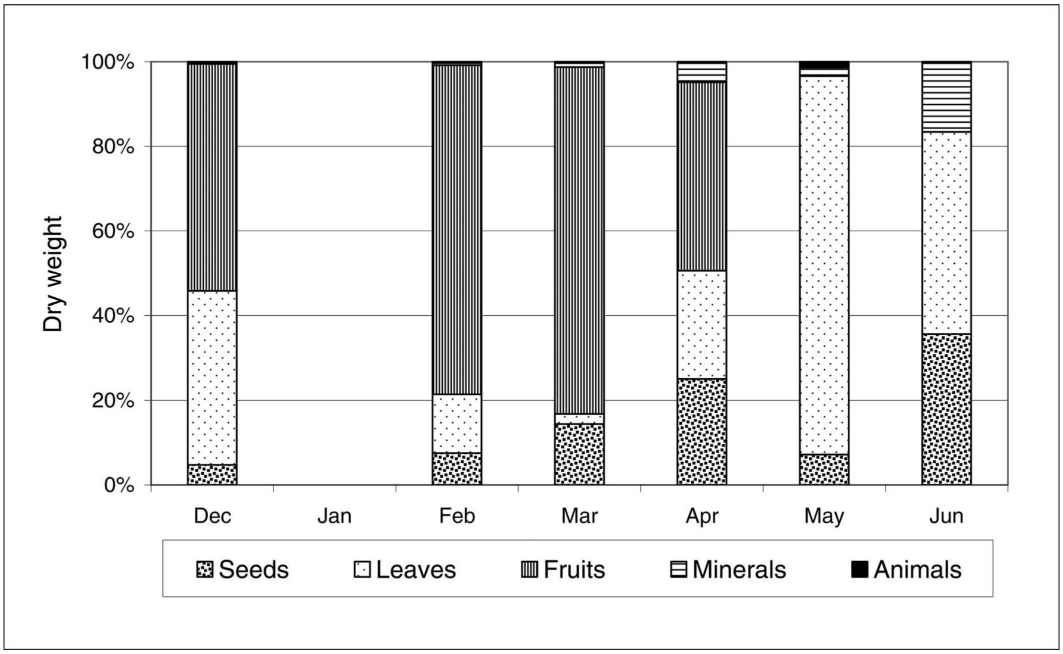

FIG. 1. Monthly variation in diet composition of Yellow-knobbed Curassows based on fecal analyses (n = 90). The number of fecal samples was 15/month.

drical, reniform, straight, curved), types (drupes and legumes), and colors (green, brown, yellow, red, white, and orange) mainly from trees and shrubs and, less frequently, from herbs. Curassows also ingested soil and pebbles (8.8%). All other components appeared in <5% of observations. Curassows were observed consuming seeds and seedlings embedded in livestock feces, and a curassow was observed consuming the tail of an unidentified lizard. Curassows were observed throughout the study (Nov–Jul) eating mainly fruits (Fig. 2). Seeds were observed being eaten from February to April. Both seedlings and animal material were consumed during the rainy season.

Stomach Content Analyses.—Stomachs contained mainly fruits and seeds with *G. ulmifolia* representing nearly 50% dry weight of the diet. Other components represented <1% dry weight (Table 1) including leaves from *Hecastotemon completus* and *Capparis odoratissima*, flowers of a Caesalpinaceae, and root fragments of an unidentified herb. A piece of a *Dyscomicetes* fungus was detected in one stomach. We found 13 morphotypes of seeds, seven identified to species and three to Family. Seed size ranged from 1 to 20 mm. *G. ulmifolia* and an unidentified Euphorbiaceae were the most frequent and dominant dry weight components (Pearson; r^2 = 0.22; P = 0.008; n = 31). Stomach contents differed from fecal contents (Spearman; R = 0.70; gl = 8; P = 0.19) although both stomachs and fecal contents had *G. ulmifolia* as the most important item. Stomachs contained more seeds, but fewer leaves, compared to feces.

Diet Diversity.—The diet of curassows included 26 plant species in 21 families in the Hato Piñero. Overall, curassows consumed 48 plant species in 29 families (Table 2). Thirty-six types of plant parts could be identified (25 to species, 6 to genus, and 5 to Family). Of these, 16 species provided fruits, 17 seeds, 10 flowers, 6 leaves, and 1 seedling. Legumes (8 species) were most frequently represented in the diet followed by Rubiaceae, Verbenaceae, and Boraginaceae (2 species each). Species consumed varied throughout the study period (Fig. 3).

DISCUSSION

Diet Composition.—Yellow-knobbed Curassows are frugivorous based on fecal and

TABLE 2. Diet of Yellow-knobbed Curassows in the Llanos of Venezuela based on fecal and stomach analyses, and field observations.

Family and species	Food category[a,c]	Found in[b,d]
Family Mimosaceae		
Acacia glomerosa	Se[c]	Ob, Fe
cv. *Mimosa pellita*	Se[c]	Fe
Enterolobium cyclocarpum	Se, S&C	Ob, Sc[d]
Samanea saman	Fr, Se, Fl	Ob, Sc
Family Bignoniaceae		
Arrabidaea mollisima	Le	Ob
Sp 1 Not identified	Se	Sc
Sp 2 Not identified	Se	Sc
Family Verbenaceae		
Lantana camara	Fr, Fl	Ob
L. trifolia	Fr, Fl	Ob
Family Rubiaceae		
cv. *Guettarda* sp.	Se[c]	Sc
Genipa americana	Fr, Le, Se	Ob, Fe[d]
Family Boraginaceae		
Cordia sp.	Fl	Ob
Cordia tetranda	Fr	Ob
Family Caesalpiniaceae		
Caesalpinia coriaria	Fr	Ob
Sp 1 Not identified	Fl	Sc
Family Sterculiaceae		
Guazuma ulmifolia	Fr	Fe, Sc, Ob
Family Marantaceae		
Thalia geniculata	Fl, Fr	Ob
Family Nyctacinaceae		
Guapira olfersiana	Le	Ob
Family Sapindaceae		
Allophylus racemosus	Fr, Le	Ob
Family Apocynaceae		
Tabernaemontana cymosa	Fr, Le	Ob
Family Combretaceae		
Combretum alternifolium	Fr, Fl	Ob
Family Flacourtiaceae		
Hecatostemon completus	Fr, Le	Ob, Sc
Family Rhamnaceae		
Zyzyphus cyclocordia	Fr	Ob
Family Anacardiaceae		
Mangifera indica	Frp	Ob
Family Chrysobalanaceae		
Licania pyrifolia	Frp	Ob
Family Capparidaceae		
Capparis odoratissima	Fr, Fl, Le	Ob, Sc
Family Arecaceae (Palmae)		
Copernicia tectorum	Fr	Ob
Family Alismotaceae		
Echinodorus paniculatus	Fr	Sc
Family Polygonaceae		
Coccoloba caracasana	Se	Ob, Sc
Family Cecropiaceae		
Cecropia sp.	Fl	Ob
Family Fabaceae		
cv. *Sesbania* sp.	Se[c]	Sc
Family Convolvulaceae		
cv. *Convolvus* sp.	Se[c]	Sc
Family Passifloraceae		
cv. *Passiflora* sp.	Se[c]	Sc
Family Cyperaceae		
cv. *Scleria* sp.	Infrut	Sc
Family Euphorbiaceae		
Sp 1 not identified	Se[c]	Sc
Family Poaceae		
Sp 1 not identified	Fr	Fe

[a] Se = Seed; Fr = Fruits (including seeds); Frp = Fruit pulp (seeds not consumed); Infrut = Infrutescence; Fl = Flowers; L = Leaves; S&C = Seedlings and Cotyledons.
[b] Ob = field observation; Fe = Feces; Sc = Stomach content.
[c] Not certain if the seed was consumed alone or with the fruit.
[d] Not certain about the identification of the item.

stomach content analyses, and direct observations in the field. They also consumed seeds, leaves, flowers, roots, fungi, animal matter, and soil as reported for other curassows (Torres 1989, Érard et al. 1991, Calchi and Pérez 1997, Gutiérrez 1997, Renjifo and Renjifo 1997, Santamaría and Franco 2000, Jímenez et al. 2001).

Fruits, the most frequently ingested food item, are nutritious and high energy foods. They represent a rich source of carbohydrates while seeds (most consumed with the fruit) contain protein and lipids (Howe and Westley 1988). Despite these features, it is not clear which traits present in fruits affect their choice by birds (reviewed by Levey and Martínez del Río 2001). Leaves are low calorie foods that are difficult to digest due to high content of structurally complex carbohydrates, including cellulose, hemicellulose and pectins, phenolic polymers such as lignin and tannins, and a variety of toxic secondary compounds including alkaloids, terpenoids, and cyanogenic compounds (Howe and Westley 1988). These compounds make leaves a low-intake item for birds. Morton (1978) and Jimenez et al. (2001) observed that consumption of leaves for nutrients (e.g., nitrogen) can be expected in frugivorous birds. Galliformes (Cracidae, Phasianidae) are among birds which feed upon leaves most frequently with some species entirely foliovorous (*Lagopus*, *Canachi-*

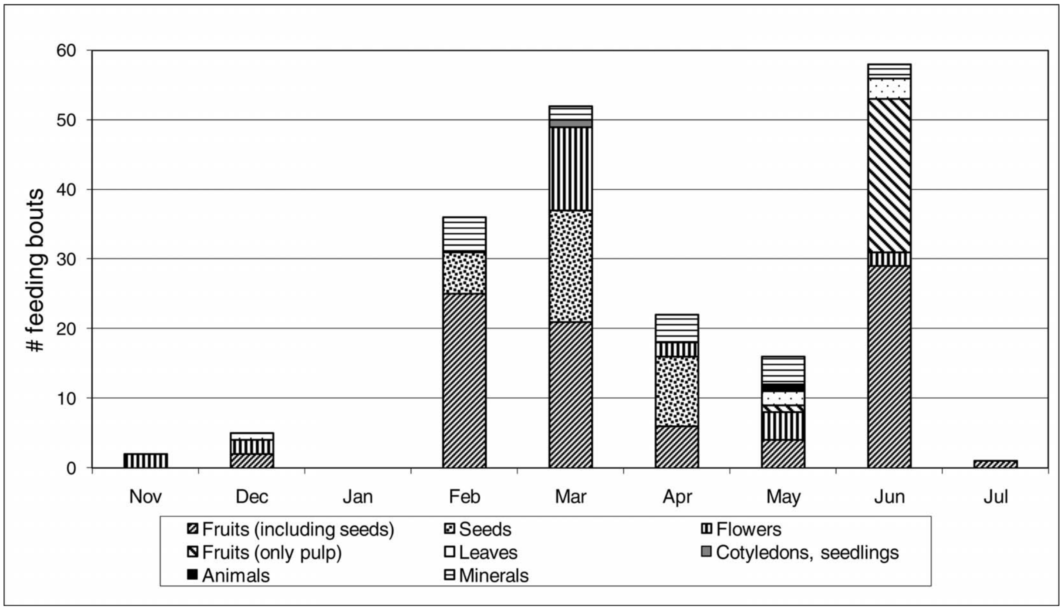

FIG. 2. Monthly variation in diet composition of Yellow-knobbed Curassows based on field observations ($n = 192$ feeding bouts). Number of observations differed between months and is represented by the monthly number of feeding bouts.

Species	Months								
	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul
Thalia geniculata	----	----	?	----	----	----			
Guazuma ulmifolia		----	?	----	----	----			
Acacia glomerosa		----	?	----	----	----			
Guapira olfersiana				----					
Enterolobium cyclocarpum				----	----	----			
cv. *Mimosa pellita*				----	----	----			
Coccoloba caracasana				----	?	----			
Hecatostemon completus				----				----	
Caesalpinia coriaria					----	----			
Combretum alternifolium					----	----			
Samanea saman					----	----	----		
Capparis odoratissima					----	?	----	----	
Poaceae sp. 1							----		
Genipa americana							----	----	
Lantana camara							----	----	
Licania pyrifolia							----	----	
Arrabidaea mollisima							----	----	
Allophylus racemosus							----	----	----
Lantana trifolia								----	
Cordia sp.								----	
Zyzyphus cyclocordia								----	
Mangifera indica								----	
Copernicia tectorum								----	
Cordia tetranda								----	
Cecropia sp.								----	
Tabernaemontana cymosa								----	

...? = even when it was not observed for that period, it is probable the item was consumed, because we observed curassows eating it during the month before and after.

FIG. 3. Monthly variation in diet diversity (species or Family level) of Yellow-knobbed Curassows based on field observations and fecal analysis.

tes, and *Tetrao*; Morton 1978). Some species of cracids are reported to feed on leaves: the diet of *Mitu mitu* is 68% leaves in Perú (Torres 1989), and leaves comprised 39 and 27% of the diet of *Ortalis canicolis* and *Penelope perspicax* in Argentina and Colombia, respectively (Caziani and Protomastro 1994, Muñoz 2004).

Consumption of soil (geophagy) by animals has been attributed to requirements for specific nutrients, anti-acids, or detoxifying substances, or to enhance grinding of food in the gizzard (Diamond et al. 1999). Soil comprised 2–10% of the diet of cracids. Nine percent of the birds we observed ingested soil and it comprised 1 and 4% dry weight in stomachs and feces, respectively. Curassows have been observed eating small pebbles which may be related to the need to grind material inside their strong gizzard (Delacour and Amadon 2004).

Several species of cracids have been reported to consume animal material including insects (ants, butterflies, caterpillars; Caziani and Protomastro 1994), earthworms (Érard et al. 1991, Érard and Théry 1994, Arriaga and Bermúdez 1997, Gutiérrez 1997, Renjifo and Renjifo 1997), spiders, terrestrial crabs, and snails (Santamaría and Franco 2000), live adult frogs, lizards, and snakes (Torres 1989), bird eggs, chicks, and carcasses of armadillos (*Dasypus* sp.), pacas (*Cuniculus paca*), rats (a number of Muridae species), and bats (Chiroptera) (Renjifo and Renjifo 1997, Santamaría and Franco 2000). This consumption, in all reported cases, coincided with the reproductive period when adults feed chicks a high protein-based diet (Morton 1973). We found small quantities of animal material (0.52% of observations and <1% dry weight in both feces and stomachs). This material may have been consumed incidentally while eating fruits, although it coincided with hatching of eggs in April (Kvarnbäck et al. 2008).

Seeds as a separate item from fruit may be overestimated as it is difficult to recognize fruit pulp in stomachs or feces. Our observations indicate curassows ingest mainly fruits, but were observed eating seeds on a few occasions. Thus, the importance of seeds in feces or stomachs (Table 1) may be an artifact, underestimating the real importance of fruits in the diet.

Different methods (fecal and stomach analyses, and direct observations) produced different results concerning importance of components other than fruits (Fig. 4). Fecal analyses produced proportions of seeds and leaves inverse from those resulting from stomach analyses. A richer diet was revealed by stomach content analysis compared to any other method, partially because the food is less processed making it possible to distinguish features that are not distinguishable in feces. However, stomach analysis requires collecting the animal.

Diet Seasonality.—The diet of Yellow-knobbed Curassows varied throughout the year with a predominance of legumes and dry fruits during the dry season, and a shift to drupes, flowers, leaves, and small proportions of animal material during the rainy season. Food resources and water are scarce during the dry season, which is a particularly difficult time for frugivorous, folivorous, and insectivorous animals (Robinson 1986, Niño P 1994). Curassows consumed large quantities of *G. ulmifolia* during the dry season, one of the few species with fruits at this time of the year, as most species produce fruits by the onset of the rainy season (Robinson 1986; pers. obs.). *G. ulmifolia*, a common species in the Llanos, is consumed by a number of frugivores and has been reported as the most important item in the diet of peccaries (*Tayassu* spp.) in the study area (Barreto et al. 1997); *G. ulmifolia* represents a keystone species in this environment (*sensu* Terborgh 1986b). Other cracids have also been reported to depend on key plant species: *Mitu mitu* in Perú (4 species of Moraceae: *Brosinum* sp., *Clarisia racemosa*, *Ficus* sp., and *Pseudolmenia* sp.) (Torres 1989), *M. salvini* in Colombia (*Guarea guidonia*) (Santamaría and Franco 2000), and *Ortalis canicollis* in Argentina (*Schinus poygamus* and *Rivina humilis*) (Caziani and Protomastro 1994).

Availability of resources is higher during the rainy season and curassows had a diverse diet during that period. It is possible that curassows behave as opportunistic foragers, consuming a wide array of resources as they become available. Curassows were observed shifting foraging areas if they contained more seeds, leaves, flowers, and fruits (Bertsch and Barreto 2008).

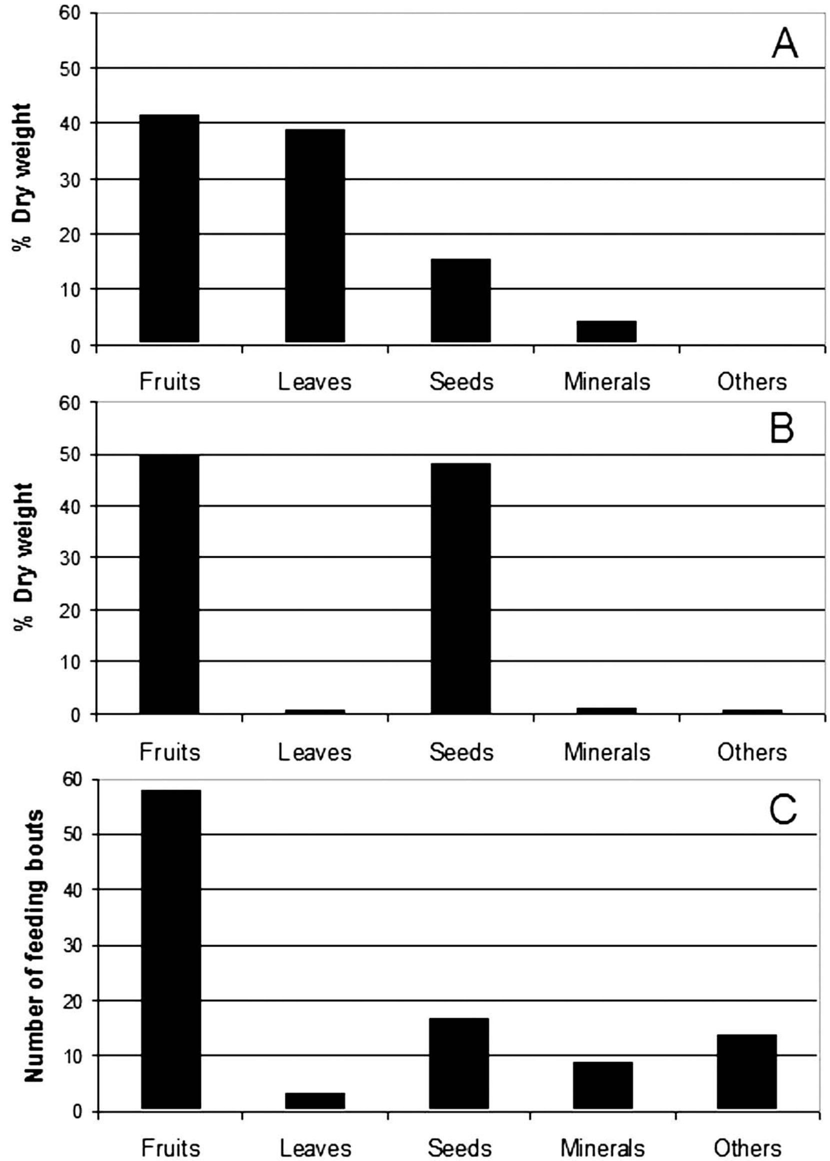

FIG. 4. Food categories in the diet of Yellow-knobbed Curassows: feces (A), stomach analysis (B), and field observations (C).

Seed Dispersers or Predators?—Are curassows dispersers or predators of the seeds they consume? Too few data are available to properly answer this question. Diets vary among species (Levey 1994, Théry et al. 1994) with guans and chachalacas serving as efficient seed dispersers (Terborgh 1986a, Strahl and Grajal 1991, Wenny 1993, Caziani and Protomastro 1994, Mamani-F 2001, Brooks and Fuller 2006), while curassows serve as dispersers and predators (Érard and Sabatier 1989, Érard and Théry 1994, Yumoto 1999). The difference may be attributed to their digestive physiology, as guans and chachalacas can regurgitate seeds they consume and have relatively weaker gizzards than those of curassows, leaving seeds to pass intact through their digestive tract (Delacour and Amadon

2004). Some studies suggest that seed size can affect seed fate. Larger seeds (6–30 mm) were completely destroyed in the gastrointestinal tracts of *Mitu salvini* and *Crax alector* compared to smaller (2–5 mm) seeds (Yumoto 1999, Santamaría and Franco 2000). Larger seeds comprised most of the diet of these species, making them seed predators, but they occasionally ingested smaller seeds which were dispersed. Seeds consumed by *C. daubentoni* in our study were mostly intact in feces, especially those $<$1–5 mm, in agreement with Santamaría and Franco (2000). Preliminary experiments showed that seeds of *G. ulmifolia* and *S. saman* germinated after passing through the digestive tract of birds, suggesting the Yellow-knobbed Curassow may be an important disperser of some of the plants they consume.

This study demonstrated that, although *C. daubentoni* has been considered a forest dwelling species (Schäefer 1953); it also uses resources at the forest border (e.g., *G. ulmifolia*) and open areas (e.g., *Mangifera indica*, *Licania pyrifolia*). The current habitat of the Yellow-knobbed Curassow is highly fragmented, and this behavior may be advantageous if this species is tolerant of fragmentation (Strahl and Grajal 1991, Borges 1999). Illegal hunting may be the most serious factor threatening Yellow-knobbed Curassow populations throughout their range.

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