European Association of Zoo- and Wildlife Veterinarians (EAZWV) 4th scientific meeting,
joint with the annual meeting of the European Wildlife Disease Association (EWDA)
May 8-12, 2002, Heidelberg, Germany.

POSTMORTEM FINDINGS IN WILD GREAT BUSTARDS (*Otis tarda*) FROM SPAIN:A CLINICAL APROACH.

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Abstract

Causes of death and morbidity are reported for 13 free-living great bustards (Otis tarda) from Spain. The main mortality cause for the adult birds and two juveniles was collision with power lines or fences. One wild adult bustard died of Aspergillus fumigatus generalised infection. Other causes of death for juveniles were predation, septicemia, parasitic obstruction of small intestine by cestodes, ventriculus impaction, and trauma with agricultural vehicles. Causes of morbidity were skin injuries, fractures, soft tissue and liver trauma, pneumonia of different etiology, ectoparasites and hemoparasites.

Zusammenfassung(??)

Résumé(??)

Key words: Great bustard, *Otis tarda*, mortality, morbidity, postmortem.

Introduction

There are 22 species of bustards (family Otididae), some of them are endangered species. The great bustard (*Otis tarda*) is a large, highly sexually dimorphic, globally endangered bird. Their numbers have declined considerably during the present century and current populations inhabit cereal steppes of Europe and Asia (2). This decline has been attributed to habitat changes caused by human population growth, farming practices, changes in agricultural practices and hunting pressure (1).

The Iberian population is the largest, being the size of the Spanish population at around 17.000-19.000 birds. Most of the Spanish great bustard nuclei seem to be stable perhaps with a very slight tendency to increase in some particularly well conserved areas (1).
Other bustard species (*Chlamydotis undulata, Ardeotis kori, Eupodotis ruficrista…*) have attracted much attention from the veterinary profession, especially in the Middle East, where a good amount of information about management and clinical aspects of bustards exists (3-7,9,12,17).
Most of the references regarding great bustards are based on ecological studies, and there are some published papers on captive great bustard diseases(13-15) but the authors could only found three references on veterinary aspects (parasites) of free-living great bustards (10,11,16), none of them being published in an international journal.
Clinical management of great bustards is not an easy task due to the strength, weight, present injuries and stressful nature of these birds. The knowledge of diseases affecting free-living great bustards could help in the daily treatment and follow up of clinical cases. The aim of this retrospective study is to provide an overview of morbidity and mortality causes in the wild Spanish great bustard population.

Material and method

We included for this retrospective study 13 postmorten cases of free-living great bustards (6 adults and 7 juveniles) that were necropsied in the period 1998-2001. Five of the 6 adults and 3 of the 7 juveniles were males. In one juvenile we could not determinate the sex. Included in this paper are only free-living birds that were found dead or died within 24 hours in the rehabilitation centre.
Standard avian postmorten examination techniques were used(8), including two X-ray projections, samples for histopathology, parasitology, and microbiology when appropriate and biometry. The condition of each bird was recorded as emaciated, poor, fair, good or obese, based on the degree of pectoral muscle wasting. Birds with emaciated and poor pectoral muscle scores were included in the pectoral muscle wasting group (4). For histopathology special stains were used when *Chlamydophila* spp. or tuberculosis were part of the differential diagnosis.
Cause of death was determined from consideration of the clinical history, clinical observations, laboratory findings, and significant postmortem findings.
Endoparasites were washed in distilled water and preserved in 70% ethanol until processed for identification. When possible a blood smear was prepared to search for hematozoa and faeces were screening by flotation method with zinc sulphate. Arthropods collected for identification were fixed and stored in 70% ethanol.

Results

Causes of death in wild great bustards are summarised in table 1.

Table 1. Causes of death in 7 juvenile and 6 adult free-living great bustards.

Cause of death	Adult	Juvenile	Total
Trauma-electric transmission power lines, fences	5	2	7
Trauma-vehicle	0	1	1
Aspergillosis	1	0	1
Predation	0	1	1
Parasitic obstruction of small intestine by cestodes	0	1	1
Septicemia	0	1	1
Gizzard impaction	0	1	1
Total	6	7	13

Trauma trough collisions with electric power lines or fences was responsible for 83.3% of adult and 42.9% of juvenile deaths in wild great bustards. Aspergillosis accounted for 16.7% of adult mortality. Other mortality causes of juvenile birds were predation (14.3%), septicemia (14.3%), gizzard impaction (14.3%) and obstruction of small intestine with cestodes (14.3%).
Other postmortem findings in the present study are summarised in table 2.

Table 2. Postmortem findings in 7 juvenile and 6 adult free-living great bustards.

Postmortem finding		Adult	Juvenile	Total
Intestinal parasitism-cestodes		6	4	10
Trauma-skin		5	4	9
Fractures		4	3	7
	humerus	1	1	2
	radius	1	0	1
	ischium	1	0	1
	femur	0	1	1
	tibiotarsus	0	1	1
	pubic bone	0	1	1
	scleral ring	1	0	1
	skull	1	0	1
Pneumonia		4	3	7
	bacteria	0	2	2
	fungus	1	0	1
	aspiration	3	1	4
Pectoral muscle wasting		2	4	6
Hemoparasites		2	2	4
Ectoparasites		2	1	3
Trauma-liver		2	1	3
Intestinal parasitism-nematodes		1	1	2
Sternal bone deformity		1	0	1

All the adult bustards (100%) and 57.1% of juveniles presented intestinal parasitism by cestodes. These cestodes were identified as *Otiditaenia conoides* and *Idiogenes otidis.* The nematodes present in the caecum of one adult and one juvenile bird were identified as *Heterakis isolonche*.
Also in the faeces of that juvenile *Capillaria* spp. and *Trichostrongylus* spp. eggs were detected, but no adults were recovered.
Skin injuries were a morbidity cause in 83.3% of adult and 57.1% of juvenile great bustards.
Bone fractures occurred in 66.7% of adult birds and 42.9% of juveniles, being open fractures of the humerus the most common fractures.
Pneumonia was observed in 66.7% of adult and 42.9% of juvenile birds. Foreign body inhalation pneumonia was recorded for 50% of adult bustards and 14.3% of juvenile birds. Pneumonia of bacterial origin (*Pasteurella* spp.) was found in 28.6% of juvenile bustards, and *Aspergillus fumigatus* pneumonia and air sacculitis was responsible for the death of one adult (16.7%) great bustard.
Hemoparasites of the specie *Haemoproteus telfordi* and *Haemoproteus tendeiroi* were seen in blood films from 2 adult and 2 juvenile great bustards. However it was not possible to make a blood smear from every bird.
Ectoparasites were found in 33.3% of adults and 14.3% of juveniles. *Qtilipeurus turmalis* (Mallophaga, Insecta) and a tick from the genus *Hyalomma* were identified.

Discussion and conclusions

Mortality causes of free-living juvenile great bustards from Spain has been cited previously (2), although it was not the objective of the study. Predation was the main mortality cause in juveniles and collision with power lines was found in two occasions. In this study only one young was found to be predated by a raptor, while other was hit by an agricultural vehicle. The later cause has been reported as common in bustards chicks as they look after cover in crop fields (18).
In a previous work in Madrid province (18) the authors found that collision with power lines was responsible of the death of 30 wild great bustards in the period 1999-2000. Trauma trough collisions with electric power lines or fences accounted for 63.1% mortality in wild great bustards in the present study. Bone fractures and dislocations, skin and soft tissue injuries, liver rupture, aspiration pneumonia and lung haemorrhage were the most frequent causes of morbidity in such cases. When such cases are admitted to rehabilitation a reasonable valuation and decisions must be done before treatment is accomplished.
A frequent postmortem finding was a high parasitic burden caused by cestodes (*Otiditaenia conoides* and *Idiogenes otidis*). These species of cestodes have been previously reported in great bustards (wild and captive) in Spain (10,16). They also report the death of one bustard following obstruction of the small intestine by cestodes. This condition has been also described in captive houbara bustards in UAE (4,12). In our study the prevalence of cestode infections in bustards was higher than the previously reported by Reina et al. (11.4%) in Spain and Jones et al. (25.6%) in the UAE. This could be due to many different causes as our small sample size and the different origin of birds. Great bustards admitted to rehabilitation centres are usually weakened, dehydrated, traumatised, and in poor body condition (authors, unpubl. data), conditions that may increase the susceptibility to the pathologic effects of cestode infections (12). The clinician must consider these observations when dealing with this specie. Nematodes were seen in low numbers in the caecum of 2 bustards.
Gizzard impactions and foreign-body obstruction have been reported as an important cause of death of captive juvenile rufous-crested bustards and houbara bustard chicks (4,5). One juvenile bird of our study died after a gizzard impaction of unknown aetiology.

Gram-negative bacterial diseases were the most important cause of death over the first 180 days of captive bustard chicks in UAE (5). In our study one week old chick died of septicemia where *E. coli* was culture from different organs. The isolation of *E. coli* from bustards at necropsy was found on many occasions in one study involving captive houbara, rufous-crested and kori bustards (9).

After collision with fences or power lines most of the birds could live for sometime and also walk away for many metres before die (pers. obs.). Aspiration pneumonia was found in 50% of the adult birds as result of aspiration of food (normally seeds) from the ventriculus after the collision.

Aspergillosis has been described as a common cause of euthanasia and postmortem finding in captive and imported adult houbara bustards and also caused mortality in juvenile kori and houbara bustards (4). One adult female died four hours after presentation prostrated and with obvious signs of dyspnea. At necropsy fungal granulomas were seen in trachea, syringe, lungs, pericardium, air sacs, kidney and pelvic nerve roots. A cream-coloured ovoid plaque (7 cm minimum diameter, 11 cm maximum diameter) was recovered surrounding the abdominal viscera. A pure culture of *Aspergillus fumigatus* was obtained from the granulomas. These bird also presented signs of external parasitism, but only a tick from the genus *Hyalomma* was recovered. A high cestode burden was another incidental finding in this bird. To the authors knowledge this is the first report of aspergillosis in a wild adult great bustard.

Klebsiella spp. pneumonia and pneumonia of unknown etiology have described in captive bustards fron the UAE (4). Bacterial pneumonia has been also a morbidity cause (28.6%) in free-living juvenile great bustards. In one occasion *Pasteurella* spp. was cultivated from the lungs of a juvenile bird. Other young great bustard had a focal bacterial pneumonia and liver lipidosis based on histopathology. Unfortunately no microbiology results are available for this case. Some authors have stated that aggressive care of bustards during the first 30 days after hatching is clearly important (5).

Hemoparasites from the genus *Haemoproteus* were detected in 4 of the bustards, but it was not possible to obtain a blood film for each bird. Studies of wild great bustards hemoparasites species and prevalence are been carried out by the authors since 1998 in the Spanish population and will be reported in the future.

Management of wild great bustards clinical cases posses a challenge to the veterinarian. The results presented in this paper could help understanding the morbidity causes when attending such patients.

Acknowledgments

Javier Caldera for providing logistic support and Gerry Dorrestein for reviewing some histopathology slides.

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