

Serological survey for bovine bacterial and viral pathogens in captive Arabian oryx (*Oryx leucoryx* Pallas, 1776)

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Summary: Tests for antibodies to bovine bacterial and viral pathogens were conducted on 239 sera from 128 Arabian oryx (*Oryx leucoryx*) from seven locations (Taif, Riyadh and Mahazat as Said, Saudi Arabia; San Diego, United States of America [USA]; Shaumari, Jordan; Qatar; and Bahrain). No antibodies to *Pasteurella multocida* type E or epizootic haemorrhagic disease 1 virus were found. Antibodies to *Brucella abortus*, *P. multocida* type B, *P. multocida* type D, lumpy skin disease virus and Akabane virus were detected in 2, 1, 5, 2 and 1 animals, respectively. Evidence of *P. multocida* type A, *Coxiella burnetti*, *Chlamydia psittaci* and parainfluenza 3 virus was found in 3 herds (prevalence in the main herd [n = 78]: 8%), 3 herds (8%), 6 herds (7%) and 5 herds (15%), respectively. Evidence of antibodies against bluetongue virus was found in five oryx from the USA and in one oryx from the Taif herd. Antibody vaccinal titres against rinderpest virus (and the virus of peste des petits ruminants, due to cross-reactions) were found in almost all the herds. This is the first report of antibodies against *B. abortus*, *C. burnetti*, *C. psittaci*, parainfluenza 3 virus and Akabane virus in the genus *Oryx*.

KEYWORDS: Arabian oryx – *Chlamydia psittaci* – *Coxiella burnetti* – Middle East – *Oryx leucoryx* – Parainfluenza 3 virus – *Pasteurella multocida* – Serosurvey.

INTRODUCTION

The Arabian oryx (*Oryx leucoryx* Pallas, 1776) became extinct in the wild in the early 1970s. The species is now the subject of relocation programmes in many countries, where animals bred in captivity are reintroduced into the wild. Disease transmission risks are enhanced for the relocated animals themselves, as well as for native wildlife and resident domestic species (6). Thus, detailed studies on the serological status of the animals and data about the susceptibility of the species to diseases can be important tools for the health management of such conservation programmes.

Arabian oryx seem to be susceptible to most pathogenic bacteria and viruses which affect cattle, sheep, goats and camels (5). There is poor knowledge of the

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epidemiological situation for certain diseases in most countries of the Middle East. The main aim of this study was thus to evaluate the exposure of Arabian oryx from various locations to selected infectious diseases found in domestic and wild ruminants.

MATERIALS AND METHODS

Tests were performed on 239 sera from 128 Arabian oryx for the following bovine bacterial and viral pathogens: *Brucella abortus*, *Pasteurella multocida* types A, B, D and E, *Coxiella burnetti*, *Chlamydia psittaci*, epizootic haemorrhagic disease 1 (EHD1) virus, lumpy skin disease (LSD) virus, Akabane virus, parainfluenza 3 (PI3) virus, bluetongue (BT) virus, rinderpest (RP) virus and peste des petits ruminants (PPR) virus. All the samples were collected in Saudi Arabia and came from captive or strictly isolated populations in the following locations: Taif, Riyadh (Thumamah) and Mahazat as Said, Saudi Arabia; San Diego, United States of America (USA); Shaumari, Jordan; Qatar; and Bahrain. The herds of the National Wildlife Research Centre (NWRC) in Taif and the King Khaled Wildlife Research Centre (KKWRC) in Thumamah originated from the former King Khaled herd which was kept in Thumamah and divided in 1986. The herd in the protected area of Mahazat as Said derived from animals from the USA and Jordan. All animals were vaccinated against RP (Kabete strain type O, Saudi Arabia Veterinary Vaccines Institute, Saudi Arabia).

The serological techniques used were as follows:

- virus neutralisation test to detect LSD, RP, PPR and Akabane virus antibodies
- complement fixation test for *B. abortus*, *C. burnetti* and *C. psittaci* antibodies
- agar gel immunodiffusion test for BT and EHD1 virus antibodies
- haemagglutination inhibition test for PI3 antibodies
- indirect haemagglutination test for *P. multocida* antibodies.

RESULTS

Table I shows the results of tests for eleven microbial disease agents in the different herds. No antibodies to *P. multocida* type E or EHD1 virus were found. Antibodies to *B. abortus*, *P. multocida* types B and D, LSD virus and Akabane virus were detected, but at extremely low prevalence. Evidence of *P. multocida* type A, *C. burnetti*, *C. psittaci* and PI3 virus were found with low, but significant prevalence. Evidence of antibodies against BT virus were found in five oryx from the USA and one oryx from the Taif herd. Antibody vaccinal titres against RP (and PPR, due to cross-reactions) were found in almost all the herds.

Except for LSD, which was found in one female in the NWRC herd (4), there were no clinical signs of disease in any of the animals.

TABLE I
Prevalence of antibodies to eleven microbial disease agents in Arabian oryx

Pathogen	Location of herd and year of sampling									
	(1987)	NWRC (1988)	(1990)	KKWRC (1989)	Mahazat (1990)	USA (1989)	Jordan (1989)	Qatar (1989)	Bahrain (1990)	
<i>Pasteurella multocida</i> type A	5/19*	4/38 (8.6)**	6/78 (7.7)	1/5	2/13	0/4	1/6	0/2	0/3	
<i>Pasteurella multocida</i> type D	0/19	0/38 (6.9)	1/78 (1.3)	0/5	0/13	0/4	0/6	0/2	0/3	
Parainfluenza 3 virus	6/19	6/38 (17.6)	12/78 (15.4)	1/5	1/13	0/4	0/6	1/2	0/3	
<i>Pasteurella multocida</i> type B	0/19	0/38 (1.7)	0/78	0/5	0/13	0/4	0/6	0/2	0/3	
<i>Coxiella burnetti</i>	0/18	4/35 (14)	6/72 (8.3)	0/3	1/11	0/3	0/5	1/2	0/2	
<i>Chlamydia psittaci</i>	1/18	0/35 (3.9)	5/74 (6.8)	1/4	2/10	0/3	2/5	1/2	0/2	
<i>Brucella abortus</i>	0/19	1/38	1/78 (1.3)	0/5	0/13	0/4	0/6	0/2	0/3	
Rinderpest virus	18/19	28/38 (69)	59/78 (75.6)	1/5	11/13	4/4	3/6	1/2	2/3	
Lumpy skin disease virus	1/19	1/38 (1.7)	2/78 (2.6)	0/5	0/13	0/4	0/6	0/2	0/3	
Bluetongue virus	0/19	0/38	1/78 (1.3)	0/5	2/13	2/4	3/6	0/2	0/3	
Akabane virus	0/19	0/38	0/77	1/5	0/13	0/4	0/6	0/2	0/3	

* number of positive sera/total tested

NWRC: National Wildlife Research Centre, Saudi Arabia

** % of positive sera
KKWRC: King Khalid Wildlife Research Centre, Saudi Arabia

DISCUSSION

The relatively high number of seroreactions against *P. multocida* type A confirms the possible free carriage of this bacterium in wild animal species (1). The PI3 virus infection, also enzootic in the NWRC herd, could lead to death in synergy with *Pasteurella* spp. (2, 3). These findings emphasise the importance of an efficient vaccination programme against pasteurellosis. Oryx from the USA, which proved to be positive for antibodies against BT, were allowed to be imported only after virus isolation tests proved negative. BT is endemic throughout the USA and the Middle East.

CONCLUSION

This study provides the first evidence of antibodies against *B. abortus*, *C. burnetti*, *C. psittaci*, PI3 virus and Akabane virus in the genus *Oryx*. These results stress the importance of adopting a high standard for sanitary and prophylactic measures in order to limit disease risks and thereby enhance the success of reintroduction programmes.

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ENQUÊTE SÉROLOGIQUE SUR LES INFECTIONS BACTÉRIENNES ET VIRALES DES BOVINS CHEZ L'ORYX D'ARABIE (*ORYX LEUCORYX* PALLAS, 1776) EN CAPTIVITÉ. – A. Greth, D. Calvez, M. Vassart et P.-C. Lefèvre.

Résumé : Les anticorps dirigés contre les bactéries et virus pathogènes pour les bovins ont été recherchés dans 239 sérums provenant de 128 oryx d'Arabie (*Oryx leucoryx*), de sept origines géographiques différentes (Tayf, Riyad et Mahazat-as-Said en Arabie Saoudite, San Diego aux Etats-Unis d'Amérique, Shaumari en Jordanie, Qatar et Bahreïn). Aucun anticorps spécifique de *Pasteurella multocida* type E ou du virus de la maladie hémorragique épizootique 1 n'a été décelé. L'étude a, par contre, révélé des anticorps spécifiques de *Brucella abortus* dans deux cas, de *P. multocida* type B dans un cas, de *P. multocida* type D dans cinq cas, du virus de la dermatose nodulaire

contagieuse dans deux cas et du virus Akabane dans un cas. Ces travaux ont mis en évidence la présence de *P. multocida* type A dans trois élevages (prévalence de 8 % [$n = 78$] dans le plus important d'entre eux), de *Coxiella burnetti* dans trois autres (8 %), de *Chlamydia psittaci* dans six (7 %) et du virus parainfluenza 3 dans cinq (15 %). La présence d'anticorps spécifiques du virus de la fièvre catarrhale du mouton a été démontrée chez cinq oryx provenant des Etats-Unis d'Amérique et chez un autre de Taïf. Des anticorps post-vaccinaux dirigés contre le virus de la peste bovine (et le virus de la peste des petits ruminants, par suite de réactions croisées) ont été constatés dans pratiquement tous les élevages. Il s'agit de la première observation d'anticorps dirigés contre *B. abortus*, *C. psittaci*, le virus parainfluenza 3 et le virus Akabane chez des animaux du genre *Oryx*.

MOTS-CLÉS : *Chlamydia psittaci* – *Coxiella burnetti* – Moyen-Orient – Oryx d'Arabie – *Oryx leucoryx* – *Pasteurella multocida* – Surveillance sérologique – Virus parainfluenza 3.

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ENCUESTA SEROLÓGICA SOBRE LAS INFECCIONES BACTERIANAS Y VIRALES DE LOS BOVINOS EN ORYX DE ARABIA (*ORYX LEUCORYX* PALLAS, 1776) CAUTIVOS. – A. Greth, D. Calvez, M. Vassart y P.-C. Lefèvre.

Resumen: Se buscaron anticuerpos dirigidos contra las bacterias y virus patógenos para los bovinos en 239 sueros provenientes de 128 oryx de Arabia (*Oryx leucoryx*), de siete orígenes geográficos distintos: Taif, Riad y Mahazat-as-Said en Arabia Saudí, San Diego en Estados Unidos de América, Shaumari en Jordania, Qatar y Bahrain. No se encontró ningún anticuerpo específico de *Pasteurella multocida* tipo E o del virus de la enfermedad hemorrágica epizootica 1. Pero el estudio reveló, en cambio, anticuerpos específicos de *Brucella abortus* en dos casos, de *P. multocida* tipo B en un caso, de *P. multocida* tipo D en cinco casos, del virus de la dermatosis nodular contagiosa en dos casos y del virus Akabane en un caso. Asimismo, se puso de manifiesto la presencia de *P. multocida* tipo A en tres rebaños (prevalencia de 8% [$n=78$] en el más importante de ellos), de *Coxiella burnetti* (8%) en otros tres, de *Chlamydia psittaci* en seis (7%) y del virus parainfluenza 3 en cinco rebaños (15%). La presencia de anticuerpos específicos del virus de la lengua azul se demostró en cinco oryx provenientes de Estados Unidos y en uno de Taif. Anticuerpos postvaccíneos dirigidos contra el virus de la peste bovina (y contra el virus de la peste de los pequeños rumiantes, por reacciones cruzadas) se constataron en prácticamente todos los rebaños. Se trata de la primera observación de anticuerpos dirigidos contra *B. abortus*, *C. psittaci*, el virus parainfluenza 3 y el virus Akabane en animales del género *Oryx*.

PALABRAS CLAVE: *Chlamydia psittaci* – *Coxiella burnetti* – Encuesta serológica – Medio Oriente – Oryx de Arabia – *Oryx leucoryx* – *Pasteurella multocida* – Virus parainfluenza 3.

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