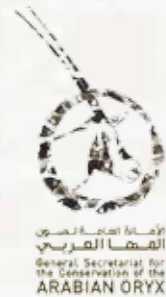




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# MIDDLE EAST ARABIAN ORYX DISEASE SURVEY REPORT 2013



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The General Secretariat for the Conservation of the Arabian oryx was established in 2000 as a regional initiative with a key role of supporting all efforts to protect and conserve the Arabian oryx, to agree regional criteria and standards, and to coordinate efforts between range states.

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## ABBREVIATIONS

AO: Arabian oryx
BTV: Blue Tongue Virus
CCPP: Contagious Caprine Pleuro Pneumonia
EAD: Environment Agency - Abu Dhabi
EHDV: Epizootic Hemorrhagic Disease Virus
FMD: Foot and Mouth Disease
GSCAO: General Secretariat for the Conservation of the Arabian Oryx
KWRC: King Khalid Wildlife Research Center
OIE: Office International des Epizooties = World Organisation for Animal Health
PPR: Peste des Petits Ruminants
TB: Tuberculosis
UAE: United Arab Emirates



## DEFINITIONS

The below definitions were developed and included to serve the purpose of the questionnaire.

### Reintroduced Herd into the wild

- The herd is free-ranging.
- The herd lives on natural resources and does not require supplementation.
- The herd's diet is not supplemented with food artificially.
- It occurs in its natural habitat within the historical distribution range of the particular species.
- The particular species' social requirements are met at all times.

### Managed Population

- It is free ranging (managed wild population) or semi free ranging.
- It lives on food from natural resources which may require supplementation.
- It occurs in its natural habitat within the historical distribution range of the particular species, and
- The particular species' social requirements are met at all time.

### Captive-bred

A population bred under controlled unnatural conditions is considered to be captive bred.

### Dystocia

Dystocia is a pathologic or difficult labor, which may be caused by an obstruction or constriction of the birth passage or abnormal size, shape, position, or condition of the fetus. This condition usually requires human intervention.

### Stillbirth

Stillbirth is a delivery of a fully formed dead neonate.

### Abortion

Abortion is a premature expulsion from the uterus of the products of conception; termination of pregnancy before the fetus is viable. Most of the time, an early abortion won't be noticed at all. When an abortion occurs during the last stage of pregnancy it can be confused with a stillbirth. Some abortions can also cause dystocia, for instance when the fetus is decaying within the uterus and becomes swollen.

## SUMMARY

- The response rate for the 2013 Middle East Arabian oryx Disease Questionnaire was 93%. The survey was sent to "focal points" across the region and to collection managers based in the Middle East.
- The collection managers surveyed in this study manage a combined total of 9706 individual Arabian oryx throughout the Middle East. The populations of Arabian oryx recorded in the UAE, Qatar and Saudi Arabia represent 64%, 15,5% and 12,3% of the total Middle Eastern population, respectively. The UAE and Qatar accommodate 80% of the total Arabian oryx population recorded in this survey.
- Over three quarters (78%) of recorded population in this survey is categorized as captive bred, and 2% are categorized as reintroduced into the wild. 20% are categorized as managed populations.
- Traumatic injuries remain the first cause of death: out of a total of 356 reported deaths, 164 were due to trauma. Old age comes second with 65 animals.
- The small amount of scientific publications on this species, especially in the veterinary field does not reflect the symbolic importance of the species, nor the considerable financial implication of its conservation





## INTRODUCTION

The General Secretariat for the Conservation of the Arabian oryx (GSCAO) and EAD decided to repeat the Disease Survey of the iconic Arabian oryx following very positive reactions to the 2011 edition and the excellent support from the range states.

The 2011 disease survey is openly and freely accessible online <https://www.arabianoryx.org> (Lignereux & AlKharusi, 2013).

While focusing on Arabian oryx only, epidemiological challenges require a multidisciplinary holistic approach including but not limited to: emerging diseases threat, epidemiological networks (national governmental entities and international organization: World Organization for Animal Health -OIE-), interactions between livestock and wildlife, etc...

Notification of infectious diseases to competent national authorities is a precondition for any successful animal disease control plan at national and international levels. All the countries surveyed in this report are members of the OIE.

Talking about animal infectious diseases wouldn't be complete without mentioning the World Animal Health Information Database (WAHID) Interface; we will do great use of this database for every OIE listed disease we encounter through the survey.

This database is openly accessible to everyone at: [http://www.oie.int/wahis\\_2/public/wahid.php/Wahidhome/Home](http://www.oie.int/wahis_2/public/wahid.php/Wahidhome/Home)

We will also emphasize the risk associated with zoonotic diseases.

Links to previous Arabian oryx Disease Surveys can be found in literature cited and recommended readings, at the end of the present survey.

Not all animal collections covered in this survey have access to veterinary services, including the availability of a veterinarian. However, we attempted to keep this report as accurate and scientifically sound as possible, keeping in mind that the reader might not have a background on veterinarian knowledge. We hope that both the veterinarians and non-veterinarians will find this survey report informative and helpful.

## METHODOLOGY OF THE SURVEY

### Questionnaire

The 2013 questionnaire has been modified since the previous survey; Chapters on “Prophylactic procedures, routine medications and veterinary tests” and “Epidemiological risk” were removed: in the previous survey the routine health checks and vaccination protocols put in place in the different collections were presented. We also gave recommendations on those matters and we felt that 2 years after, it might be too early to assess what changes have happened and our recommendations would probably be the same.

Nevertheless, for people interested in those aspects please refer to the 2011 survey (Lignereux & AlKharusi, 2013), available on the website [www.arabianoryx.org](http://www.arabianoryx.org).

### Method

The questionnaire was sent in April 2014 to “focal organizations” across the Middle East, whose role is to reach a maximum number of national collections, both governmental and private, holding Arabian oryx species.

The last response was received in July 2014.

We based this report on the direct answers from the collection managers. The short discussion following each chapter was based on personal experience and scientific literature.

An important challenge is to obtain a full list of collections as we usually lack basic information such as location of the collection and contact details of the collection managers in order to reach them.

The list of surveyed collections is still not exhaustive and we think an important number of collections is still unknown to us, with no manager/ no veterinarian, perhaps without record keeping system in place, and also no background information on founders (history of the collection) or veterinary aspects or even the owner.

Small collections can be of high genetic value as they might hold genetically diverse animals. Expanding this conservation network and coverage is one of the GSCAO's main tasks.

Getting answers from collections is also challenging and require frequent reminders due to busy schedules on the managers' sides.

## OBJECTIVES

The Arabian oryx disease survey was reinitiated upon recommendations after the Arabian oryx workshop held in Al Ain in 2011, following requests coming from different collection managers and veterinarians. The main objectives are:

- Create a network of people involved in the conservation of this species and draw up an exhaustive list of the Arabian oryx collections in the Middle East,
- Obtain an updated and accurate number of Arabian oryx throughout the Arabian Peninsula, along with demographic parameters,
- Help to improve genetic diversity by promoting and facilitating animal exchange,
- Limit the risk associated with zoonotic diseases and other infectious diseases affecting this species, by helping and supporting the establishment of guidelines and protocols,
- Conduct a gap-analysis in the veterinarian aspects of the Arabian oryx management,
- Assess the risks that could compromise the long term sustainability and conservation of this emblematic species.
- Review the literature to provide updated information on the topic.

## RESPONSE RATE

For the present edition covering the January to December 2013 period, we had many collections joining this participative effort for the first time bringing the total number of collections surveyed to 25, distributed all across the Middle East as shown in table 1. These new collections are mainly privately owned and located in the UAE.

These collections represent a total of 54 sites.

Only 2 collections didn't send their responses with a total number of 25 collections surveyed. The return rate is 93% (25/27).







Table 1: : List of collections and sites which participated in the 2013 Arabian oryx Disease Survey

Country	Collection	Site
Bahrain	Supreme Council for Environment	Al Areen Wildlife Park 1
		Al Areen Wildlife Park 2
		Hawar Island
Jordan	Wadi Rum Protected area - Project of HH Sheikh Mohammed bin Zayed	Wadi Rum
	Shaumari Wildlife Reserve	Shaumari
Kuwait	Kuwait Zoo *	Zoo
	Private Collection *	
Oman	Office for Conservation of Environment - Diwan of Royal Court	Jaaluni (enclosures) The fenced Reserve
Qatar	Shahanyah Breeding Center, Almazhabyah Collection	Shahanyah
		Mazhabyah
		Alwajbah
		U.Th, U.Qr, U.Ma, RL
		Farm 279
Saudi Arabia	Saudi Wildlife Authority	NWRC - TAIF
		KKWRC - Thumamah
		Mahazat as- Sayd Protected Area
		Uruq Bani ma'arid Protected Area
	Private Collections *	Private Collection - Thumamah Private Collections
Yemen	San'a Zoo	Zoo
	Taiz Zoo	Zoo

\* New in this survey

Country	Collection	Site
United Arab Emirates	Management of Nature Conservation – President's affair	Green Dunes
		Al Wathba
		Abu Al Abyad
		Saih Al Bin Ammar
		Sam
	Al Ain Zoo - Abu Dhabi Emirate	Core Zoo
		Back of House
		MET
	EAD – Protected Area Department - Abu Dhabi Emirate	OAPA Umm Al Zomoul
	EAD – Ex Situ Conservation - Abu Dhabi Emirate *	Al Faya Holding Facility
		Deleikha Holding Facility
	EAD – Forestry Management - Abu Dhabi Emirate *	Al Ujair – Al Ain
		Al Wudihi – Medinat Zayed
		Al Kabshia – Medinat Zayed
		Ghantoot – Abu Dhabi Central Region
		Buhairan – Abu Dhabi Central Region
	Arabian oryx collection of HH Sheikh Mansour bin Zayed - Abu Dhabi Emirate	Bu Deep
	Sir Bani Yas Island - Abu Dhabi Emirate	Bani Yas
	Al Ajban Desert Safaris - Abu Dhabi Emirate	Breeding groups
		Al Ajban
		Al Khazna
	Rawdat al Reef collection of HH Seikha Fatima Bint Mubarak - Abu Dhabi Emirate *	Sea Palace
	WRSAN Wildlife division – Ajban - Abu Dhabi Emirate *	Arabian oryx Collection
	Dubai Desert Conservation Reserve - Dubai Emirate	Dubai Desert
	Wadi Al Safa Wildlife Centre - Dubai Emirate	Wadi Al Safa
Al Awir		
Muou Dara		
Endangered species Breeding Centre - Sharjah Emirate	Display Camp	
	Museum Camp	
	Dhuleiman	
Al Bustan Zoological Center - Sharjah Emirate *	Zoo	
	Back Farm	
<b>TOTAL</b>	<b>25</b>	<b>54</b>

\* New in this survey



## TOTAL NUMBER OF ORYX

A total number of 9706 Arabian oryx is surveyed throughout this study.

Compared to the 7123 animals surveyed 2 years ago (Lignereux & Alkharusi, 2013), it represents a 36% increase. This number is mainly due to newly surveyed collections, mostly located in the United Arab Emirates, but also Saudi Arabia: four of them are home to 450+ individuals each (up to 800+).

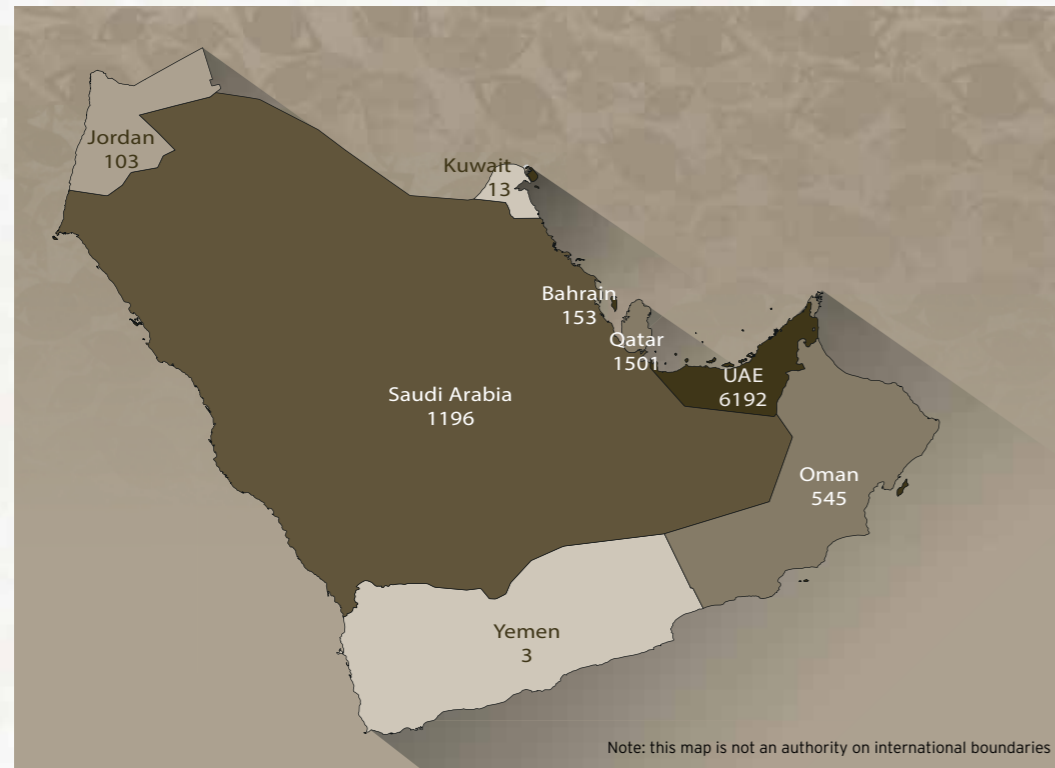


Figure 1: Distribution of Arabian oryx surveyed in 2013

## DISTRIBUTION OF THE ARABIAN ORYX THROUGHOUT THE RANGE STATES

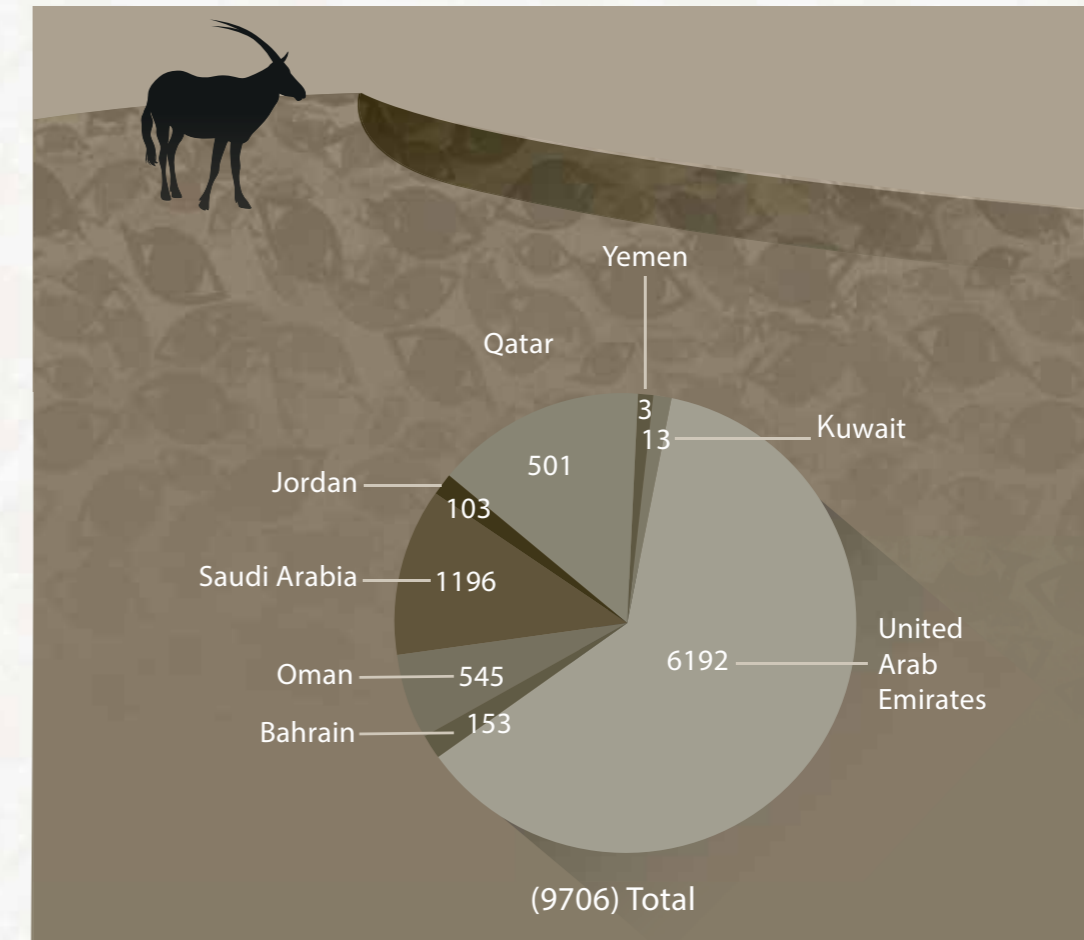


Figure 2: Percentage of Arabian Oryx reported in the Middle East by country (n = 9706)

## POPULATION CATEGORIES

Three population categories were defined in the questionnaire (please refer to the definitions given above). The collection managers answered the survey according to those definitions.

While all the Arabian oryx are “wild”, by opposition to “domesticated”, they are not all “into the wild”. This notion seems to have created some confusion in the past. Please see figure 3.

### Reintroduced Herd into the wild

The fenced reserve of Al Wusta Wildlife Reserve in Oman, Uruq Bani Ma’arid Protected Area and a part of the population at Mahazat as Sayd protected area in Saudi Arabia categorized themselves as herds released into the wild. They represent 2% of the overall Arabian oryx population covered by this study.

This ratio decreased dramatically since the previous survey mainly due to the Arabian Oryx Protected Area reclassification to managed population, this population being supplemented in feed and water.

### Managed Population

The Arabian oryx Protected Area in the UAE, The Dubai Desert Conservation Reserve in the UAE, Al Areen Wildlife Park 1 and Hawar Island in Bahrain, Mahazat as Sayd protected area in Saudi Arabia, Wadi Rum protected area and Shaumari Wildlife Reserve in Jordan are categorized as Managed Populations.

They represent 20% of the overall Arabian oryx population covered by this study.

### Captive-bred

A vast majority (78%) of the overall Arabian oryx population covered by this study is kept and bred in captivity.

## SEX RATIO

The sex ratio is 76 adult males per 100 adult females.

## JUVENILE POPULATION

No distinction was done between neonates and juveniles. We will consider them as one category.

The juvenile population represents 10,5 % of the overall population of known age and 20% of the adult female population. Please see figure 4

In a theoretical set up, a sexually mature female (adult) gives birth yearly to a single calf, thus in this “perfect” population, we should observe at any given time one calf and one juvenile per adult female, equivalent to 2 juveniles per adult female. In the surveyed population, we observe 1 juvenile every 5 adult females.

This apparent unbalance with the theoretical population makes us think that abortions, neonatal mortality and juvenile mortality should be investigated more in depth to explain such differences.

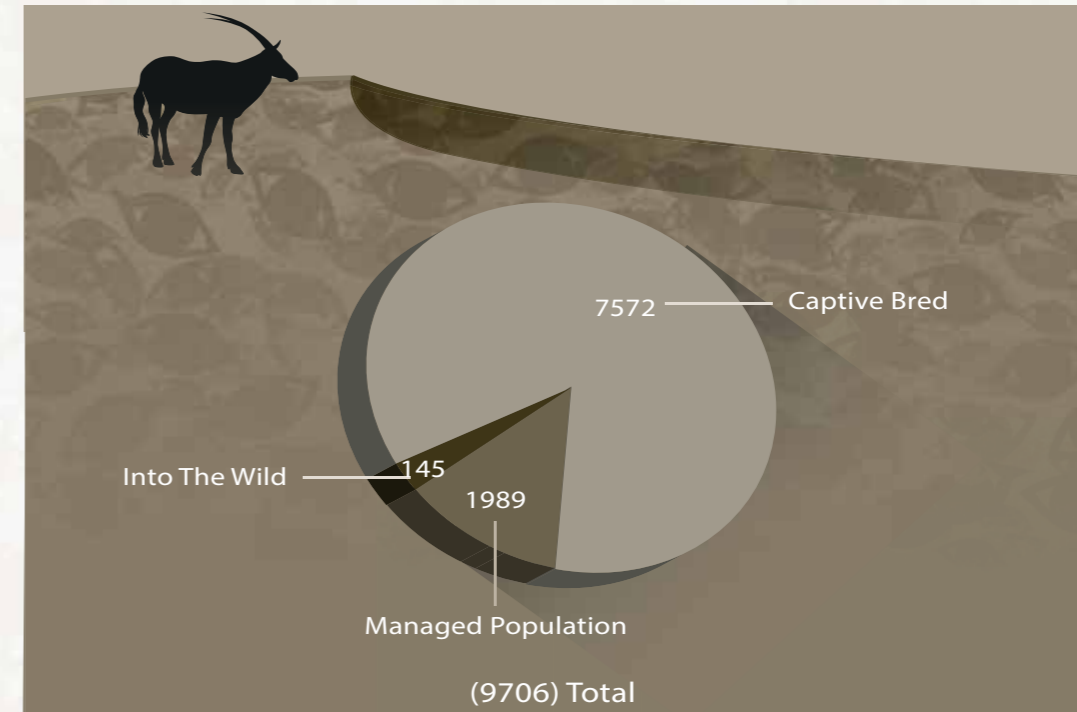


Figure 3: Distribution of Arabian oryx herds in the Middle-East in 2013 (n=9706)



Figure 4: Distribution of male to female and adult to juvenile Arabian oryx in the 2013 population

## ANIMAL EXCHANGE

The overall population of Arabian oryx in the Middle East is considered a meta-population. Most of it is bred in fenced facilities in unnatural conditions, with no possibility to mimic the nomadic behavior of the species that may be once existed before Man impacted so much on its environment. While re-creating blood lines that disappeared is not possible, an important task for collection managers is to keep their population at the highest possible level of genetic diversity. Having the full history of the collection, including founders and genealogy tree gives invaluable information, and thanks to molecular biology methods, it is now possible to assess quite easily the genetic status of a collection, and compare it to others.

Animal exchange plays an important role in the long term survival of the species. We therefore asked Arabian oryx collection managers if they exchange animals.

Twelve collections reported exchanging animals (50% of the collections) and 2 collections that answered "no" are keen to do it.

## RECORD KEEPING

Record keeping, especially for large collections of oryx can be challenging. We asked what technique collection managers are using to accomplish this important task.

Twelve collections are using Microsoft Excel, 5 collections use ISIS-ZIMS (Zoological Information Management Software), 4 collections use Microsoft Word, 4 collections use ARKS (Animal Record Keeping Software), 3 collections use SPARKS (Single Population Analysis & Records Keeping System), 2 collection keep records on paper, one collection developed its own software.

Larger collections seem to rely more on Microsoft Excel.

Five collections are using 2 or more record keeping systems, one collection reported not keeping records.

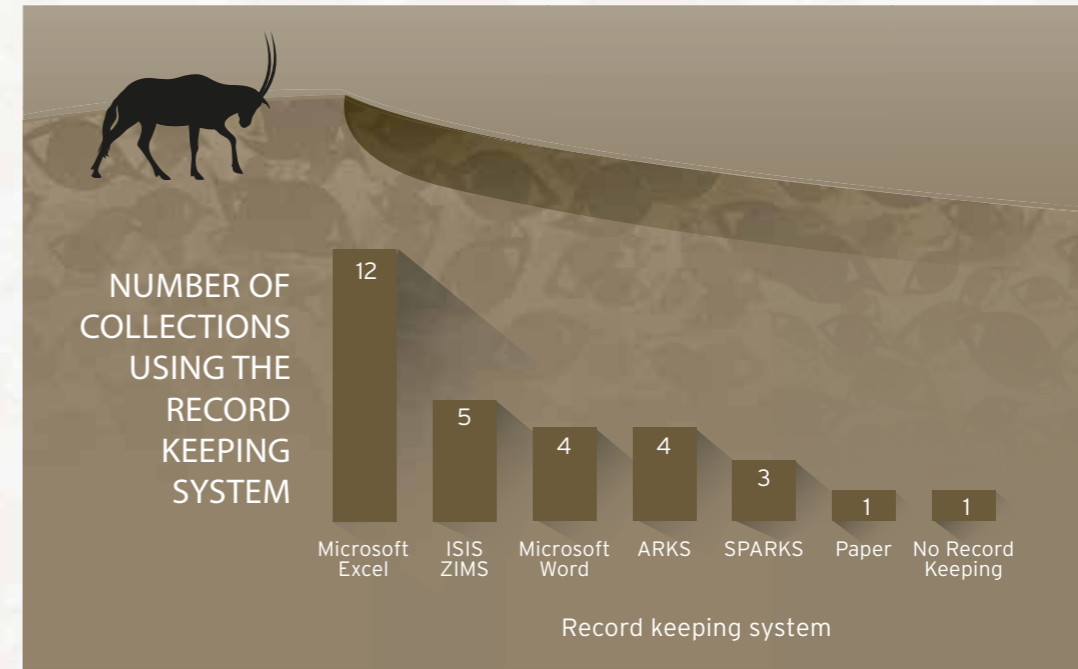


Figure 5: Record keeping systems used by Arabian oryx collection in the Middle East.









# REPORTED PATHOLOGIES IN 2013

## BACTERIAL DISEASES

### Subcutaneous Abscess

Forty eight cases of subcutaneous abscess were documented with 5 casualties. Intraspecific aggression is usually the main cause, especially between dominant males and during the post partum oestrus. All surveyed countries reported the lesion, but the incidence doesn't seem to be correlated with the size of the collection.

The way the collections are managed, especially the surface allocated per herd, the number of females per male, the implementation of male castration, keeping bachelor herds away from breeding groups, and other demography parameters would be interesting to record and compare to establish guidelines in order to reduce the impact of the lesion. We can also consider its incidence, along with the incidence of traumatic injuries (see further) as criteria for judging animal well-being.

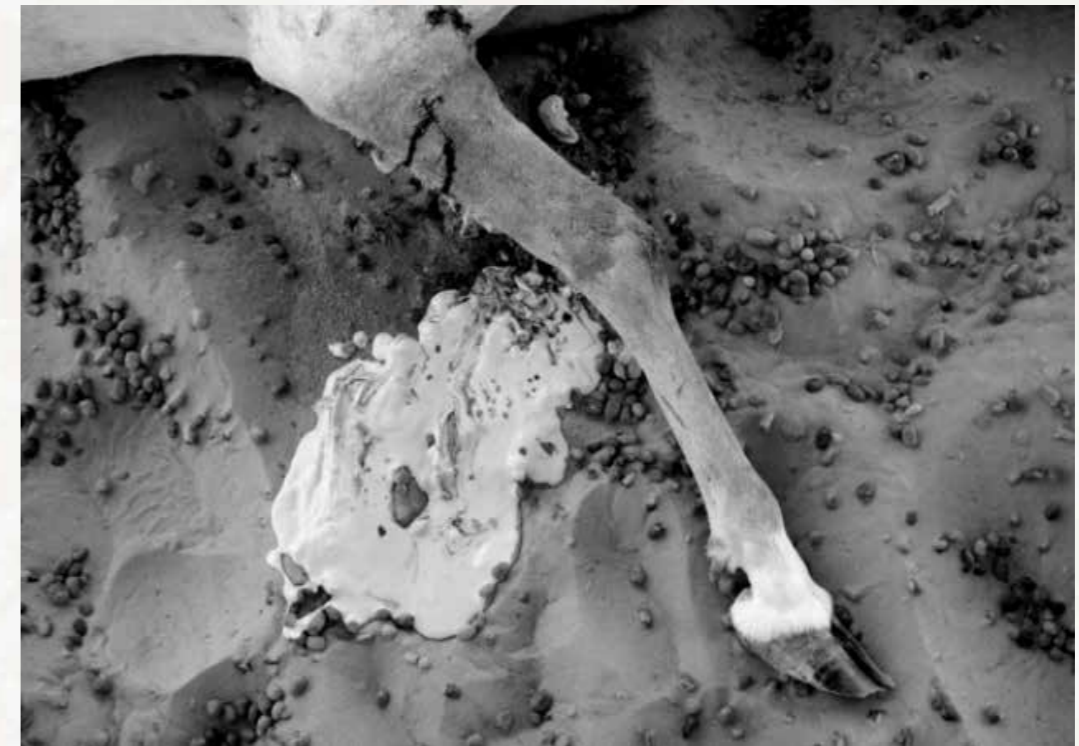


Figure 6: Large lanced subcutaneous abscess located on an elbow



## Actinomycosis

Also called lumpy jaw, one case of the disease in Oman and 35 cases in Qatar were recorded in 2013.

## Anaplasmosis

One case was reported in the UAE and in Qatar, a collection in Saudi Arabia reported to have 70% of the population being carrier of this rickettsia based on blood smear. No indication was given on the symptoms associated, and no mortality was linked to this infection.

Bovine anaplasmosis is an OIE-listed disease.

## Bacillary haemoglobinuria (Red water disease)

One collection in the UAE had 4 lethal cases, confirmed by gram stain and culture of *Clostridium haemolyticum*.

## Brucellosis

Five cases of brucellosis in Qatar and 2 cases in the UAE were reported during this survey.

No bacterial isolation or PCR were performed and the diagnosis was based on serological tests only: The UAE cases were diagnosed based on rose Bengal test, while the cases in Qatar were ELISA-based diagnosis and the answer to the questionnaire specified *B. abortus*.

While endemic in the region, brucellosis due to *B. abortus* and *B. melitensis* seem to be a rising concern, especially because of its zoonotic nature. Rose Bengal is a convenient screening test, but hasn't been validated for the oryx, like most of the tests used for both this disease and others. False positive can occur but even more importantly false negative, and a herd with positive (false or true) animals should be considered as infected until proven otherwise.

Environmental contamination and juvenile females that can test negative to serological test even though they can be affected are important to consider when facing brucellosis cases.

Control measures are different from eradication measures and eradication cannot be implemented at national or regional scale if control is not successful. Lengthy scientific literature exists on brucellosis affecting the domestic species but since the article published in 2002 by Ostrowski *et al.* near to zero has been written on brucellosis affecting the Arabian oryx, vaccine effectiveness and tests validation for this specific species.

Two very interesting examples can be found in the Alpine ibex (*Capra ibex*) and Yellowstone bison (*Bison bison*), where wildlife populations are found affected by brucellosis. Brucellosis in bison was discovered before 1917 (White *et al.* 2011) and resulted in extensive publications that can mostly be found online and that should inspire veterinarians working on endangered species.

All animals being imported, exported or reintroduced into the wild should also be tested for this disease. Furthermore, animals to be reintroduced into the wild should be sourced from known brucellosis-free herds, collection managers of brucellosis-positive collection should refrain from exchanging their animals until appropriate and proven methods are implemented.

Brucellosis is a zoonotic disease listed by the OIE (World Organization for Animal Health)

## Enterotoxaemia

Enterotoxaemia was reported in 4 collections across the UAE and one collection in Qatar, claiming a total of 12 dead animals.

## Lyme disease (Borreliosis)

Six percent of a population in Saudi Arabia was reported ELISA positive to this disease. We have no information about its clinical implications in the Arabian oryx species, nor the tick species (usually *Ixodes* sp.) involved in the transmission.

## Mycoplasmosis

Contagious Caprine Pleuro Pneumoniae (CCPP) has been documented in one Arabian oryx in the UAE (Chaber *et al.* 2014). *Mycoplasma capricolum capripneumoniae* infected the Arabian oryx from the nearby sand gazelle population while struck by an outbreak. The wall-less bacterium was isolated and genotyped and constitutes the first recorded case showing that Arabian oryx is sensitive to the disease and highlights the fact that this disease should be part of differential diagnosis when pulmonary lesions (lung hepatisation, sero hemorrhagic pleural fluid with fibrin) are observed. Identification of the pathogen using specific PCR is a minimum standard, ideally isolation and culture of the bacterium should be carried out. Respect of the cold chain during the transport of the samples to reference laboratory is key. C-ELISA kits are under development to check potential carriers prior to introducing them into a collection.

Antibiotics used in the event of an outbreak can lead to the creation of chronic carriers and the disease is usually brought into a group of animals by the introduction of chronic carriers. The epidemiological role of the sand gazelles is unknown but the CCPP-status of sand gazelles and goat species should be investigated before putting them in contact with Arabian oryx.

CCPP is an OIE listed disease whose arduous growth and pasteurellosis-like lesions can lead to mis- or under-diagnosis.





## Pasteurellosis

One collection in the UAE suspected pasteurellosis in 5 lethal cases. One collection in Qatar cultured and isolated *P. multocida*, reporting 4 cases of which 3 lethal.

“Pasteurellosis” correspond to several clinical entities as different as haemorrhagic septicemia, septicemic pasteurellosis in lambs, shipping fever (bovine pneumonic pasteurellosis), ovine pneumonic pasteurellosis. While these diseases are mainly caused by *Mannheimia haemolytica* and to a lower extent *Pasteurella multocida*, *Pasteurella multocida* serotypes B:2 and E:2 are the causative agents for haemorrhagic septicemia.

As written above, a case of CAPP was reported on Arabian oryx showing respiratory lesions. Based on gross lesions only, respiratory diseases can mistakenly be put on pasteurellosis account and we can only advise to think about CAPP each time compatible pulmonary lesions are seen during post mortem examination and the bacteriology results are inconclusive. We would recommend to always keep some frozen pleural fluid at -20 Celsius for further analysis in a reference laboratory.

Haemorrhagic septicemia is an OIE-listed disease, other pasteurellosis are not.

## Q-fever

Seven percent of an Arabian oryx population in Saudi Arabia was reported seropositive to *Coxiella burnetti*.

This result is compatible with a survey conducted by Greth *et al.* (1992).

Seropositive animals can have cleared the pathogen without showing any clinical signs, while, on the other hand, clinically affected animals can remain seronegative. Environmental contamination and presence of bacterium through fecal sampling could be interesting to investigate.

As of the date of publication, there is no description of the disease in this particular species.

Q fever is an OIE-listed zoonotic disease.

## Other Bacterial Diseases

Even though we lack information on causative agents for those cases, several pathologies were reported under “bacterial diseases” :

- One lethal case of pneumonia (UAE), one lethal case of anemia (UAE), one lethal case of peritonitis (UAE), and 40 cases of diarrhea in calves in one collection in the Oman, leading to the loss of 27 calves.
- Two lethal cases of “necrotic myositis” were also reported in one collection in the UAE. Usually, necrotic myositis is also called capture or stress myopathy and is an aseptic lesion mainly affecting gastrocnemius muscles.





## VIRAL DISEASES

We had really interesting reports on viral diseases this year, even though this part was mistakenly removed from the questionnaire.

### Blue Tongue

One collection in Qatar reported one suspicious case of bluetongue.

It appears that an infection due to Blue Tongue virus in Arabian oryx can be left unnoticed, resulting in seroconversion, and eventually long term protection against the strain that caused the seroconversion.

Past the shedding period, a seropositive animal is thought to eliminate the virus, and become immune to it. It is nevertheless important not to introduce foreign serotypes of Blue Tongue virus into the Middle East, and we can only recommend to import only seropositive (following natural infection or vaccination) animals from countries where Blue Tongue is also endemic, at the only condition that the shedding period is over (around 10-15 days). Two independent assays (paired sera) is a possibility.

At date of publication, 26 serotypes of Blue Tongue virus exist worldwide, with regional specificities. The 26th and last serotype was identified in Kuwait by Maan *et al.* (2011). While usually considered to be transmitted by biting midges (*Culicoides sp.*), strong evidences of transplacental (BTV-8) and direct contact (BTV-8 and BTV-26) contamination were found (Menzies *et al.* 2008, Batten *et al.* 2014), Serotypes isolated in the Middle East are: 2, 4, 6, 10, 15, 16, 24, 26. and serological evidences were found for the following serotypes in the Middle East: 9, 12, 13, 14, 17, 19, 20. ([http://www.reoviridae.org/dsrna\\_virus\\_proteins/btv-serotype-distribution.htm](http://www.reoviridae.org/dsrna_virus_proteins/btv-serotype-distribution.htm))

Blue Tongue is an OIE-listed disease.

### Foot and Mouth Disease (FMD)

This highly contagious disease was reported to us in one collection in Qatar where 2 animals were found seropositive and only one animal was reported to die of this disease. We don't know if the cases were linked to compatible clinical signs as animals can seroconvert after vaccination, even using 3ABC-ELISA tests when injecting not sufficiently purified vaccines. We think it is important to note that this collection conducts yearly FMD vaccination using aftovax pur.

The Arabian oryx disease survey conducted in 2000 (Ostrowski and Anajariyah, 2001) gives the clinical appearance of the disease affecting this species. No further articles can be found on the subject. However, this disease is a threat for the Arabian oryx, we have no information available on the possibility for this species to carry the virus over extended periods of time. Whenever an outbreak happens on this species, it would be beneficial to study further the epidemiology of the disease.

Genotyping of the isolated virus is a powerful epidemiological tool that allows us to study the spreading and mutations of the virus.

Table 2: Reported serotypes of FMDV in surveyed countries in the past 10 years

FMDV Serotypes reported by those countries to WRLFMD in the last 10 years (2004-2014)							
countries that participated in this survey	O	A	C	Asia 1	SAT 1	SAT 2	SAT 3
Bahrain	yes	yes		yes		yes	
Jordan	yes	yes					
Kuwait	yes	yes					
Oman							
Qatar							
Saudi Arabia	yes	yes					
Syria							
United Arab Emirates	yes						
Yemen							

FMD reports can be accessed online: [http://www.wrlfmd.org/fmd\\_genotyping/](http://www.wrlfmd.org/fmd_genotyping/)

FMD is an OIE listed disease.

### Lumpy Skin Disease and related

An outbreak of capripox virus infection has been recorded in one collection in the UAE

Several strains of virus belonging to the capripox virus genus can affect ruminants. While the name lumpy skin disease refers to a disease affecting primarily cattle we can also encounter sheeppox and goatpox affecting small ruminants. Capripox virus infection affecting the Arabian oryx was described in 1992 by Greth *et al.* 1992. We don't have more information about this case (clinical and epidemiological aspects, as well as accurate identification of the virus).

Live attenuated vaccines are marketed for domestic small ruminants and no study has been published on their use and effectiveness on the Arabian oryx. We would nevertheless recommend to vaccinate in enzootic countries.

Lumpy skin disease, sheeppox and goatpox infections are all OIE-listed diseases.

### Peste des Petits Ruminants (PPR)

One collection in Qatar reported 3 lethal cases of PPR in their Arabian oryx population, diagnosis based on post mortem examination and serology (ELISA). This collection does yearly vaccination against PPR.

A peer reviewed communication on this case would be appreciated and very informative.

Several homologous live attenuated vaccines exist against PPR and are locally commercially available. The disease is endemic in the region, but as of date of publication, the only article found on PPR outbreak in or close to an Arabian oryx population dates back from 1987 (Furley *et al.*), with no mention of the disease affecting this particular species.

Sa *et al.* (2013) demonstrate the seroconversion following the injection of PPR vaccine in Arabian oryx, therefore we can only advise to include PPR vaccine in veterinary protocols, if the oryx' sensitivity to this disease was to be confirmed.

According to Munir *et al.* in "Molecular Biology and Pathogenesis of Peste des Petits Ruminants Virus": "there is no chronic and convalescent carrier state in PPR".

PPR is an OIE listed disease, closely related to Rinderpest that was officially globally eradicated in 2011. OIE was created as a reaction to a Rinderpest outbreak in Europe back in 1920.



## PARASITIC DISEASES

### Helminthiasis

Three collections (one in Saudi Arabia, 2 in the UAE) reported helminths as part of routine fecal examination: *Nematodirus sp.* and *Strongylus sp.* oocysts were identified by microscopic observation.

*Nematodirus* and *Strongylus* are usually of low clinical importance unless high infestation of young animals occurs.

### Hydatidosis

One collection in the UAE reported a single case of echinococcosis found during post mortem examination.

*Taenia hydatigena* was identified in an Arabian oryx in Saudi Arabia and was documented in the 2000 edition of the survey.

A collection in Sharjah also reported echinococcosis this same year.

Handling objects that could have been in contact with canine dejections in a region where echinococcosis is enzootic should be seen as a hazard.

We would recommend to assess the parasitic status of canids living in the collection or at the oryx feed sourcing facility.

Hydatidosis is a zoonotic disease and an OIE-listed disease.

### Coccidiosis

Five collections located in Qatar, Saudi Arabia and the UAE reported coccidiosis during this survey. *Eimeria sp.* was mentioned.

Finding coccidial cysts in fecal samples is not always related to clinical signs. Nevertheless, heavy coccidian infestation on juveniles or immuno-compromised animals can lead to diarrhea, and pave the way to stress related diseases such as enterotoxaemia or pasteurellosis.

### Warble fly or hypodermosis

Warble fly was confirmed in one collection in Bahrain, affecting 3 animals, and suspected in one collection in the UAE with about 100 animals affected. See chapter "Other pathologies - Skin disease" for interpretation.



## Myasis

Twenty seven animals were reported to suffer from myasis in one collection in the UAE, with 5 lethal cases.

## Mange

One animal in the UAE and 15 animals in Qatar were reported to suffer from mange. No information was provided on the identification of the mite.

Sarcoptic mange (*Sarcoptes scabiei*) has been documented in Arabian oryx and several neighboring species (Yeruham *et al.* 1996).

## Ticks

Tick challenge can be quite important and the parasite was reported in all the countries surveyed but Kuwait and Yemen, No information was provided on tick species.

A surgery conducted in 2002 (Dubai Municipality) in Dubai, UAE, gives the following list of encountered hard ticks: *Hyalomma anatolicum excavatum*, *Hyaloma dromaderii*, *Hyaloma marginatum rufipes*, *Hyaloma truncatum*, *Boophilus spp.*, *Amblyomma lepidum*, *Rhipicephalus sanguineus*, *Rhipicephalus pulchellus*, *Rhipicephallus evertsi evertsi*, *Dermacentor marginatus*.

## Theileriosis

Theileria was identified in 14 blood samples in a collection in Qatar.

## FUNGAL DISEASES

Ringworm was identified in about 55 animals in one collection in Oman, showing skin lesions on the croup. We lack information on fungal species and case management.

## OTHER PATHOLOGIES

### Dental diseases

Jordan reported dental diseases, such as plaque, that was treated by descaling and polishing.

### Metabolic diseases

"Goitre" was reported in one animal in Jordan.

"Ketosis" was reported in one animal in Oman.

### Nutritional disorder

A collection reported 9 cases (3 lethal) of "general weakness and diarrhea" under this category.

#### - Ruminal Acidosis

8 Arabian oryx died in the UAE as a result of ruminal acidosis.

No information was provided whether those cases were acute or chronic acidosis and we also lack information on the diet of those animals.

#### - Copper deficiency

Copper deficiency was reported in one collection in the UAE.

### Stress myopathy

2 collections in the UAE and one collection in Qatar reported myopathy linked to stress in 2013. 8 animals were affected, 3 died.

2 cases of "necrotic myositis" were also reported in "bacterial diseases".

### Trauma

Trauma remains the main cause of reported death: 164 lethal cases were reported with a total of 221 cases throughout the range states.

Most traumas are stabbing wounds inflicted between animals and severity will be directly linked to the affected part of the body, and while most of the wounds will heal by themselves, some can lead to subcutaneous or deep abscess, peritonitis or pleuritis ...

High male density in mixed groups of animals, relatively small enclosures and birthing season are usual predisposing factors for male fighting.

Creating bachelor groups of males, horns trimming or horns tubing, male castration are known effective means to decrease aggressive behavior and its consequences.



## Reproductive tract disorder

### - Uterine prolapse

3 collections reported a total of 5 cases of uterine prolapse, causing death in 3 cases.

### - Dystocia

19 cases of dystocia were reported in 2013 leading to 16 deaths. We had no indication whether those deaths occurred on the birthing females or on the calves. We suspect they were 16 Dams.

Successful intervention on dystocia cases involves early detection, thus permanent (24/7) monitoring of late pregnant females is needed. Large and very large collections can experience difficulties on such staff demanding aspects. Dystocia will lead to calf death but should be distinguished from stillbirth or abortion. Unattended dystocia will usually lead to Dam's mortality.

### - Abortion

Five cases of abortion were reported this year.

We expect that reported abortion cases are late abortion cases as early abortion might not lead to fetal expulsion but most likely resorption by the mother and thus remain unnoticed by the keepers.

Early abortion usually leads the female oryx to start a new cycle. It is very difficult to establish reproductive guidelines and optimal fertility parameters due to the nature itself of the wild animals, and the lack of reproductive cycle follow up. Fecal steroids could be an option to monitor such parameters.

Non-infectious causes of abortion in livestock are quite numerous and include (but are not limited to): genetic factors, micronutrients deficiency (Vit. A, E, Selenium, Iron,...), heat stress, toxins etc...

While no attempt has been made to list infectious causes of abortion in the Arabian oryx, such list could include: Border disease, Bovine Viral Diarrhea (Bovine herpesvirus 1), Brucellosis, Chlamydia, Bluetongue virus, Neosporosis, Q-fever, Toxoplasmosis etc...

An international cooperative serosurveillance project of those agents could be interesting to implement at a regional level.

### - Retained Placenta

One case in Jordan and one case in the UAE were reported in 2013.

Etiology for retained placenta has been discussed in domestic species but totally uninvestigated in this species.

## Digestive Foreign Bodies

All but 4 collections in the UAE reported cases of digestive foreign bodies, such as ropes and plastic bags. The total number of reported deadly cases was 35.

No information was provided whether or not the cause of death was linked to the foreign body or the foreign body was a fortuitous post mortem discovery.

However, care should be taken in order to meticulously remove plastic material and pieces of wires, especially after fence or building work has been done, has most of the building companies and contractors don't see them as a direct threat to the animals.

Pieces of wires and ropes can also be found acting as snares and may become life threatening hazards.



Figure 7: Metal wire can become a snare, leading to amputation in this case



## Skin disease

Three collections in the UAE reported similar lesions happening in the September - December 2013 period:

Clinical findings can be summarized as follow:

- Several animals affected in groups, from different ages and both genders. Animals were not showing signs of itchiness or loss of condition.
- Inspection from distance showed raised/matted tufts of hair, 2 to 4cm in diameter, located on dorsal midline and extending to the flanks, mainly on caudal half of the body, in the upper part.
- Closer examination revealed in some cases normal skin but also multifocal scabby dermatitis with hyperemic to hemorrhagic skin lesion in other cases.
- A collection in Dubai reported inconclusive laboratory results: skin biopsy, blood Zinc/Copper/Vitamine A, fungus and ectoparasites, culture for dermatophilosis were all negative or within normal range, and suspected an allergic dermatitis.
- All cases settled spontaneously within a matter of weeks.
- A collection in the UAE reported 100 cases of Hypodermosis with no confirmation/ report of maggots. It could well have been another case of this skin condition.



Figure 8: Distance examination of skin disease of unknown origin

## Mismothering

Mismothering was reported in 4 collections in the UAE and 1 collection in Jordan, with a total number of 13 cases.

A female oryx that gave birth to a weak calf might abandon its offspring and thus be considered as mismothering, while she is not.

## Old Age

Old age claimed 65 animals in 2013. A collection reported osteoarthritis in shoulder and hip joint on one animal.

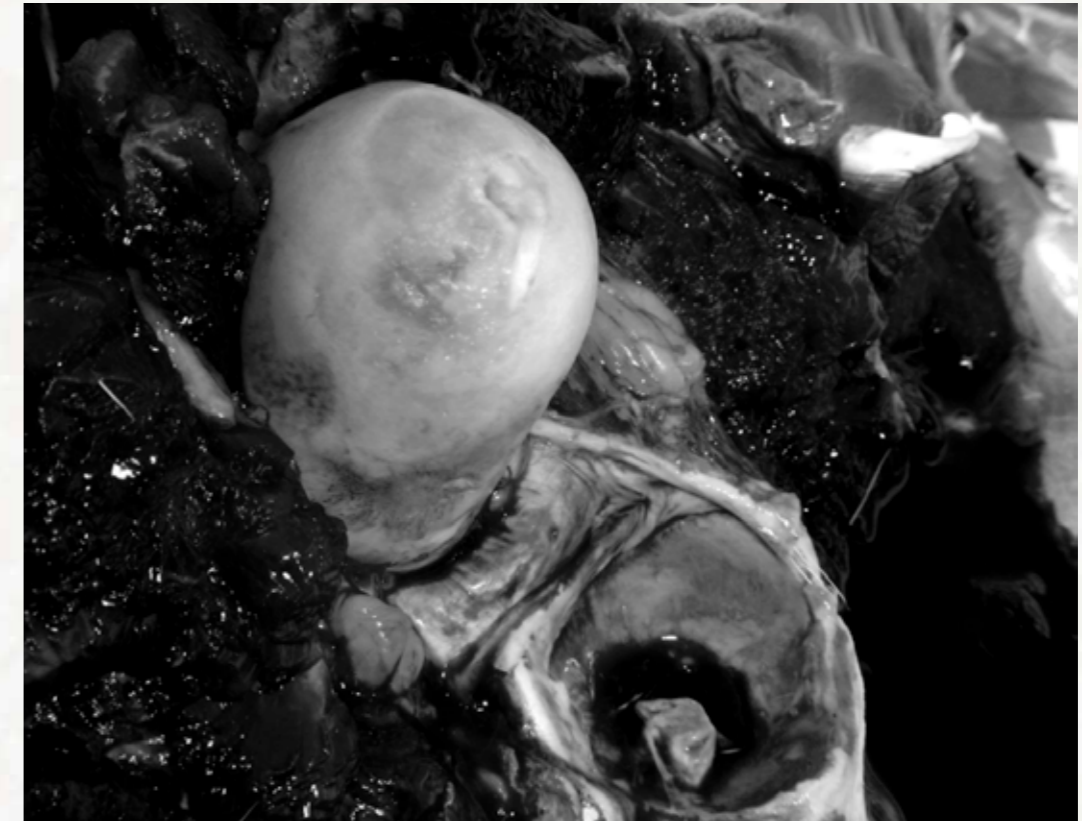


Figure 9: Osteoarthritis lesions on coxofemoral joint in an Arabian oryx - note the eroded cartilages



# PATHOLOGIES NOT REPORTED IN 2013

Even though the following diseases were included in the questionnaire, they were NOT reported in the 2013 survey:

- Anthrax
- Babesiosis
- Botulism
- Caseous Lymphadenitis (Pseudotuberculosis)
- Chlamydiosis
- Leptospirosis
- Tetanus
- Blackleg
- Leptospirosis
- Bovine Tuberculosis
- Paratuberculosis (Johne's disease)
- Toxoplasmosis



# RECOMMENDATIONS



Please refer to previous surveys but also to OIE recommendations.

Control and eradications of infectious animal diseases (including zoonotic diseases) are or should be parts of national and international plans, where strategic, integrated, coherent approaches are key.

Wild animals' populations can also be seen as reservoir for certain of those diseases. It is our responsibility, as veterinarians and as collection managers, to be transparent and increase the understanding and knowledge of those diseases affecting wild animal collections whenever it is possible to give the best information to stakeholders, in order to take appropriate decisions and avoid dramatic ones such as mass culling and ineffective disease control strategies. As of date of publication, we experience an important lack of data on epidemiological aspects of this species.

## Epidemiological risks

We thought important to recall the risk associated with direct or close contact between other livestock species, both domestics and wild and Arabian oryx. Prophylactic measures should be taken every time a new animal enter a collection and should include but are not limited to:

- Pre-transport quarantine with proper health assessment based on clinical examination, complete blood cell count, biochemistry, and serology against main/endemic pathogens prior to departure of the leaving facility. A negative serology doesn't mean the pathogen is absent from the animal and paired sera (two blood samples taken a 1 month apart) can be required. Serological results should always be examined with suspicion and criticism, and compared to the rest of the herd. This is the work of the veterinarian.
- Up to date vaccination at the time of transport, deworming and global anti parasitic treatment.
- At the arrival facility, new comers should be placed in a proper quarantine area, physically separated from the rest of the collection, ideally with dedicated equipment and staff to avoid cross contamination, for a usual minimum of 4 weeks during which they will be serologically assessed and health screened and possibly vaccinated.

Animals will be released from quarantine and put in contact with the rest of the collection AFTER there is good evidence they are free of infectious pathogens.

At minimum, animals to be imported, exported or reintroduced into the wild should be tested for tuberculosis and brucellosis.

Animal reintroduction into the wild should always follow IUCN recommendations, in particular IUCN Manual of Procedures for Wildlife Disease Risk Analysis, freely downloadable at: <http://www.cbsg.org/content/iucn-manual-procedures-wildlife-disease-risk-analysis>

## VACCINATION

To establish a vaccination protocol, the following background information are key:

- Knowing what infectious diseases are circulating, what strains or serotypes are involved in the region
- Oryx' sensitivity to those infectious diseases
- Vaccines available
- Effectiveness of those vaccine and minimized side effects on the oryx.

In wildlife, species in general and Arabian oryx in particular, we lack information on the tools used in routine work and most of vaccination protocols are based on assumptions: we are assuming that the Arabian oryx can be affected by those diseases, but we don't know its role in the transmission of these diseases, we are assuming the vaccines we are using are appropriate and will confer an immunity level good enough to protect the valuable herds. Most of the vaccines we use were designed and tested on domestic livestock and we totally lack scientific evidence of effectiveness on Arabian oryx (and most wildlife species). Collections testing those vaccines and sharing knowledge by writing scientific papers are very few, and it could be an extraordinary community project to list and answer those questions.

Vaccines should at least be manufactured according to the OIE recommendations: Manual of Diagnostic Test and Vaccines for Terrestrial Animals 2014 freely available to all : <http://www.oie.int/en/international-standard-setting/terrestrial-manual/access-online/>

The following recommendations will only focus on updated information. Please refer to the previous disease survey for further recommendations.

### PPR vaccination

PPR vaccine is a live attenuated vaccine. While the disease hasn't been described in the Arabian oryx, we still recommend to vaccinate against it. A recent study published by Sa *et al.* (2013) shows that a locally available vaccine confers an appropriate immunity level, consistent with protection.

### FMD vaccination

While the Arabian oryx is sensitive to this disease, the vaccines available today and according to studies conducted on domestic livestock don't confer a long immune response, and therefore must be injected twice with a month apart and then every 6 months to be effective. This protocol is likely impossible to implement in wildlife collections.

Double Oil Emulsion (DOE) based vaccines seems to provide a longer protection. No cross protection exists between the different serotypes, please refer to the "reported pathologies in 2013" chapter for further information.

### Sheep and Goat Pox Vaccination

The Arabian oryx can be affected by the disease that is enzootic in the region, causing mortality. We can only recommend to vaccinate on a regular basis but we totally lack information on this topic: vaccines are live attenuated and we don't know how safe and effective they are for this species.

### CCPP vaccination

Arabian oryx has been proven to be affected by this disease (see corresponding chapter). Only one case was reported, it is nevertheless important to think about this disease each time we encounter compatible respiratory lesions as it might be largely underdiagnosed. Further studies on CCPP vaccines will be required if more cases of CCPP were to be discovered on the Arabian oryx.

### Enterotoxaemia, Pasteurellosis and Calf diarrhoea vaccinations

Please refer to the previous survey.

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Oman:	Diwan of Royal Court (Office for Conservation of the Environment)
Qatar:	Shahanyah Breeding Center, Almazhabyah Collection
Saudi Arabia:	Saudi Wildlife Authority
United Arab Emirates:	Management of Nature Conservation; Office of H.H. Sheikha Fatima bint Mubarak; Office of H.H. Sheikh Mansour bin Zayed Al Nahyan; Environment Agency- Abu Dhabi (EAD); Warsan Wildlife Division; Zoo \$ Aquarium Public Institution at Al Ain; Al Ajban Trophy Hunting \$ Desert Safai; Tourism Development Investment Company (Sir Bani Yas Island); Dubai Desert Conservation Reserve; Wadi Al Safa Wildlife Centre of Dubai; Breeding Centre for Endangered Arabian Wildlife-Sharjah; Al Bustan Zoological Centre- Sharjah.
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