Arbovirus infections of ruminants in Al-Rub Al-Khali desert

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AL-RUB Al-Khali is a well-known desert in the Arabian peninsula, lying roughly between 44-55°E and 17-22°N. Otherwise known as the ‘Empty Quarter’ it was so-called because it is almost empty of any form of life except for a few nomads and their livestock, and very few species of wild mammals. Historically, it is the homeland of the Arabian oryx (Oryx leucoryx) and other gazelles which have become almost extinct in the area during the second half of this century.

In an attempt to rehabilitate this region with wild mammals, including the Arabian oryx, the Saudi authorities have established a protectorate at Al-Rub Al-Khali in a place called Urig Bani Ma’arid (18° 30’-20°N; 45°-46°15’E), located at the western edge of the desert. It covers an area of 12,000 km² and a core 2200 km² section is strict reserve, from which domestic livestock are theoretically excluded. From early 1995 the Arabian oryx and the Arabian sand gazelle (Gazella subgutturosa marica) have been introduced into the reserve under the supervision of the Saudi National Commission for Wildlife Conservation and Development. To date, some 100 oryx and 200 sand gazelles have been released in the core area and the numbers of sand gazelles have at least doubled at the time of writing this short communication.

The area surrounding the reserve is used by nomadic bedouins, whose livestock are almost isolated from contact with other domestic animals in the country but may come in contact with the wildlife in the reserve. While the wildlife reintroduction has been carried out with disease-free animals, the situation in the domestic animals surrounding the reserve area was unknown. The present study was conducted in an attempt to discover what diseases were present in the area.

One hundred and twenty-seven sheep and goats and 49 camels were screened for serum antibodies against bluetongue (BT) virus, Akabane virus, orf virus and pestes des petits ruminants (PPR) virus. These viruses were chosen because they are common in Saudi Arabia. The sera were inactivated for 30 minutes at 56°C and stored at −20°C before testing.

The agar gel immunodiffusion test (AGID) was performed for the detection of BT and orf virus antibodies. For the latter, the reagents and methodology of Housawi and others (1992), which described by Rossiter and others (1985). The micro serum neutralisation tests (SNT) were employed for detection of PPR virus. For the Akabane SNT, the method of Sellers and Hemman (1981) was followed. The SNT for detection of serum antibodies was based on that of Rossiter and others (1985). The PPR virus used in the study was the Saudi isolate, SAU 1/88 (Abu Elzein and others 1990). The reading of the results was as described by Roositer and others (1985).

Table 1 shows the results of the survey. Of the tested sheep and goats, 83 per cent were positive for BT antibodies and 100 per cent were positive for Akabane antibodies. No antibodies were detected to orf or PPR viruses in the sheep and goat sera.

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TABLE 1: Antibodies against viral diseases in domestic ruminants at Al-Rub Al-Khali

<table>
<thead>
<tr>
<th>Animal species</th>
<th>Number tested</th>
<th>Bluetongue virus</th>
<th>PPR virus</th>
<th>Akabane virus</th>
<th>Orf virus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sheep</td>
<td>127</td>
<td>105</td>
<td>22</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Goats</td>
<td>146</td>
<td>116</td>
<td>30</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Of the camel sera tested, 58 per cent had antibodies against the BT virus while 100 per cent had antibodies against the Akabane virus. No antibodies were detected in the camel sera against PPR or orf viruses.

Inspite of the wide distribution of orf (Housawi and others 1991, Gameel and others 1995, Abu Elzein and Housawi 1998) and the presence of PPR in Saudi Arabia (Abu Elzein and others 1990, Al-Naeem and others 1997), the present results indicate that the surveyed animals had no antibodies against these two contagious diseases, but had a high positive rate against both arboviruses (Akabane and BT).

Before discussing these findings it must be stressed that Al-Rub Al-Khali presents a natural barrier for animals within its zone, so it was not expected that contagious viral diseases could pose a threat to animals within this area. However, the results indicated high activity of the two arboviruses in animals at Al-Rub Al-Khali. This is of interest as the arid conditions of the desert are not ideal for the breeding of the Culicoides species vectors (Lane 1983, Al-Busaidy and Mellor 1991, Mellor 1996). The most probable explanation for such a high arboviral activity is therefore wind-driven, virally-infected arthropod vectors, either from other parts of the Kingdom or from countries around Saudi Arabia. However, the remote possibility of finding small niches of Culicoides breeding sites during favourable climatic conditions cannot be excluded.

Two wind systems prevail over the Arabian Peninsula in winter. One moves from Iran in a north-easterly pattern through the eastern parts of the peninsula and on reaching the eastern coast some of this jet is redirected inland. The second wind system carries dry air from the north west into the northern areas of the peninsula. According to Grant (1983) these two wind systems converge over the sand dunes of Al-Rub Al-Khali. In summer, the south-westerly monsoons prevail, covering most areas of the peninsula including Al-Rub Al-Khali (Takahashi and Arakawa 1981). From this wind system pattern it appears that Al-Rub Al-Khali is a convergence zone for winds blowing from various areas surrounding the Arabian Peninsula. Indeed, these winds could blow virally-infected midges from endemic areas into Al-Rub Al-Khali (Sellers and others 1979). Such midges may establish infection if the appropriate susceptible ruminants are available at the right time. However, to the best of the authors' knowledge, the occurrence of any clinical disease associated with infection by either BT or Akabane virus has not been recorded at Al-Rub Al-Khali.

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References


Abstracts

Serology and pathology of paratuberculosis in sheep

THE sensitivity and specificity of agar gel immunodiffusion (AGID) and ELISA tests for the detection of paratuberculosis were tested in 134 adult sheep culled from flocks with a history of chronic weight loss. The results of the tests were compared with the lesions observed postmortem. Of the 46:3 per cent of the sheep which had any type of lesion, 37-1 per cent had a positive AGID result and 48-4 per cent had a positive ELISA. None of the sheep with no lesions had a positive AGID, but 11-1 per cent of them had a positive ELISA. Different types of lesion were associated with between 0 and 95 per cent positive reactions in the AGID. It is suggested that the high specificity of the AGID should make it a useful tool for obtaining evidence of paratuberculosis in live sheep, and may provide a basis for control programmes in areas where the disease is a serious threat to sheep production.


Vitreous body glutamate in canine glaucoma

VITREOUS body glutamate concentrations were significantly elevated in dogs with breed-related primary glaucoma. Vitreal glycine and vitreal tryptophan were also significantly increased compared with normal dogs. The authors consider that the increased glutamate concentration provides evidence of an ischaemic mechanism for retinal ganglion cell death and optic nerve atrophy in glaucomatous dogs and that the emphasis on reduction of high intra-ocular pressure should be augmented by other therapeutic regimes, such as excitatory amino acid antagonists, N-methyl-D-aspartate subtypes, nitric oxide synthase inhibitors and calcium channel blockers.