Trop. Anim. Hlth Prod. (1983) 15, 139–143

INCIDENCE OF BRUCELLOSIS IN DOMESTIC LIVESTOCK IN SAUDI ARABIA

AHMED I. RADWAN, JOSEPH A. ASMAR, WAYNE M. FRERICHS, SAAD I. BEKAIRI and ABDULLAH A. AL-MUKAYEL

Animal Production and Health Section, Regional Agriculture and Water Research Centre, Ministry of Agriculture and Water, PO Box 17285, Riyadh, Saudi Arabia

SUMMARY

The results of an extensive serological survey for brucellosis antibodies using the standard plate agglutination procedure on 14,000 serum samples from native domestic animals and imported livestock over a five year period are reported. The incidence of brucellosis was highest (11·6%) in small ruminants reared intensively in breeding establishments, next highest (2·6%) in imported animals sacrificed during the Hajj season of 1977 and somewhat lower (1·5%) in local livestock sacrificed during the same Hajj season. The incidence was very low among the following groups of livestock: small ruminants raised on desert ranges (0·5%), small ruminants raised in small groups around individual homes (0·4%) and in commercial dairy herds (0·2%).

INTRODUCTION

Brucellosis, a zoonotic disease caused by various species of the genus *Brucella*, has a world-wide distribution. Several developed countries have succeeded in eradicating this disease and others are well on the way to doing so. At the same time some less developed countries are reporting an increasing incidence of the disease (Alton, 1981). In Saudi Arabia there was some evidence that brucellosis does occur in sheep, goats, cattle and humans. However, the exact incidence and distribution of brucellosis infection within the Kingdom was unknown. The present investigation was conducted during the period 1977 to 1982 to determine the presence of *Brucella* antibodies in domestic animals in Saudi Arabia.

MATERIALS AND METHODS

Serum samples from six major groups of livestock were tested by the standard plate agglutination procedure (Blair, Lennette and Truant, 1970) in which 0·08, 0·04, 0·02, 0·01 and 0·005 ml of serum were mixed with 0·03 ml of the standard *Brucella* plate antigen (made of *B. abortus* strain 1119-3 and obtained from the USDA at Ames, Iowa) and examined for the presence of agglutination. These amounts of serum when mixed with the antigen result in dilutions of 1:25, 1:50, 1:100, 1:200 and 1:400. Agglutinations at the 1:25 dilution are considered non-specific and reported as negative. In the case of cattle and camels reactions at 1:50 were considered inconclusive and at 1:100 or more were classified positive. However, in the case of sheep and goats reactions at 1:50 or greater were considered positive.

The groups of animals were as follows:

1. Local livestock sacrificed at Makkah during the Hajj season of 1977 (1,686 animals).
2. Imported livestock sacrificed at Makkah during the Hajj season of 1977 (4,314 animals).

3. Small ruminants raised on desert ranges at 16 locations in the Kingdom (4,265 animals).
4. Small ruminants raised in small numbers for milk and meat supply in backyards in the Riyadh and Jeddah districts (445 animals).
5. Small ruminants raised intensively in breeding farms at nine locations (1,236 animals).
6. Dairy cattle held in commercial dairies at four locations (2,054 animals).

RESULTS

Of the 14,000 serum samples tested in this survey 305 proved positive in the brucellosis plate test giving an overall incidence of 2·2%.

The incidence according to species and breeds among local livestock sacrificed during the Hajj season of 1977 is shown in Table I. Among the 1,686 samples tested in this group the overall incidence was 1·5%. The highest incidence in this group was among the local zebu-type cattle (3·6%). Local camels were shown for the first time to be infected (2·8%). The majority of sheep and goats tested in this group

TABLE I

Incidence of brucellosis in local livestock sacrificed in Makkah, Hajj 1977

Animal species	Animal breed						Total
	Harri	Najdi	Awasy	Masry	Baladi	Undetermined	
Sheep	415 (0·2)[1]	156 (1·3)	33 (0)	5 (0)	—[2]	—	609 (0·5)
Goats	—	—	—	22 (0)	499 (0·8)	—	521 (0·8)
Cattle	—	—	—	—	413 (3·6)	—	413 (3·6)
Camels	—	—	—	—	—	143 (2·8)	143 (2·8)
							1,686 (1·5)

[1] Number of animals tested (percentage positive).
[2] — Not applicable.

TABLE II

Incidence of brucellosis in imported livestock sacrificed in Makkah, Hajj 1977

Origin of animals	Animal species				Total
	Sheep	Goat	Cattle	Camels	
Australia	671 (0)[1]	—[2]	—	—	671 (0)
India	—	—	15 (13·3)	—	15 (13·3)
Somalia	1,940 (1·3)	1,290 (4·8)	277 (7·2)	10 (0)	3,517 (3)
Sudan	59 (5)	4 (0)	—	48 (4·2)	111 (4·5)
Total	2,670 (1·1)	1,294 (4·8)	292 (7·5)	58 (3·5)	4,314 (2·6)

[1] Number of animals tested (percentage positive).
[2] — Not applicable.

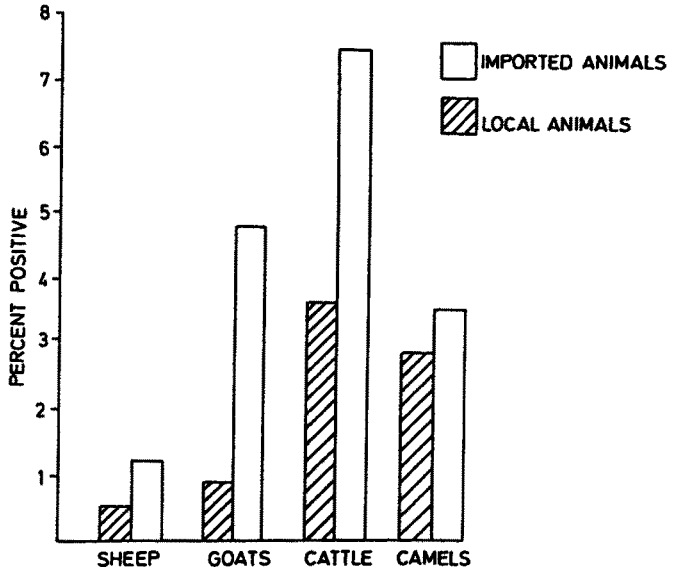

FIG. 1. Comparative incidence of brucellosis among local and imported animals.

were from the Harri and Baladi breeds which are commonly raised on the south-western mountains of the country.

The incidence according to the species and country of origin among imported livestock sacrificed during the Hajj season of 1977 is shown in Table II. The overall incidence was 2·6%. In this group of livestock the incidence was in the following order: 13·3% in Indian cattle; 7·2% in Somali cattle; 5·0% in Sudani sheep; 4·8% in Somali goats; 4·2% in Sudani camels; and 1·3% in Somali sheep.

The comparative incidence of brucellosis among the tested animal species of local and imported animals (which were sacrificed during the Hajj season of 1977) is shown in Fig. 1. The imported animals had a higher incidence than did the local livestock.

Of 4,265 sheep and goats raised on desert ranges at 16 different locations in the Kingdom only 19 animals (0·5%) were positive as shown in Table III. The small ruminants which showed evidence of infection were raised near the borders of the Kingdom (Abha, Jizan and Najran in the south and Al-Jouf, Arar, Tabuk and Hafr Al-Batin in the north).

Table III also shows the incidence of brucellosis among small ruminants raised in backyards in the Riyadh and Jeddah districts (0·8 and 0·0% respectively). The

TABLE III

Incidence of brucellosis in small ruminants and dairy cattle

Livestock group	Flocks positive/ Flocks tested	Animals tested	% positive
Small ruminants/desert	15/267	4,265	0·5
Small ruminants/backyard	2/60	445	0·4
Small ruminants/farms	6/9	1,236	11·6
Cattle/dairies	4/9	2,054	0·2

overall incidence was 0·4%. The group of small ruminants raised intensively on farms had the highest overall incidence (11·6%) when compared with the other groups of tested livestock even though three of the nine farms (224 sheep) had no reactors. Of nine dairy farms tested only four farms in the Al-Kharj area had reactors with an incidence ranging from 0·6 to 3·0%. The overall incidence for this group was 0·2%.

DISCUSSION

Because of the unique situation in Saudi Arabia in which numerous animals are imported within a short time period as potential sacrifices during the Hajj period we were particularly interested in determining the incidence of brucellosis among these animals. The incidence among imported animals was almost twice as great as among local livestock during the same period (2·6% vs. 1·5%) and individual species showed even higher rates of infection (goats 4·8%, cattle 7·5% and camels 3·5%). During the sale of these animals they are held in close contact with local stock and usually those that are not sold during the Hajj season are added to local breeding flocks. Since such animals are not routinely subjected to brucellosis testing the danger of introducing infected animals into the Kingdom is obvious.

However, strict testing and quarantine procedures against imported animals alone will not solve the problem of brucellosis in the Kingdom. It is evident from the results of testing among flocks raised under intensive conditions on farms that brucellosis is already prevalent among local livestock. The incidence of 11·6% in this group of livestock indicates that some attention must be paid to local control and eradication measures also. A model programme to determine if eradication of brucellosis from an infected flock can be achieved is now underway at Haradh, central Saudi Arabia.

The low incidence of brucellosis among flocks raised on desert ranges (0·5%) indicates that such animals do not pose a major threat as sources of infection for other animals. The ecological factors present in such locations (desiccation, exposure to sunlight and mobility of the animals) all work against the survival and spread of *Brucella* organisms (Crawford and Hidalgo, 1977). Nevertheless such ordinary precautions as boiling or pasteurisation of the milk and the use of care in handling and disposing of foetal materials and animal discharges should be maintained in these situations.

Those animals being raised in backyard operations in and around cities also had a low incidence of brucellosis (0·4%) in this survey but the close proximity of the owners and their families to these animals on a day-to-day basis makes them more dangerous than the flocks on range as a source of infection to man. The precautions listed in the previous paragraph are even more important here since the animals are treated almost like pets in these situations.

Although the incidence in commercial dairies was low there were enough reactors to underscore the necessity for importing only tested dairy cattle from brucellosis-free areas and continuing surveillance testing to detect early infection. Since reactors were found on farms where infected sheep and goats were also present it would be advisable not to raise other types of livestock on dairy farms.

ACKNOWLEDGEMENTS

The authors acknowledge with thanks the assistance of Mr Abdullah Al-Zeid, Dr Salah Abu-Shakra, Dr Saleh Al-Muzeni, Dr M. I. Sayour, Dr M. Al-Jamali and

the technical and administrative staff at the directorates of the Ministry of Agriculture and Water throughout the Kingdom. We thank M. A. Hedia, A. Al-Rasheid, S. I. Al-Saudi and N. A. Fadle for technical assistance.

Accepted for publication August 1982

REFERENCES

Alton, G. C. (1981). *World Animal Review, FAO,* **39,** 17–24.

Blair, J. E., Lennette, E. H. & Truant, J. P. (1970). Manual of Clinical Microbiology, American Society for Microbiology, Bethesda, Maryland, USA.

Crawford, R. P. & Hidalgo, R. J. (1977). Bovine Brucellosis. An International Symposium. Texas A&M University Press, College Station, Texas, USA.

INCIDENCE DE LA BRUCELLOSE CHEZ LE CHEPTEL DOMESTIQUE D'ARABIE SAOUDITE

Résumé—Sont présentés les résultats d'une vaste enquête sérologique sur la brucellose portant sur 14000 échantillons de sérum prélevés sur des animaux domestiques et du bétail importé pendante une période de 5 ans. La méthode standard d'agglutination sur lame a été utilisée. L'incidence de la brucellose était la plus élevée (11,6 p. 100) chez les petits ruminants des Centres d'Elevage intensif. Ensuite venaient les animaux importés (2,6 p. 100) sacrifiés pendant la période du Hajj 1977. Enfin, on a trouvé une incidence quelque peu plus faible chez le bétail local (1,5 p. 100) sacrifié la même période du Hajj. L'incidence était très faible parmi les groupes suivants de bétail: petits ruminants élevés sur des parcours désertiques (0,5 p. 100), petits ruminants élevés en petit groupe autour de maisons individuelles (0,4 p. 100) et dans les troupeaux laitiers industriels (0,2 p. 100).

INCIDENCIA DE BRUCELOSIS EN ANIMALES DOMESTICOS EN ARABIA SAUDITA

Resumen—Se describen los resultados de un extenso estudio sobre brucelosis, utilizando la prueba de aglutinación en placa, en 14,000 muestras de suero proveniente de animales nativos e importados, estudio que duró cinco años. La prevalencia de brucelosis fue alta (11·6%) en pequeños rumiantes criados intensivamente, menor (2·6%) en animales importados sacrificados durante la estación Hajj de 1·977 y baja (1·5%) en animales locales sacrificados durante la misma estación. La prevalencia fué muy baja en los siguientes grupos de ganado: pequeños rumiantes criados en el desierto (0·5%), pequenos rumiantes criados cerca de las casas de habitación (0·4%) y en hatos lecheros comerciales (0·2%).