M. Giangaspero ¹D. Tabbaa ²H. Nishikawa ¹E. Vanopdenbosh ³

Epidemiological survey of the Maedi Visna (MV) virus in Syrian Awassi sheep

GIANGASPERO (M.), TABBAA (D.), NISHIKAWA (H.), VANOP-DENSBOSH (E.). Enquête épidémiologique sur le virus Maedi Visna (MV) chez des moutons Awassi de Syrie. *Revue Élev. Méd. vét. Pays trop.*, 1993, **46** (3) : 431-434

Des sérums d'ovins Awassi de toutes les provinces syriennes ont été testés pour rechercher les anticorps du virus Maedi Visna (MVv) par le test d'immunodiffusion en gélose. Quatre vingt-sept animaux sur 1 445 testés ont montré une positivité à la glycoprotéine 135 du MVv soit 6 p. 100. L'infection a été décelée dans la plupart des provinces sauf dans celles, méridionales, de Damas, Konaitra et Sweida. Le mode d'utilisation et la qualité des bergeries ainsi que la pluviosité ont été considérés comme des facteurs influençant la distribution du MVv. L'infection pourrait être en relation avec les pertes de production ovine, et plus spécialement avec la diminution du pourcentage net annuel de survie des moutons (pourcentage de moutons qui ne meurent pas et ne sont pas réformés).

Mots clés : Ovin - Mouton Awassi - Virus Maedi Visna - Epidémiologie - Sérum - Anticorps - Glycoprotéine - Technique d'immunodiffusion - Syrie.

INTRODUCTION

The Maedi Visna (MV) virus infection was reported for the first time in Syria in a small sample of Awassi sheep originating from 3 different locations in the Aleppo province and Euphrates valley. Four sheep out of 73 tested were positive (R.F. SELLERS, W.P. TAYLOR : Investigations on virus diseases of ruminants in Syria, 1978-1981. Animal Virus Research Institute, Pirbright, U.K., unpublished data). In order to obtain a clear picture of the epidemiology of this disease in Syria, a serological survey of antibodies to MV virus was undertaken to determine the prevalence in the thirteen Syrian provinces. The survey encompassed sheep raised both commercially and traditionally. Farmers were interviewed on flock management, productivity and losses referring to the previous year to define possible factors of influence on the epidemiology of the disease and to explore the impact on sheep productivity.

MATERIAL and METHODS

Sample collection

Seventy-three Awassi fat-tailed sheep flocks from the 13 Syrian provinces were sampled from mid-November 1991 until mid-February 1992 (map 1). The number of flocks was chosen according to the animal population of each province (Ministry of Agriculture and Agrarian Reform, Department of statistics, 1991, unpublished data) (table I) and are representative of the livestock production systems in Syria. Lattakia and Tartous provinces were considered together because of their very small sheep populations. Twenty sheep from each flock were selected for sampling, according to the national standard of flock composition (number of rams, ewes and yearlings). All age categories, from 1 up till 9 years were sampled except lambs to prevent interpretation difficulties due to maternal antibodies.

One-thousand-four-hundred-and-forty-five blood serum samples were collected. The sera were stored at -20 °C until examination.

Map 1 : Syrian Arab Republic. Agro-climatic zones (defined by rainfall) :
 IA = + 600 mm. IB = 350-600 mm. II = 250-349 mm. III = + 250 mm in
 1 or 2 years. IV = + 200 mm in 1 or 2 years. V = - 200 mm.
 - : Boundaries of agro-climatic zones ; ... : Province boundaries ;
 * Places of sampling.

1. International Center of Research in the Dry Areas (ICARDA),
POB 5466, Aleppo, Syrie.

2. Al Baath University, Faculty of Veterinary Medicine, Hama, Syrie.

3. National Institute for Veterinary Research (NIVR), Groeselenberg 99, 1180 Brussels, Belgique.

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TABLE I Animal population in the different provinces of Syria (1991) (Values expressed in thousands and percentage).

Province	n	%	Province	n	%
Aleppo	2,370	15.6	Deirzor	2,213	14.6
Edleb	572	3.75	Hasake	2,041	13.4
Hama	1,656	10.9	Damascus	727	4.8
Homs	3,150	20.7	Daraa	421	2.8
Tartous	30	0.2	Konaitra	118	0.8
Lattakia	7.5	0.05	Sweida	182	1.2
Rakka	1,696	11.2			

Agar Gel Immuno Diffusion Test (AGID)

A commercial test kit* for the detection of Maedi Visna antibodies was used. Briefly, WLC-1 Maedi Visna virus strain, growth on ovine foetal lung (OFL) cell culture, sheep reference serum against MV virus gp 135 and a caprine serum precipitating both MVv gp 135 and p 28, positive controls, were used for the execution of the test.

Reading was performed up to 14 days of incubation. Doubtful reactions were retested with 1:2 diluted antigen. Sera that formed lines of non-identity peripheral to the major glycoprotein line were retested using the control serum for both the viral internal protein and external glycoprotein. Curved lines and lines of identity with the control serum lines were considered positive, excluding non-specific reactions.

Statistical analysis

Data were analysed by computing chi-square statistics based on the deviations of the observed proportions from equality. The chi-square tests were based on the relevant degrees of freedom (df).

RESULTS

Using The AGID test, 87 samples out of the 1,445 sera examined were observed to be positive for anti-MV gp 135 immunoglobulins (fig. 1, table II) ; this corresponds to a prevalence of 6 %. Most of the sera showed positive-ness after 24 h of incubation and 13 sera showed a positive reaction during the following two weeks. Seven sera also reacted against MV virus p 28. Porportions of infected sheep were found to increase with age ($P < 0.01$). Seropositiveness was not found in animals older than eight years.

Maedi Visna infection was detected in 24 flocks. Excluding 2 flocks which were heavily infected, having 50 and 75 % respectively of positive animals, the average of ranging from 5 to 35 %.

* Maeditect 1000, Central Veterinary Laboratory, Weybridge, U.K.

Prevalence of MV virus infection was found to vary between provinces (table II). Infection was absent in the Southern provinces of Damascus, Sweida and Konaitra.

Evaluation of possible factors of influence on MV epidemiology showed that the use of folds and their quality as

Figure 1 : Agar-Immuno-diffusion test (AGID). Anti-MV virus antibodies detection in sheep sera. Positive reaction of serum n° 925 (arrow) which have formed identity lines with antisera (small peripheral wells). MV antigen (central well), negative test sera (large peripheral wells).

TABLE II Comparison between different provinces of Syria of the percentage of sheep positive for antibodies to MV virus.

Province	n flocks	n samples	% Positive
Aleppo	14	282	8.5
Edleb	4	86	5.8
Hama	8	157	7.6
Homs	14	282	8.5
Lattakia/Tartous	2	41	12.2
Rakka	7	139	3.6
Deirzor	6	114	6.1
Hasake	11	208	0.5
Damascus	3	58	0
Daraa	2	38	10.5
Sweida	1	20	0
Konaitra	1	20	0

well as rainfall were correlated with the levels of seropositivity. In particular, for animals not sheltered during the night, 7.9 % were MV positive, while animals sheltered in poorly ventilated and humid folds showed 6.07 % positivity compared with 3 % in well sheltered animals ($P < 0.05$). Furthermore, comparison of flocks from the different climatic zones (defined by rainfall) showed that the level of seropositivity to MV was highest in the wettest areas, with more than 600 mm of rainfall per year (9 % in the IA zone) (Map 1) and gradually decreased to 4.07 % in the driest areas (zone V) ($P < 0.01$).

Comparison of the proportions of seropositivity to MV between flocks with different survival rates (*i.e.* annual percentage of sheep not dying or culled) in 1991 (the year prior to sampling), showed a variation of the infection rate ($P < 0.001$). Occurrence of MV infection was highest in flocks with a 8-18 % reduction of survival (53 % of the MV positive sheep).

Similarly, flocks were also compared according to their mortality rate of adults during 1991, which showed a positive relation with the infection rate ($P < 0.001$) ; 77 % of the MV positive sheep belonged to flocks with a mortality rate of 1 to 10 %.

DISCUSSION

Antibodies against the Maedi Visna virus were found in most of the provinces of Syria where serum was collected (table II).

No seropositive animals were found in the three Southern provinces of Damascus, Konaitra and Sweida. This may be related to the fact that these provinces do not lie on the major East-West line of transhumance. The lower livestock movement consequently may relatively reduce the risk of introduction of this disease. The seropositivity found in sheep from the Daraa province may be due to the import of animals from other regions.

Proportions of infected sheep were found to increase with age. This corresponds to the findings of surveys in other countries (3). Mortality or culling explain probably the absence of seropositivity in sheep older than eight years.

The study of possible factors of influence on MV epidemiology showed interesting aspects. Distribution of MV infection appeared to be related to the use of folds and their quality. The stress due to exposure during the night or sheltering in poorly ventilated and humid folds might facilitate the occurrence of the infection. Sheep from the wettest regions, with more than 600 mm of rainfall per year (IA zone), showed the highest prevalence of MV. This aspect remain unclear and needs further evaluation.

The MVv infection could be related to losses in sheep production, especially with a 8-18 % reduction of survival (*i.e.* annual percentage of sheep not dying or culled)

and with a 1-10 % mortality rate among adults. This mortality rate does not represent a relevant finding while it occurs normally in sheep flocks. Nevertheless, it is worthwhile to take into account the estimation of losses due to MVv in previous studies undertaken in other countries. These studies indicate that the losses gradually increased over several years and reached 15-30 % annually in some flocks (7).

CONCLUSIONS

This survey demonstrates that infection with Maedi Visna virus is widespread in Syria. However, the low prevalence reported may suggest the possibility of eradicating the disease, as the pathology caused by the virus is known to adversely affect animal production. The cost effectiveness of control measures must be investigated. As vaccination is not available (2), these measures actually rely on prevention, through serological tests of the initial flocks when sheep originate from another flock (7) and eradication in the flocks, according to the proportion of infected animals :

- test every six months and culling of reactors and their progeny, when the proportion of infected animals is low (1, 4, 6) ;

- isolations and tests in heavily infected flocks, by removing lambs from infected ewes at birth and raising them artificially, and isolated from the infected flock (1, 5).

Once a seronegative flock is established, annual monitoring of the serological status is necessary to assure that the flock remains virus-free (1) and to control any new introduction.

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GIANGASPERO (M.), TABBAA (D.), NISHIKAWA (H.), VANOPDENSBOSH (E.). Epidemiological survey of the Maedi Visna (MV) virus in Syrian Awassi sheep. *Revue Élev. Méd. vét. Pays trop.*, 1993, **46** (3) : 431-434

Awassi sheep sera from all the Syrian provinces were tested for antibodies against the Maedi Visna (MV) virus using the Agar Immuno-diffusion test. Eighty-seven animals out of 1,445 tested, showed positiveness (6 %) to MV glycoprotein 135. The infection was detected in most provinces except in the Southern provinces of Damascus, Sweida and Konaitra. Use and quality of folds and rainfall were considered as factors influencing Maedi Visna distribution. The infection could be related to losses in sheep production and especially to the reduction in survivability (*i.e.* annual percentage of sheep not dying or culled).

Key words : Sheep - Awassi sheep - Maedi Visna virus - Epidemiology - Sera - Antibody - Glycoprotein - Immunodiffusion test - Syria.

GIANGASPERO (M.), TABBAA (D.), NISHIKAWA (H.), VANOPDENSBOSH (E.). Encuesta epidemiológica del virus de Maedi Visna (MV) en ovejas Awassi sirias. *Revue Élev. Méd. vét. Pays trop.*, 1993, **46** (3) : 431-434

Con el fin de detectar anticuerpos anti virus de Maedi Visna (MV), se examinaron sueros de ovinos Awassi procedentes de todas las provincias sirias, mediante el test de inmunodifusión en agar. Ochenta y siete animales, de los 1 445 examinados, presentaron resultados positivos (6 p. 100) a la glicoproteína 135 del MV. Se detectó la infección en la mayoría de las provincias excepto en las meridionales : Damasco, Sweida y Konaitra. El uso y la calidad de forraje y la pluviosidad han sido considerados como factores que influyen la distribución del MV. La infección podría estar relacionada con pérdidas en la producción ovina, especialmente en la reducción de la supervivencia (por ejemplo, el porcentaje anual de ovejas que no mueren o van al matadero).

Palabras claves : Ovino - Oveja Awassi - Virus de Maedi Visna - Epidemiología - Suero - Anticuerpo - Glicoproteína - Test de inmunodifusión - Siria.