



A SEROLOGICAL SURVEY OF BOVINE HERPESVIRUS-1 INFECTION IN SELECTED DAIRY HERDS IN NORTHERN AND CENTRAL ITALY

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Abstract—Serum samples from a total of 6979 dairy cattle from 55 herds in northern Italy (51 herds) and central Italy (4 herds), were examined by the serum neutralization test for the presence of antibody to bovine herpesvirus-1 (BHV-1). It was found that 84.31% of the farms selected in northern Italy and all the farms from central Italy had seropositive animals at titers of 1:4 or higher. The prevalence of infection was essentially the same among the cattle populations of the two selected areas of the country, being of 34.99% in the north and of 38.65% in central regions. A comparison of the data from the present study with those obtained in a serological survey conducted in Italy in 1966, shows that the rate of seropositive cattle to BHV-1 has increased by about 5.0% in the last 30 years. Published by Elsevier Science Ltd

Key words: Serological survey, cattle, bovine herpesvirus-1.

Résumé—On a examiné, au moyen du test de sero-neutralisation portant sur la présence d'anticorps à l'herpesvirus-1 du bovin (BHV-1), des échantillons de sérum prélevés sur 6979 vaches laitières appartenant à 55 troupeaux, dont 51 en Italie du nord et 4 en Italie centrale. On a relevé la présence d'animaux séropositifs-a des titres de 1:4 ou davantage-dans 84.31% des fermes sélectionnées en Italie du nord et dans toutes les fermes de l'Italie centrale. Quant à la fréquence de l'infection, elle a été à peu près équivalente pour les populations bovines provenant des deux zones sélectionnées: 34.99% dans le nord et 38.65% dans le centre. Il ressort, d'une comparaison entre les résultats de cette étude et ceux obtenus lors d'une étude sérologique menée en Italie en 1966, que le taux de bétail présentant une séropositivité au BHV-1 a augmenté d'environ 5.0% au cours de ces 30 dernières années. Published by Elsevier Science Ltd

Mots clefs: Etude sérologique, bétail, herpesvirus-1 du bovin.

INTRODUCTION

The prevalence of infection with bovine herpesvirus-1 (BHV-1) and the economic losses that it can cause have resulted in several countries considering the eradication of this infection from their cattle herds. At present, elimination of the infection depends on serological testing and the removal of serologically positive cattle. Indeed this approach has been successful in Denmark, Switzerland and Austria, where cattle populations are relatively small and movement of identifiable animals is limited.

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Table 1. A serological survey of *Bovine herpesvirus-1* in cattle from selected farms in northern and central Italy.

Region	No. of farms selected	No. of Farms with seropositive animals ($\geq 1:4$)	
		No.	%
North	51	43	84.31
Central	4	4	100.00
TOTALS	55	47	85.45

As a preliminary to any eradication programme that might involve annual vaccination and the gradual elimination of latently-infected cattle [1], a seroepidemiological study to determine the prevalence of infection would be essential. The survey reported here was undertaken to ascertain the level of infection in cattle in northern and central Italy. With the aim of achieving a representative survey, farms were selected that had no history of recent vaccination against BHV-1; some in the north of Italy, where there is a large cattle population, and others in the central area with a smaller cattle population.

MATERIALS AND METHODS

Sera

Sera were obtained from 6979 milking cows distributed in 55 herds, 51 of which were located in northern Italy (Lombardia) and 4 in central Italy (Marche and Lazio). The sera were frozen after collection and stored frozen after testing, for further serological study.

Serology

The serum neutralization (SN) test was used for the study reported. It was carried out in 96-well microtiter plates using the strain LA* of BHV-1 at its 50th passage level in bovine embryo kidney (BEK) cells. Each serum was diluted in 2-fold steps from 1:4 through 1:16 in minimum essential medium (MEM), using one well for each dilution of serum. To each of the latter was added 100 tissue culture infectious doses₅₀ (TCID₅₀) of BHV-1. Following incubation at room temperature (22°C), BEK cells suspended in MEM containing 5% by volume of fetal calf serum were mixed with each serum-virus mixture in a volume of 0.05 ml giving a concentration of approximately 20,000 cells per well. Titers were expressed as the highest dilution of each serum giving complete neutralization.

RESULTS AND CONCLUSIONS

The results that are shown in Tables 1 and 2 indicate that BHV-1 infection is widespread throughout the 55 dairy farms selected for this study. From Table 1 it can be seen that

*The strain LA of BHV-1 has been kindly supplied by the late Dr. D.G. McKercher in 1961, from the University of California, Davis, CA.

Table 2. A serological survey of *Bovine herpesvirus-1* in a number of farms selected in northern and central Italy.

Regions	No. of farms	No. of serums	Positive Serum $\geq 1:4$		1:4		Titers 1:8		$\geq 1:16$	
			No.	%	No.	%	No.	%	No.	%
North	51	6,415	2,245	34.99	1,073	47.79	742	33.05	430	19.15
Central	4	564	218	38.65	108	49.54	79	36.23	31	14.22
TOTALS	55	6,979	2,463	35.29	1,181	47.94	821	33.33	461	18.71

84.31% of the farms sampled in northern Italy and all the 4 farms from central Italy, had seropositive animals with titers 1:4 or higher.

It is also evident from the results that the prevalence of the infection is essentially the same among the cattle populations of the two selected areas of the country, being 34.99% in the north and 38.65% in the central regions.

In a previous serological survey of BHV-1 carried out in 1966 [2], which involved 1392 sera obtained from several slaughter houses in different regions of Italy, the prevalence of neutralizing antibody to BHV-1 was 8.1%, 4.4% and 30.4%, for calves, heifers and adults, respectively. So, in the last 30 yr, if we can consider this survey as a model of the present situation in Italy, the rate of seropositive adult cattle has increased by about 5.0%, i.e. from a prevalence in adult animals of 30.4% in 1966 to a prevalence of 35.29% in 1996 (Table 2).

A general picture of the prevalence of BHV-1 infection in several countries on three continents, has been given in a review by Straub [3]. For the countries quoted the prevalences of seropositive cattle varied from 14.3–60.0% in Africa, 36.6–48.0% in Central and South America and 5.6–76.1% in Europe.

The percentage of seropositive adult dairy cows in the Netherlands was reported in 1994 [4] to be 49.0% (1st calf cows), 63.0% (2nd calf cows) and 91.0% (older cows). In Bavaria the figure of seropositive adult cows, also in 1994, has been given as 33.5% [5].

The worldwide distribution of BHV-1, its prevalence in cattle populations and the serious impact it can make on the livestock industry, identify it as one of the most important infectious agents with which the veterinarian and the livestock owner have to contend. In countries with large cattle populations the prospects for controlling infections of BHV-1 or eradicating the virus from cattle do not seem encouraging. However, one of the approaches that has been proposed, which might hold the best possibility, is for an immunisation programme using a vaccine to control the disease, in parallel with a diagnostic test that could differentiate vaccinated cattle from latent carriers of the virus [6]. In this way it should be possible, over time, to achieve a population of immunised cattle and at the same time eliminate those carrying wild strains of BHV-1.

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