



Short Communication

Frequency of Antibodies against Bovine Leukosis Virus in Bulk Tank Milk

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ABSTRACT

Objective. To determine the presence of anti-BLV antibodies in samples from bulk tank milk from several Colombian states. **Materials and methods.** Out of 2220 samples arriving to the quality milk laboratory from the University of Antioquia in a fortnight period from the month of may 2016, 329 were randomly selected according to the number of samples per each one of the 7 states participating in the study. These samples were run through ELISA test for anti-BLV antibodies. **Results.** The main result of this random analysis of milk tanks in search of antibodies against BLV was the positivity of the farms in ranks ranging from 57 to 100%; the approach to this bovine health problem in Colombia is possible through the tank milk samples that routinely reach the quality analysis laboratories. **Conclusions.** The infection with BLV is present in Colombia, the establishment of control programs could be done taking advantage of the samples of milk that are sent routinely to the laboratories accredited for payment.

Keywords: ELISA, milk bulk tank, farm, Colombia, Quality Milk laboratory (Source: AGROVOC).

RESUMEN

Objetivo. Determinar presencia de anticuerpos contra VLB en muestras de leche de tanques, en varios departamentos de Colombia. **Materiales y métodos.** De 2220 muestras llegadas al laboratorio de calidad de la leche de la Universidad de Antioquia para análisis de calidad para pago de una quincena en el mes de mayo de 2016, se seleccionaron 329 al azar y de manera ponderada según el número de muestras disponibles para cada uno de los 7 departamentos participantes. Estas muestras fueron sometidas a la prueba de ELISA para determinar la presencia de anticuerpos contra VLB. **Resultados.** El resultado principal de este análisis al azar de tanques de leche en busca de anticuerpos contra BLV, fue la positividad de los predios en rangos que oscilan entre el 57 y el 100%; el abordaje de este problema de salud bovina en Colombia es posible mediante las muestras de leche de tanque que rutinariamente llegan a los laboratorios de análisis de calidad. **Conclusiones.** La infección con BLV está presente en Colombia, el establecimiento de programas de control se podría hacer aprovechando las muestras de leche que se envían de rutina a los laboratorios acreditados para pago.

Palabras clave. ELISA, predio, Colombia, laboratorio calidad de leche, tanque leche (Fuente: AGROVOC).

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INTRODUCTION

Enzootic bovine leukosis is caused by bovine leukosis virus (BLV) and is of economic importance (1) because affected animals die or have to be prematurely discarded due to their low production, rendering the meat unmarketable due to the presence of lymphosarcoma (2). Additionally, researchers have detected this virus in human mammary tissue, although the zoonotic potential of the virus has not been clearly evaluated (3,4).

The prevalence of this disease in North America has increased up to 90% in Canada (2) and 94.2% in the USA (5). In Argentina, the frequency of this disease in dairy herds was 84% in 2001 (6), while in Peru, a 92.7% seroprevalence was recorded within a single dairy herd in 2015 (7). In 2016, several studies in Colombia that tested blood serum reported frequencies of 3.9%–73% across regions (8-12).

Europe has successfully eradicated this disease by analyzing bulk tank milk samples, which is a simple, cost-effective, and noninvasive method. This method can be used for epidemiological and eradication monitoring (13). The objective of this study was to determine the frequency of anti-BLV antibodies in bulk tank milk samples across several departments in Colombia.

MATERIALS AND METHODS

Type of study: A cross-sectional study was performed to determine the frequency of anti-BLV antibodies in multiple dairy farms. From the 2200 samples submitted in a fortnight for quality analyses, 329 samples from seven departments were analyzed with an error margin of 5% and a confidence level of 95%.

Sample distribution per department was calculated considering the percentage of samples received within a fortnight from each department. Thus, 55% of the samples were sent from the department of Cundinamarca, 12% from Meta, 11% from César, 7% from Antioquia, 4% each from Boyacá and Nariño, and 3% Valle (Table 1).

Ethics: For confidentiality purposes, company names, dairy farm names, and ELISA test results are not shown. This study was performed after obtaining informed consent and with the participants' confidentiality.

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Laboratory methods: We used an indirect ELISA test, Leukosis Milk Screening Ab (IDEXX®), which detects the prevalence of anti-BLV antibodies in milk. Absorbance was measured with a

spectrophotometer at 450 nm using X-Check Plus software, and it was expressed as percent positivity (M/P%), which was calculated as follows: $\text{sample OD} / \text{positive control mean OD} \times 100$, where OD refers to optical density. Samples with an M/P value $\leq 60\%$ were considered negative, those with an M/P value $>60\%$ but $<70\%$ were classified as inconclusive, and those with an M/P value $>70\%$ were classified as positive. Even though the manufacturer reports the test's specificity to be 98.8%, they do not specify the sensitivity because of the difficulty of obtaining true positive serums.

Table 1. Distribution of the percentage of sampled farms by department

Department	Total number of farms	Percentage of farms
Antioquia	26	7.9
Boyacá	13	4.0
César	39	11.9
Cundinamarca	184	55.9
Meta	42	12.8
Nariño	14	4.3
Valle	11	3.3
Total	329	100

Statistics: Descriptive statistics were calculated using SPSS version 24 licensed to the University of Antioquia (Table 2).

RESULTS

Overall results and results per department:

The number and percentage of anti-BLV antibody-positive farms across departments are shown in Table 2. It is remarkable that all the departments in this study tested positive.

Table 2. Frequency of anti-bovine leukosis virus (BLV) antibodies across the departments.

Department	Total number of Farms	BLV positive farms	Percentage of positive farms	BLV negative Farms	Percentage of negative farms
Antioquia	26	25	96	1	4
Boyacá	13	9	69	4	31
César	39	39	100	0	0
Cundinamarca	184	163	89	21	11
Meta	42	24	57	18	43
Nariño	14	11	79	3	21
Valle	11	10	91	1	9
Total	329	281	85	48	15

DISCUSSION

The main result of this study was the widespread of anti-BLV antibodies in farms (57–100%). This is consistent with the reported BLV seroprevalence in Colombia (8-12), although the percentages of positive samples were larger in our study. In the USA and Canada, studies using bulk tank milk samples reported frequencies larger than the mean frequency reported here (2,5).

Given the exploratory nature of this study, we should be cautious when making inferences. However, we believe that it is evident that the bovine health issue in Colombia can be addressed using bulk tank milk samples that are routinely submitted to milk quality laboratories. This method was previously analyzed by Reber et al (13), who concluded that using bulk tank milk samples improves the flexibility of control and monitoring programs, that monitoring intensity can be improved, and that recently infected dairy farms can be promptly detected (13). Moreover, other studies suggested that the ability to geographically track BLV using bulk milk tanks could contribute to the effective eradication of the disease. The first steps of a control program involve establishing the frequency of antibodies; according to previous studies (14,15) bimonthly tank testing followed by

appropriate sanitary measures could help eradicate this disease within 10 years (14).

It is important to note that the tanks contain milk from cows milked on that day. This implies that dry cows, sick cows, and cows that recently delivered were not sampled; therefore, sampling should be performed bimonthly (13). The authors developed a model or algorithm to estimate the number of infected cows in each farm with some precision (14, 15).

This pilot study was the first of its kind in Colombia to be conducted with prior consent. We suggest implementing this method to establish a national control program for BLV infection.

Conflicts of interests.

The authors declare no conflicts of interest.

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