ASSESSMENT METHODOLOGY OF THE INTRADERMAL TUBERCULOSIS SKIN TEST PERFORMED IN CATTLE BY FIELD PRACTITIONERS

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SUMMARY

A questionnaire-based epidemiological inquiry allowed collecting data related to skin test practices in a country. An assessment methodology of skin test practices based on the opinion of international experts in the field of bovine tuberculosis was elaborated. This methodoldy could be applied to other regions/countries or to assess the surveillance programme of other diseases.

INTRODUCTION

Bovine tuberculosis (bTB) remains of great concern in the world, in particular in the European Union despite the implementation of eradication programs. This study aimed to elaborate a useful and original assessment methodology of the current situation of skin test practices in different regions or in a country, on the basis of an anonymous epidemiological questionnaire. The first objective was to collect informations available on skin test practices by mean of a questionnaire. The second objective was to compare the answers with predefined notes assigned to each questionnaire by reference to standardised answers provided by international experts in the field of bTB.

RESULTS

Veterinary practitioners participated at a rate of 18.3%. A significant correlation was found between the number of answers and the number of veterinarians per province (Pearson's correlation coefficient of 0.96, with $P < 0.0001$), so the participation was considered as being representative for the different provinces. Missing data were homogeneously and proportionally split between WAVT and FLVT. According to the first scenario (distribution of global notes with imputation for missing data), the mean of FLVT (Mean : 21.66 ; IC 95% : 20.80 – 22.54) and WAVT global notes (Mean : 21.02 ; IC 95% : 19.72 – 22.39) did not differ significantly. In the second scenario (mean note without imputation for missing data), the distribution parameters of the mean note for FLVT (*Bootstrapped quantile regression distribution* ; mean : 0.72 ; percentile 25 : 0.60 ; median : 0.70 ; percentile 75 : 0.83) and for WAVT (*Bootstrapped quantile regression distribution* ; mean : 0.70 ; percentile 25 : 0.57 ; median : 0.70 ; percentile 75 : 0.80) were not significantly different. Before weighting the scores, no significant difference was observed whatever the scenario and the category of items used. After weighting the scores, significant differences were observed between the two regions for three categories of criteria: materials, reading of the response and other epidemiological aspects.
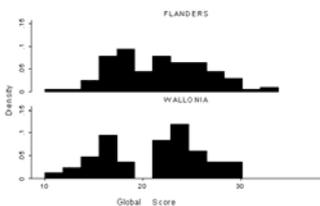

Figure 1a : Density of individual global scores which estimate the skin test strategy to detect bTB in Flanders ($N = 111$) and Wallonia ($N = 46$)
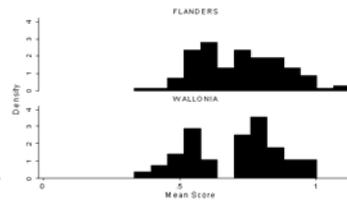
Figure 1b : Density of mean score which estimate the skin test strategy to detect bTB in Flanders ($N = 111$) and Wallonia ($N = 46$)

DISCUSSION

The weighting of scores allowed a correct identification of potential differences between regions and should be advantaged. It seems necessary to harmonize tuberculin test practices at the country level. No veterinarian summed a null score: a new veterinary manual summarizing recommendations for 'good skin test practices' could be suggested to the sanitary authorities. The study could be repeated in the future in the same country to check the improvement of practices and also in other countries (multicentric study) to evaluate the suitability of the proposed assessment methodology in order to insure confidence in the trade of living animals.

ACKNOWLEDGEMENTS

MATERIALS AND METHODS

The questionnaire was pretested ($N=10$ vets) and included items related to the performance of the skin test. It was further dispatched to Belgian veterinary bovine practitioners ($N=859$). The participation of vets was on a voluntary basis. International experts in the field of bTB were also asked to fill the questionnaire and to specify the standard (ideal), acceptable and unacceptable answers ($N=5$). A scoring scale was then built: for each item, a score of 0 was recorded for the standard answer, a score of 1 for an acceptable answer, whilst a score of 2 was given to an unacceptable answer. Furthermore, experts ($N=11$) were asked to weight the questionnaire's items according to their possible impact on the risk of no-detection of reactors.

The performance criteria ($N=30$) were classified into five categories: materials, injection procedure, reading of the response, particular aspects applicable in case of purchase and others epidemiological aspects (e.g., skin-testing of animals suffering from a chronic pneumonia resistant to a classical treatment), as illustrated in Table I. A global note was calculated for each participant. Given the guaranteed anonymity, only the region of the respondent (Flanders or Wallonia) was available as spatial information. The situation between both regions of the country was compared (Flemish [FLVT] *vs.* Walloon veterinarians [WAVT]) before and after weighting the scores using two scenarios in each case: first scenario with imputation (each missing value was replaced by a score of 2 corresponding to the worst case scenario, assuming the absence of answer meant masking an unacceptable answer) and second scenario without imputation for missing values.

Statistical analyses

A Pearson's correlation coefficient was calculated to evaluate the provincial representativeness (geographical origin). Differences were considered as significantly different for $P \leq 0.05$. In the first scenario, the comparison between the distribution of global notes (FLVT *vs.* WAVT) was assessed by use of a Poisson regression model. Nevertheless, as extra-binomial variability was observed, the Poisson regression was left aside and a negative binomial regression was applied. In the second scenario (average scores), the comparison between both regions was assessed by mean of a boostrapped quantile regression distribution, an iterative method allowing the estimation of the parameters of interest on the basis of a handing-over sampling. All statistical analyses were carried out in STATA/SE 10.1.

Table I. Single intradermal tuberculin test (SIT) scoring table elaborated on the basis of (inter-)national experts' opinion ($N = 5$) and total of points obtained for each criteria ($N = 11$ experts)

Items of the questionnaire	0 (Standard)	1 (acceptable)	2 (not acceptable)	Points
A. MATERIAL				
1. Tuberculin conservation methods (in general)	Off light, 3-8°C	—	Other answers	70
2. Tuberculin conservation in vehicle	Icebox 4°C	—	Other answers	25
3. Mean tuberculin conservation delay in the vehicle before use	1 day	3-5 days	> 5 days	47
4. Percentage of use of tuberculin doses	90 to 100%	80 to 89%	< 80%	12
5. Tool of injection	Manual syringe	Dermojet, automatic syringe	—	21
6. Use of a syringe previously filled with a tuberculin carpule	No	Yes	—	17
7. Use of a dermojet previously filled with a tuberculin solution	No	Yes	—	17
8. Cleansing/disinfection of SIT material	Cleansing+Disinf.	Disinf. or cleansing	Nor cleansing nor disinf.	28
9. Frequency of cleansing/disinfection of SIT material	After each herd	Once a week	Less often than once a week	25
10. Frequency of needle replacement (syringe)	After each herd; if broken	Once a week	Others	20
11. Frequency of dermojet revision	Yearly	If defective	Others	22
B. INJECTION				
12. Use of avian tuberculin	Never	Occasionally**	Often	36
13. Site of injection	Neck	—	Caudal fold, other	51
14. Shaving of the site of injection	—	Yes	No	22
15. Clipping of the site of injection	Yes	No	—	24
16. Use of scissors to clip the hair of the site of injection	Yes	No	—	44
17. Checking for the absence of swelling or lesion before injection	Yes	—	No	45
18. Evaluation of the skin fold before injection	Spring cutimeter or Slide caliper	Palpation or visual observation	—	48
19. Post-injection verification (formation of a pea-like swollen area)	Yes	—	No	75
C. READING OF THE RESPONSE				
20. Type of reading of the response	Quant. + Qual.; Quant.	Qual.; palpation	Visual observation	94
21. Mean delay of reading of the response	72 hours	—	—	58
22. Isolation of a test-reactor and/or –suspect	Yes	—	No	23
23. Delay of warning of the Authority	Immediately	12 to 24 hours	> 24 hours	33
D. SIT AT PURCHASE				
24. Systematic checking of the animal's identification when skin-tested at purchase	Yes	—	No	42
25. Isolation at purchase, until reading of the response	Yes	—	No	19
26. Systematic SIT at purchase	Yes	—	No	53
27. Repetition of SIT if test-suspect at purchase	Yes	No§	—	42
E. OTHERS				
28. Minimal age of calves for carrying out a skin test	6 weeks	< 6 weeks	> 6 weeks	23
29. SIT if steroidal anti-inflammatory treatment	No*	—	Yes	42
30. SIT if chronic pneumonia (resistant to classical TTM)	Yes	—	No	37