

AN EVALUATION OF THE COMPARATIVE CERVICAL TEST IN DEER
Carter, C.E. Corrin, K.C. de Lisle, G.W. Kissling, R.C.

In 1985 178,788 New Zealand deer were tested using the standard tuberculin test (2 mg/ml bovine PPD, Commonwealth Serum Laboratories, Melbourne, Australia). There were 2,594 (1.45%) reactors. It is estimated, on the basis of the sensitivity and specificity of the test, that the true prevalence of tuberculosis (Mycobacterium bovis) in farmed deer is 0.5%.

The occurrence of false positives has caused many farmers to lose confidence in the standard test (ST). However, the introduction in March of this year of the comparative cervical test (CCT), a supplementary test to the ST, will increase the specificity of testing and make the voluntary accreditation scheme more acceptable.

The CCT may be used on deer with positive ST results when the herd of origin has no evidence of tuberculosis or has a history of nonspecificity.

This paper examines:

- a. The sensitivity and specificity of the CCT.
- b. Suppressive effects of the standard test on the CCT.
- c. The repeatability of skin measurements.

Sensitivity and Specificity of the CCT

Sensitivity

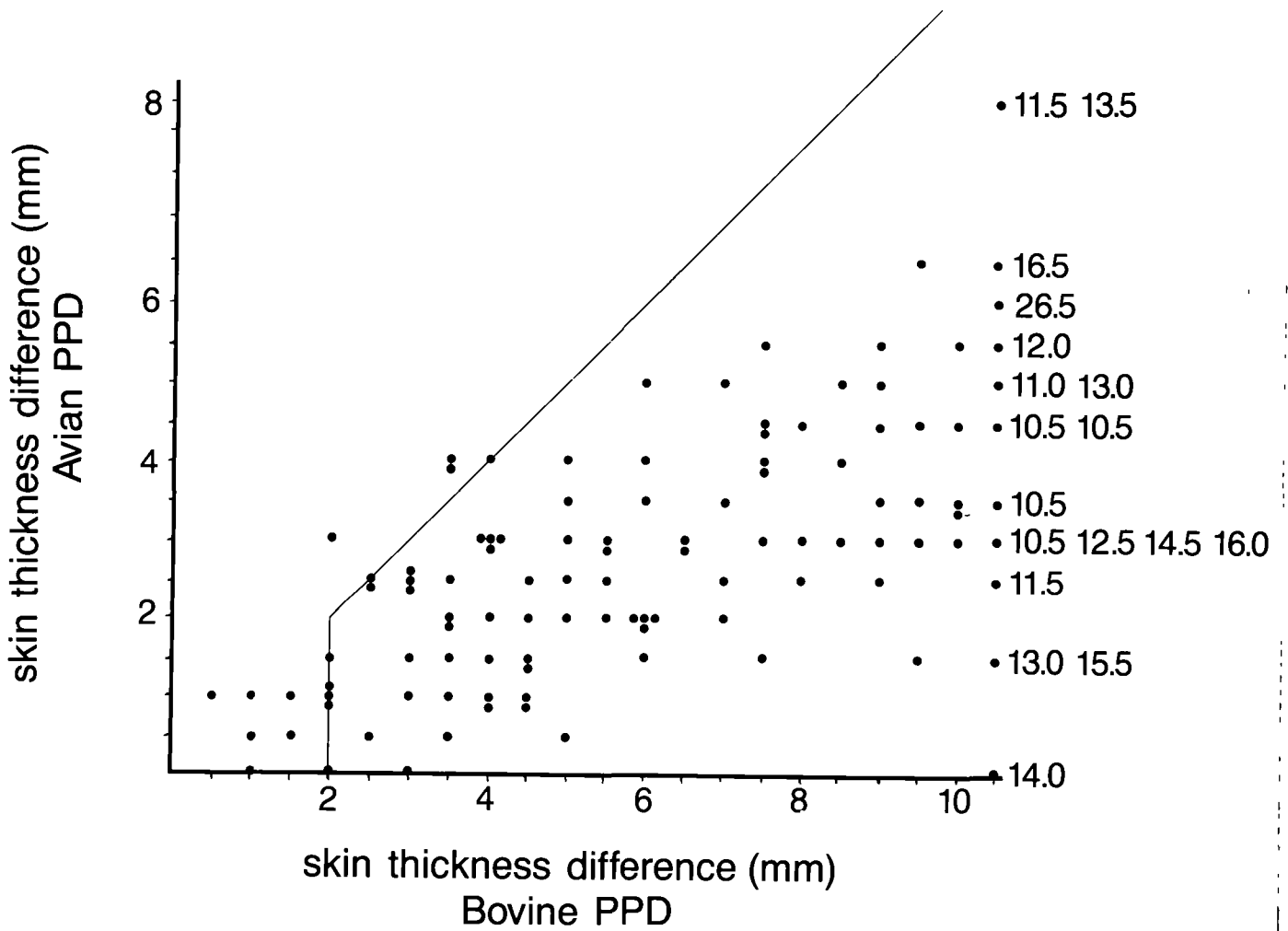
Castrated stags inoculated with M. bovis were tested using the CCT as described previously (1). Figure 1 shows the CCT results when the time between the ST and CCT was at least 120 days. Ninety two percent of tests were classed as **bovine positive reactions**; that is, they had a skin thickness difference (STD) at the bovine site of 2 mm or more and were equal to or greater than the avian STD. Hence the sensitivity was 92%.

As for the ST with a sensitivity of 95% under experimental conditions, the estimate of sensitivity for the CCT of 92% is higher than can be expected in the field, and possibly reflects the ideal conditions experienced at Flock House and the use of inoculated animals.

The sensitivity of the ST based on field experience is 85%, and because bovine reactions of less than 2 mm are ignored in the CCT then the latter should have a lower sensitivity than the ST, say 80%. If the standard and comparative tests are used sequentially, then the overall sensitivity will be less than that of the ST:

$$\text{i.e. } 0.85 \text{ (sensitivity ST)} * 0.8 \text{ (sensitivity CCT)} = 0.68 \text{ (68\%).}$$

Figure 1 Results of a CCT applied to tuberculosis-infected deer tested at least 120 days previously



Specificity

The CCT was evaluated in commercial deer herds which had been tested regularly for more than 18 months with no evidence of M. bovis but had a history of nonspecific sensitisation. The test was applied to 2 populations:

1. Deer which had been positive to a ST applied 60 or more days previously.
2. Deer which had been negative to a ST applied 60 or more days previously, and deer which had not been tested previously.

Deer in the first group were retested with the CCT and the results of 449 tests on 35 properties are shown in Figure 2. Only 8 (1.78%) deer showed positive bovine reactions.

Of 1,157 deer from 17 properties in the second group, 15 (1.3%) showed positive bovine reactions. The positive CCT reactions from populations 1 and 2 are shown in Table 1. There is no evidence that the herds with these positive reactions were infected with M. bovis. Hence the specificity of the CCT under trial conditions was approximately 98.5%.

Table 1: The positive bovine reactions recorded in the CCT from herds with a history of nonspecificity

REACTION SIZES		DEER PER GROUP		TOTAL DEER
Bovine STD (mm)	Avian STD (mm)	Gp 1	Gp 2	
2	0	0	2	2
2	1	0	3	3
2	2	8	7	15
3	2	0	3	3
TOTAL		8	15	33

The specificity of the ST in the national herd is approximately 99%. However, in herds with nonspecific sensitisation the specificity may be considerably less, and retesting with the CCT will increase the specificity.

Suppression of Skin Reactivity

The full discriminatory power of the CCT can be expressed only when it is not affected by the previous ST (2). Reaction sizes to bovine PPD in infected deer were seen to be reduced significantly when the deer had been tested with the ST 28 days previously (1).

The 28 and 60 day retest intervals for the ST and CCT have been compared with a CCT given to infected deer that had a tuberculin test at least 120 days previously (Table 2 & Fig 3).

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Figure 2 Scatter diagram of the CCT reactions of 449 deer which were positive to the ST but not infected with *M. bovis*

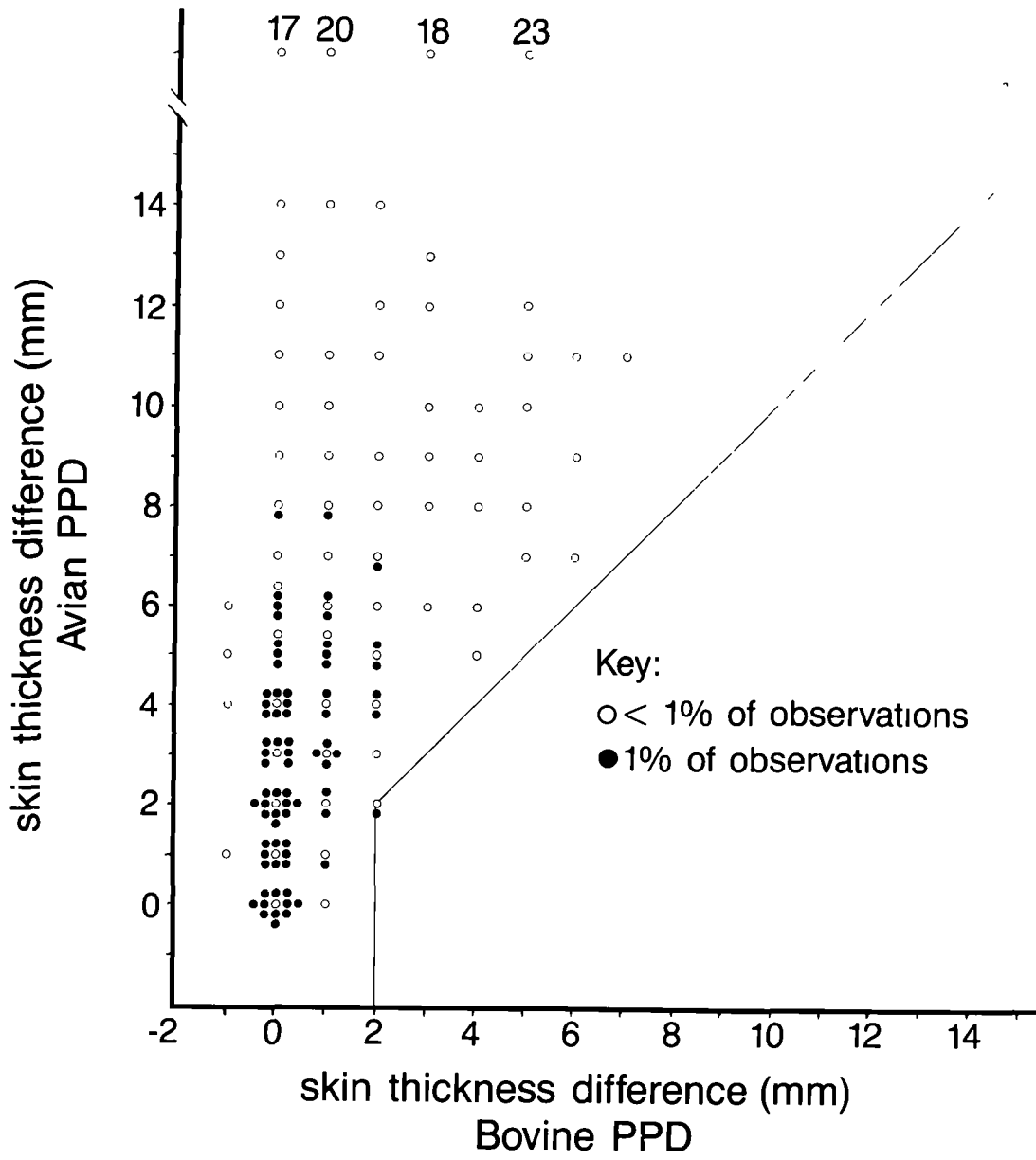


Figure 3 Results of a CCT applied to 3 groups of tuberculosis-infected deer tested according to the following schedule:

group 1 — tuberculin test applied at least 120 days previously

group 2 — ST 28 days previously

group 3 — ST 60 days previously.

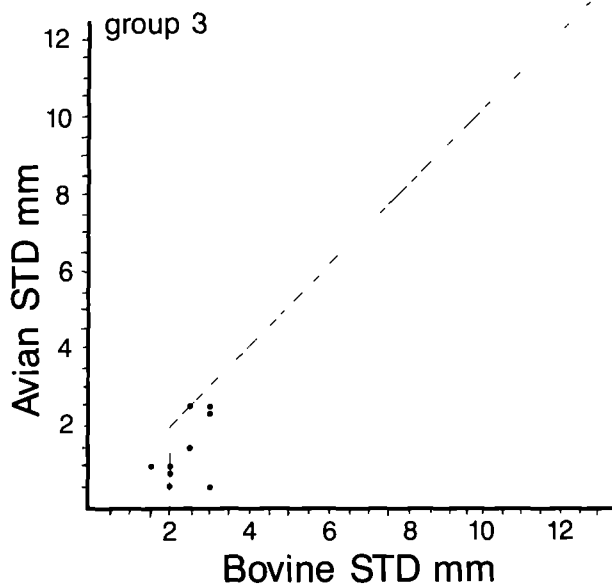
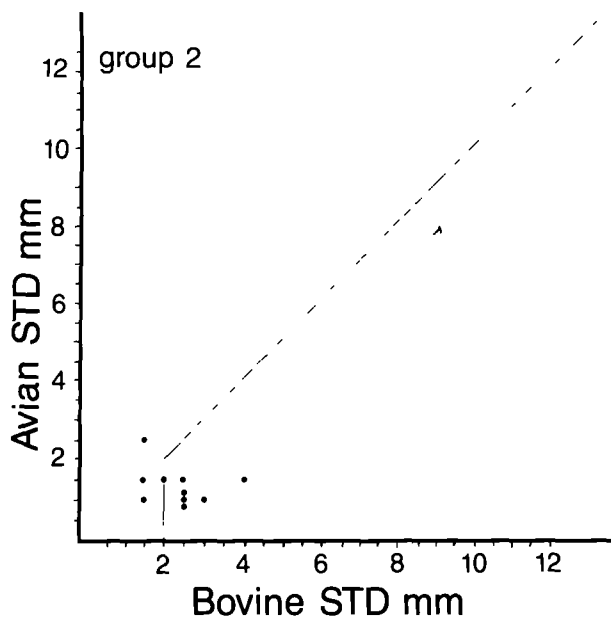
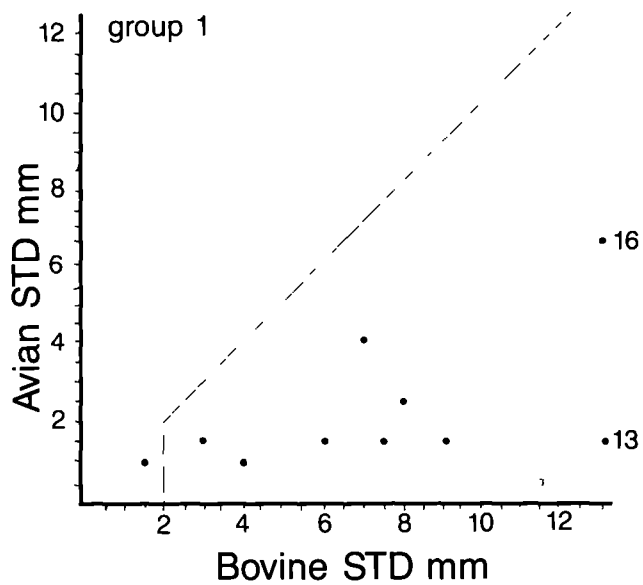


Table 2: Results of the CCT when the interval after a ST was 28 and 60 days

Treatment	Control CCT	CCT 28 days after ST	CCT 60 days after ST
	n=10	n=10	n=9
Mean STD* (mm) Avian PPD	2.21	1.22	1.49
Mean STD (mm) Bovine PPD	7.49	2.26	2.44
Mean Bovine/ Avian Difference	5.28	1.04	0.95

*STD = Skin thickness difference

There was a highly significant difference ($p < 0.001$) between the treatment groups and the control. Suppressed skin reactivity to bovine tuberculin is still present at 60 days and is not significantly different from that at 28 days. However, if the criterium for a positive test result is used, 8/9 (88.9%) of the 60 day retest group were positive, compared to 6/10 (60%) of the 28 day retest and 9/10 (90%) of the controls.

Although the test sensitivity of the 60 day CCT retest is high, the marked reduction in skin reactivity (STD) to bovine tuberculin means that its use cannot be recommended. The effects of measurement errors may also influence greatly the sensitivity of the test under field conditions.

There has been no evidence of a loss in skin reactivity with a 120 day retest interval but, because of management constraints, a 90 day interval has been recommended. The sensitivity of the CCT using this 90 day interval is currently under investigation.

Repeatability of Skin Measurements

At Flock House, under ideal conditions the repeatability of skin measurements was measured on a series of comparative tests. The repeatability for 95% of these measurements was ± 0.4 mm. If considerable care is not taken while testing, then errors in skin measurements will be large. This may affect adversely the sensitivity and specificity of the CCT.

References

- (1) Carter, C.E.; Corrin, K.C.; de Lisle, G.W.; Kissling, R.C. (1985): Comparative cervical testing in deer. Proceedings of a deer course for veterinarians, Deer branch course No. 2, Ashburton. p80-87.
- (2) Radunz, B.L.; Lepper, A.W.D. (1985): Suppression of skin reactivity to bovine tuberculin in repeat tests. Aust. Vet. J. 62: 191-4.