

TB TEST PERFORMANCE

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Performance measures for diagnostic tests

Sensitivity

Specificity

Predictive value positive

Predictive value negative

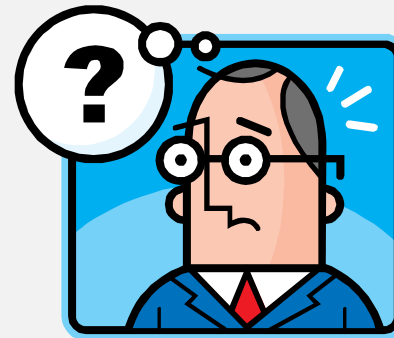
Likelihood estimates

Accuracy

Precision

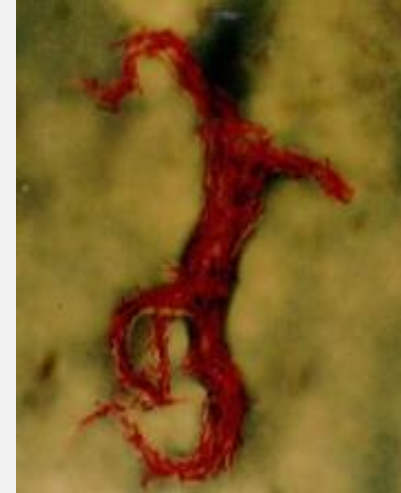
ROC analysis

Examples showing variability and complexity of testing



Antemortem tests in US TB program for cattle/bison

- Caudal-fold tuberculin (CFT)
- Comparative cervical tuberculin (CCT)
- Gamma interferon, currently suspended
- Others occasionally used:
 - IDEXX ELISA
 - Cervical test (CT)
- On the horizon? I'd like to be optimistic, but am skeptical



Contrast of two depopulated US cattle herds

- SD beef herd in 2017
 - 657 cows/bulls
 - Infection rate, $37/661 = 5.6\%$
- Texas dairy in 2015, depopulated 2016
 - 10,309 cows/heifers
 - Infection rate first test, $149/10,309 = 1.4\%$



Caudal-fold test



SD beef herd in 2017

- 3 lesioned compatible cows found on depopulation among 578 skin-test negative
- 37 lesioned compatible cows found among 87 CFT positives
- CFT detected 37 of 40 lesioned cattle, sensitivity of **92.5%**
- Mean 18 days to postmortem on reactors, ~40 days on negatives

Texas dairy in 2015, depopulated in 2016

- 33 lesioned compatible found on depopulation among 8,087 skin-test negative
- 114 lesioned compatible found among 336 CFT positives
- CFT detected 114 of 147 lesioned cattle, sensitivity of **77.6%**
- Mean 26 days to postmortem on reactors, mean 22 days on negatives

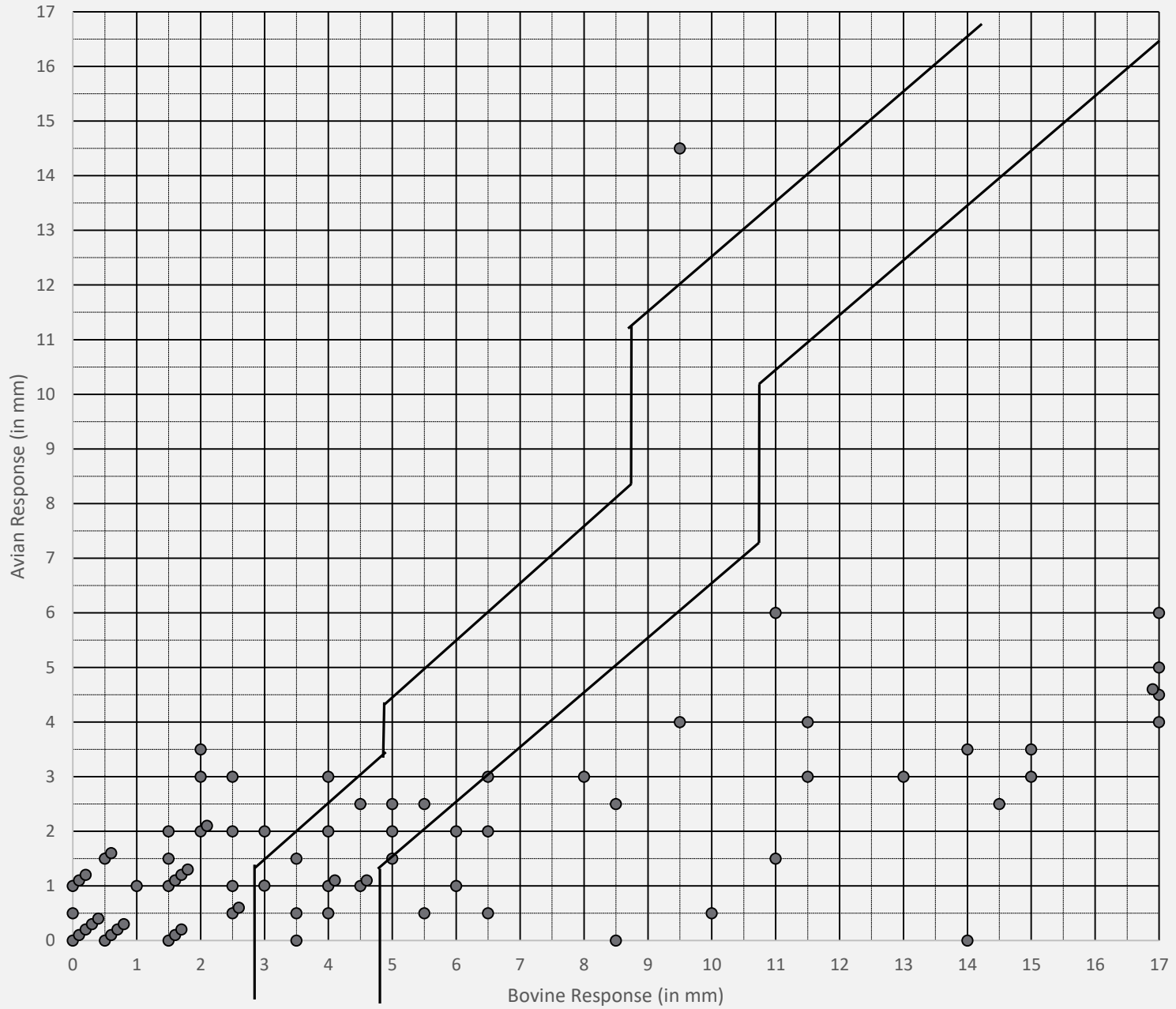
Comparative-cervical test

SD beef herd in 2017

- 87 tested
 - 37 negative
 - 14 suspect
 - 27 reactor zones
- Sensitivity – detection of TB
 - Of CCT on CFT positive cattle, 29 of 37 visibly lesioned, 78.4%
 - Of CFT/CCT combination, 29 of 40 visibly lesioned in the herd, 72.5%



CCT, Beef in SD, 78 tested, 2/24/17



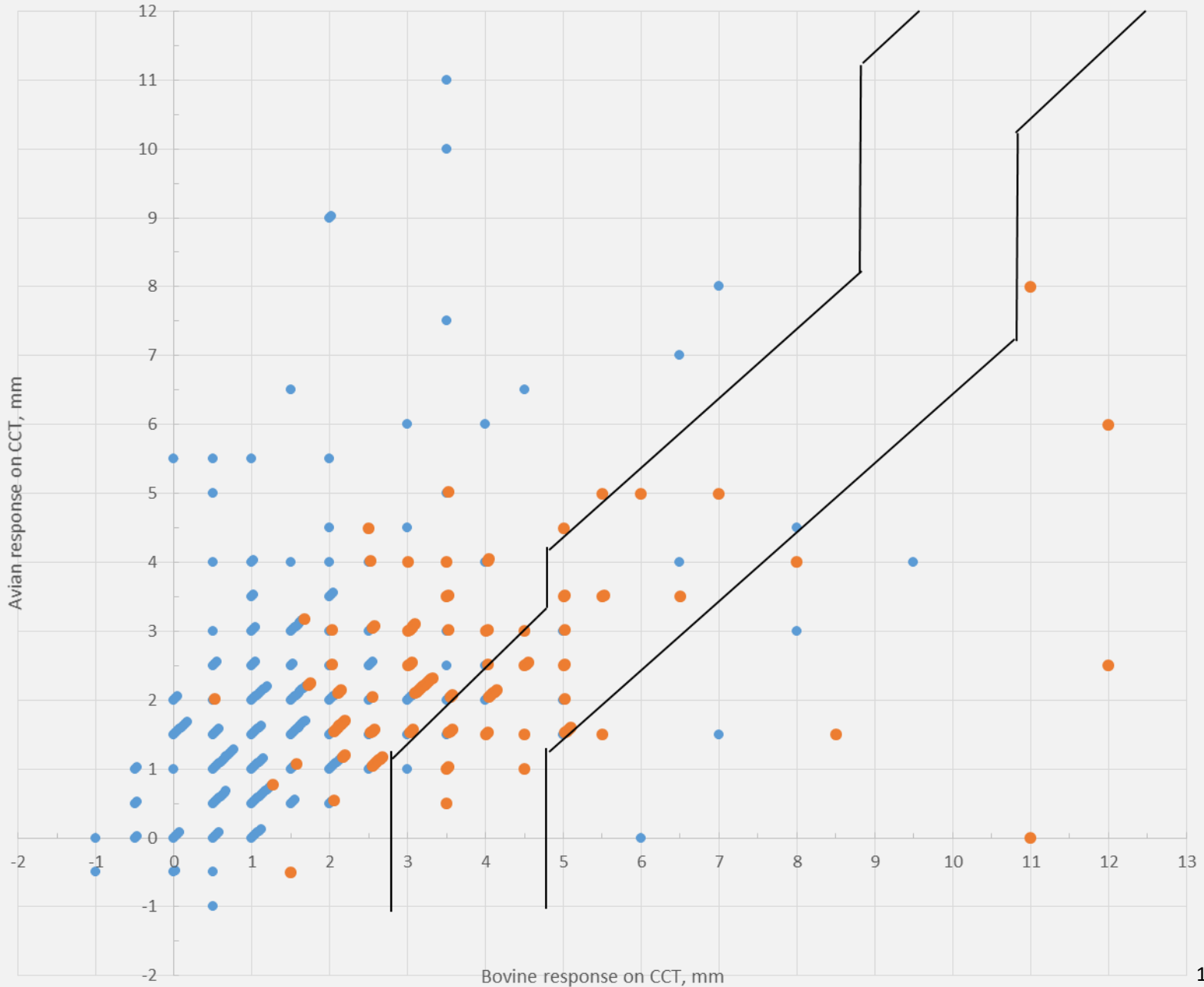
Comparative-cervical test

TX dairy herd in 2015, depopulated in 2016

- 333 tested
 - 267 negative
 - 49 suspect
 - 17 reactor zones
- Sensitivity – detection of TB
 - Of CCT on CFT positive cattle, 49 of 113 visibly lesioned, 43.3%
 - Of CFT/CCT combination, 49 of 147 visibly lesioned in the herd, 33.3%



Dairy Depopulation, CCT results on 333 cows, 113 TB-confirmed and 220 negative



IDEXX ELISA test

Major interest is sensitivity in detecting TB in skin-test negative cattle

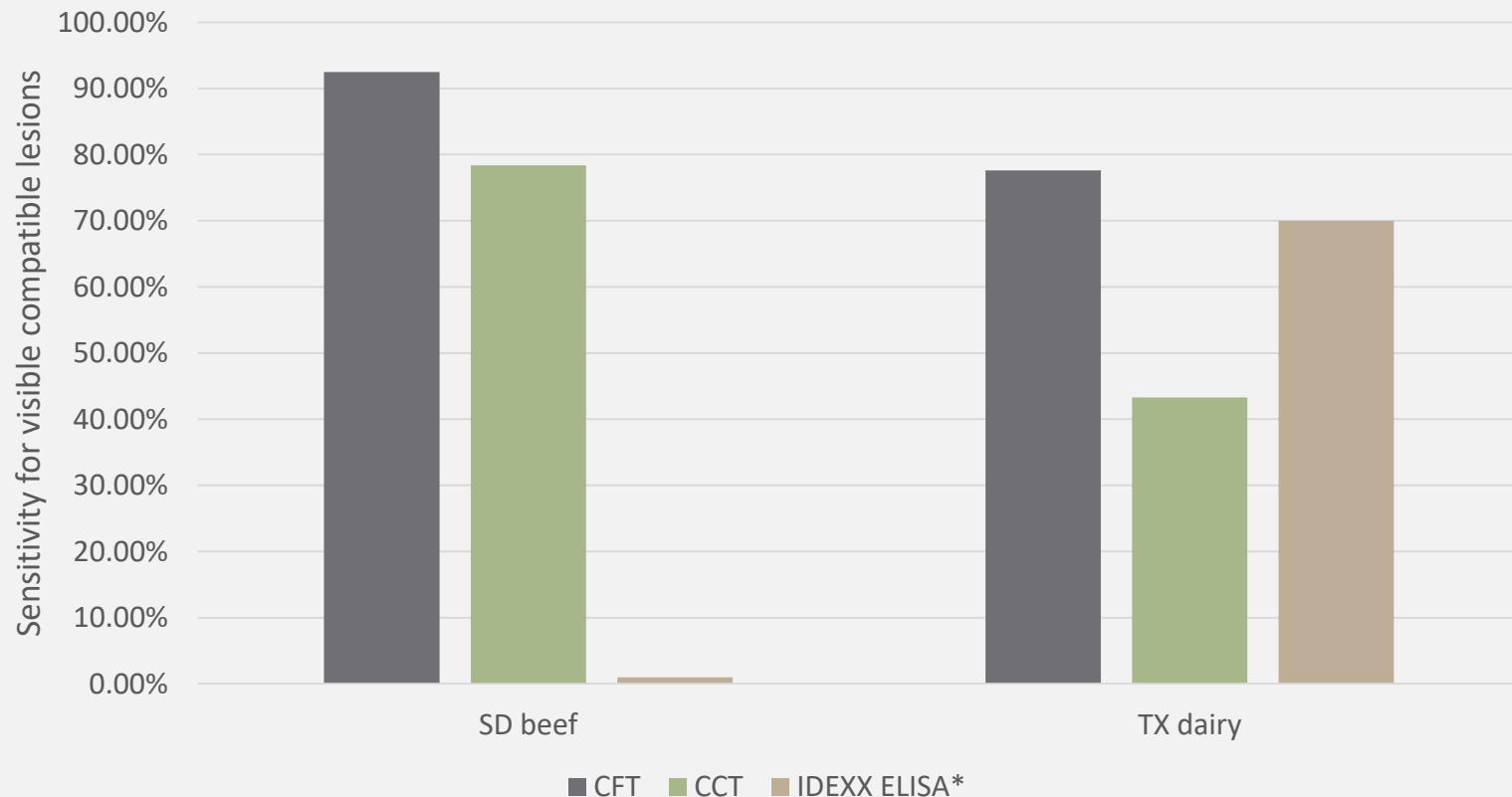
SD beef herd in 2017

- 3 lesioned compatible cows found on depopulation among 578 skin-test negative
- All 3 negative to IDEXX ELISA (0% sensitivity)

Texas dairy in 2015

- 33 lesioned compatible found on depopulation among 8,087 skin-test negative
- 27 had IDEXX ELISA results
 - 19 positive (19/27 = 70% sensitivity), 7 of these were CFT positive 6 months earlier
 - 8 negative, 1 of these was CFT positive 6 months earlier
- 19, Removing positives from earlier tests
 - 12 positive (12/19 = 63% sensitivity)
 - 7 negative

Contrast sensitivity performance in these two cattle herds



*Only tests on skin-test negative animals are included

Why so different?

TX Dairy had been tested 3 times prior to final test before depopulation

- Desensitization phenomena
- Prior removal of best responding animals
- First test is the best test

Dairy/Beef differences

- Production environments were very different
- Breed differences

Timing of testing

Tester difference?

Bacterial strain differences?

Add your own _____





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