



AGRICULTURE AND FOOD DEVELOPMENT AUTHORITY

The Irish Agriculture and Food Development Authority

Associations between delayed type hypersensitivity to purified protein derivative and MAP-antibody ELISA in Irish dairy cows

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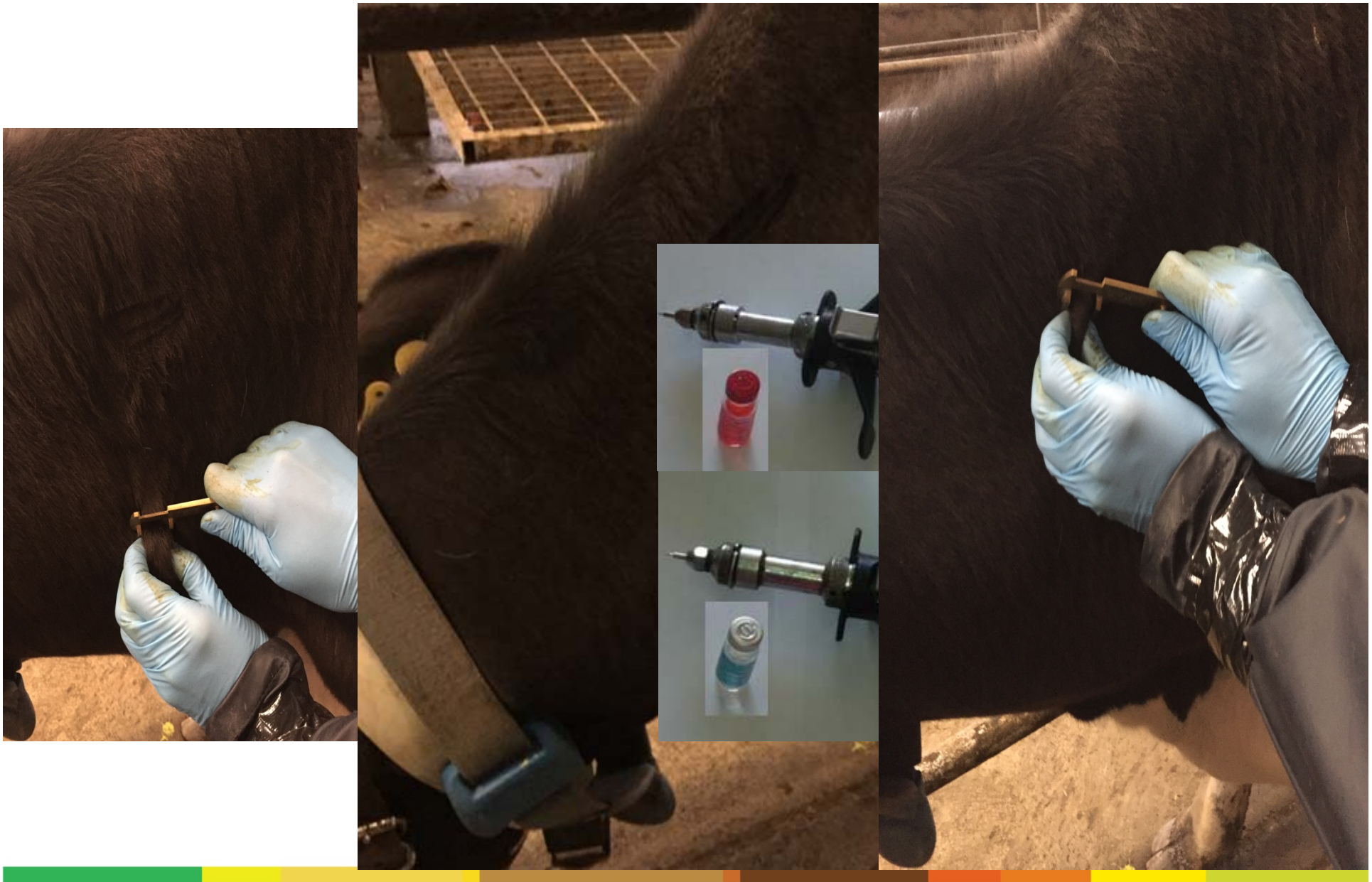


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Mycobacteria

- *Mycobacterium bovis*- bovine tuberculosis (bTB)
- Intradermal skin test
- Purified protein derivative (PPD)
 - Avian
 - Bovine
- Single intradermal cervical comparative test (SICCT)
- SICCT: skin thickness- mm (0hrs + 72hrs)
- Delayed type hypersensitivity response (DTH)
- Ireland – comprehensive bTB eradication programme
 - All bovines over 6 weeks
 - Minimum one test per year





Johne's Disease

Mycobacterium avium subspecies paratuberculosis (MAP)

Clinical signs include:

- Decreased performance
 - Weight loss
 - Diarrhoea
 - Bottle jaw
 - Eventual death
- Usually start between 2 to 6 years

Infection :

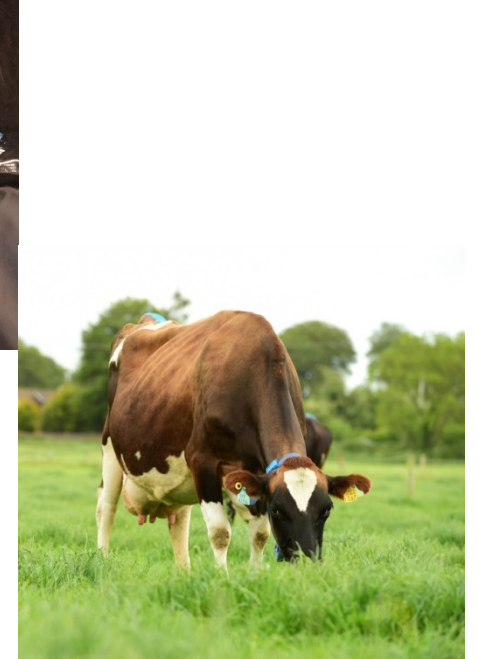
- Infection usually occurs as calves
- Ingestion of MAP infected
 - Faeces
 - Colostrum
 - Milk

- Treatment ineffective – Break cycle of transmission
 - Identify and Remove Infected animals



Introduction

- Johne's disease (JD)
 - ELISA
 - PCR
 - Culture
 - Sensitivity & Specificity
- Intradermal testing
 - aPPD, johnin, SICCT
- OIE

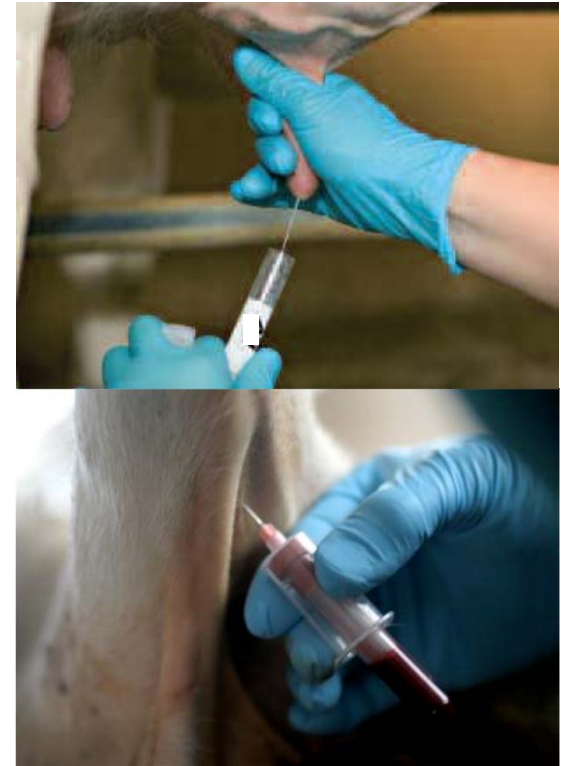


Aim

- DTH (skin reaction) to aPPD or bPPD → increase in MAP ELISA
- Potentially identify research areas aid MAP diagnosis

Background

- Examine impact of SICCT (PPD administration) on MAP ELISA
- Aim: Identify suitable time MAP diagnostics post SICCT
- Milk and serum samples pre & post SICCT
- ELISA- IDvet MAP Antibody Test Kit



Statistical analysis

- ELISA results -categorical and continuous variable

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Frontiers in Immunology. 2014; 5: 564.doi: [10.3389/fimmu.2014.00564](https://doi.org/10.3389/fimmu.2014.00564)

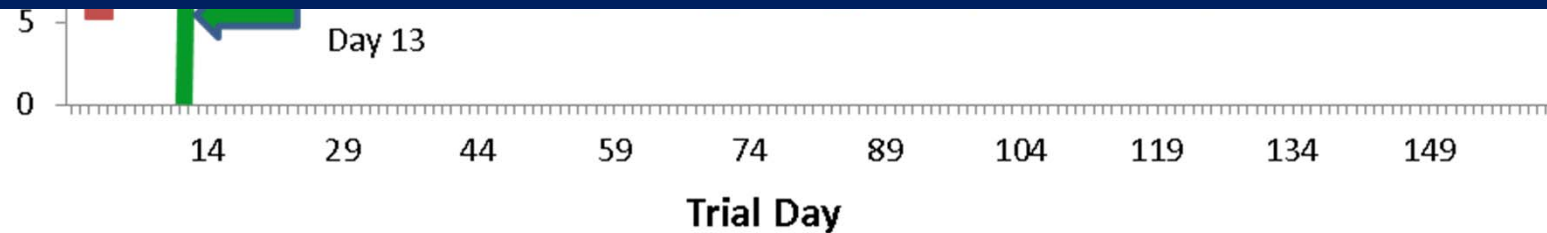
Herd prevalence of ELISA positives



Aim

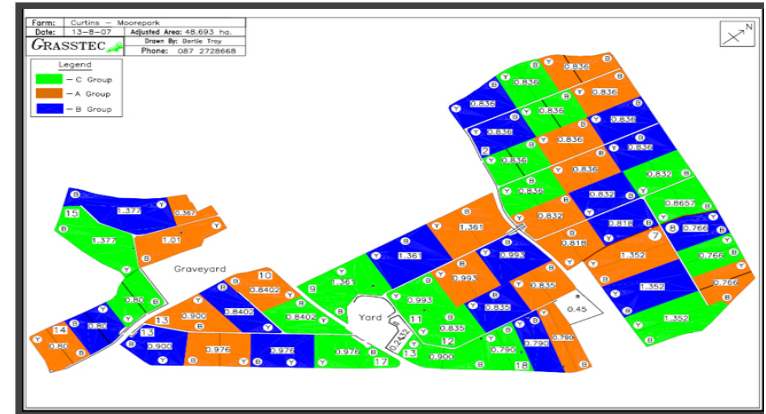
- DTH (skin reaction) to aPPD or bPPD → increase in MAP

ELISA



Materials and Methods

- 139-cow spring-calving
- 54%-HF 46%-JX
- Clinical case JD 2013- confirmed Post Mortem (PM)
- ELISA negative herd 2014
- 3 culture positive cows 2015



Materials and Methods

- Statutory SICCT
- SICCT: skin thickness- mm (0hrs + 72hrs)
- DTH categories
 - DTH at both aPPD and bPPD sites
 - DTH at one PPD administration site only
 - No DTH



Materials and Methods

- **Blood samples**
 - Pre SICCT
 - Post SICCT: Day 10, 16, 42, 57, and 91
- **ELISA**
 - IDvet MAP Antibody Test Kit
 - S/P ratio ≥ 70 : Positive



Statistical Analysis

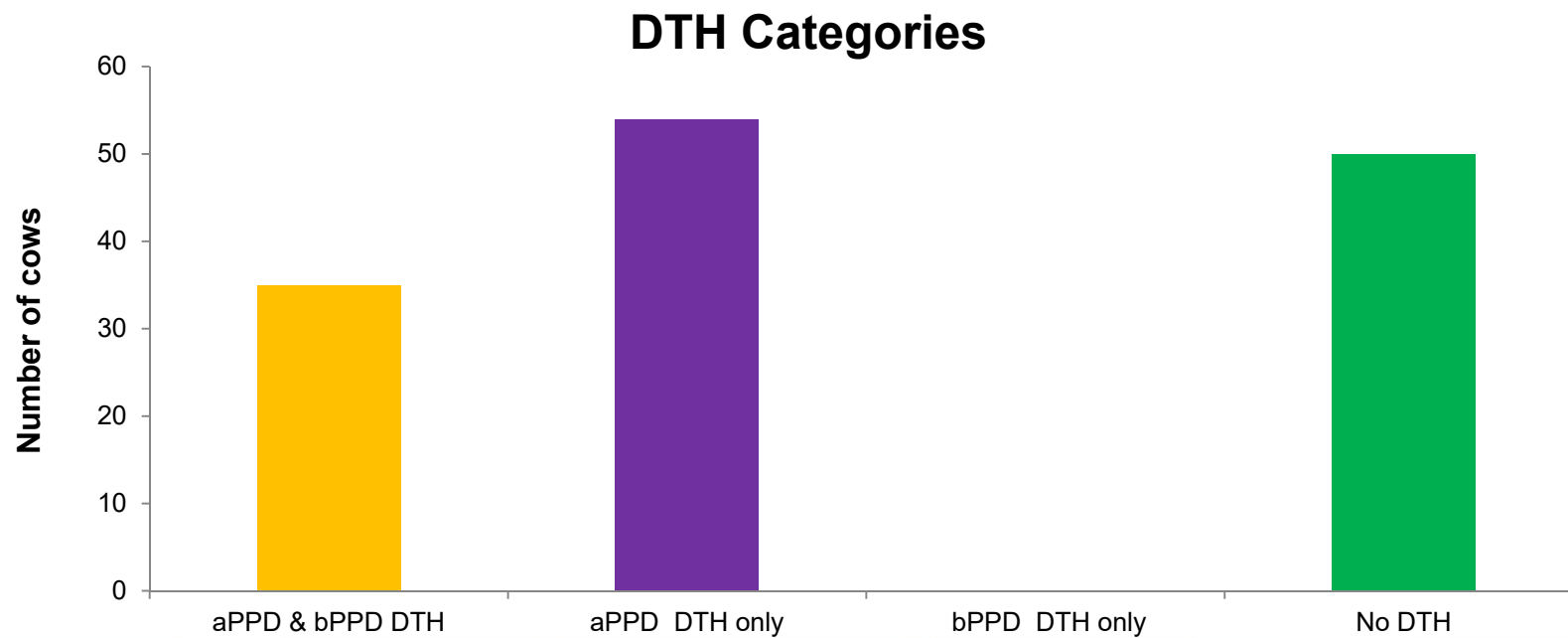
- Generalised Estimating Equations
- ELISA results: categorical (+/-) & continuous variable (S/P)
- DTH results: categorical & continuous (skin thickness mm's)
- Independent Variables

Time point, breed & parity



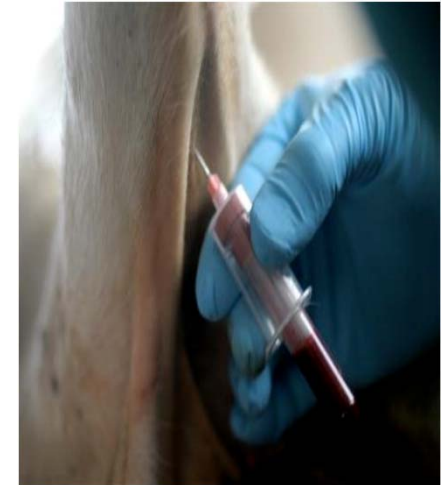
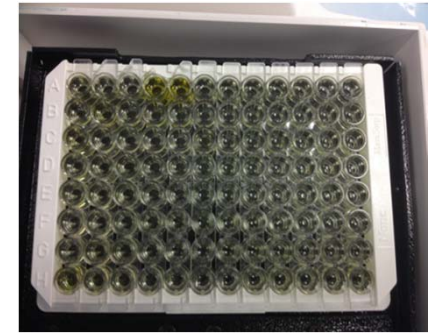
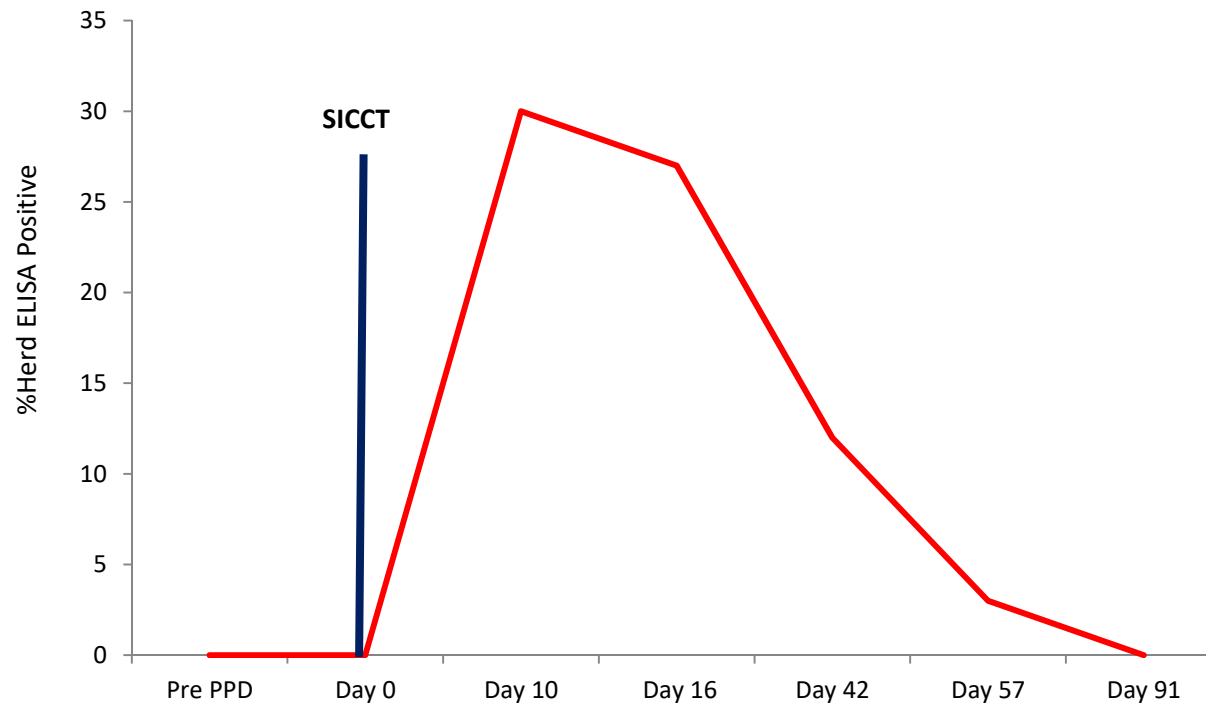
DTH Results

- No TB reactor (i.e. no bPPD 4mm > aPPD)
- DTH both PPD sites- 35
- DTH aPPD only- 54
- No DTH- 50



MAP ELISA Results

- ELISA negative pre-SICCT
- Day 10 post-SICCT 30% positive



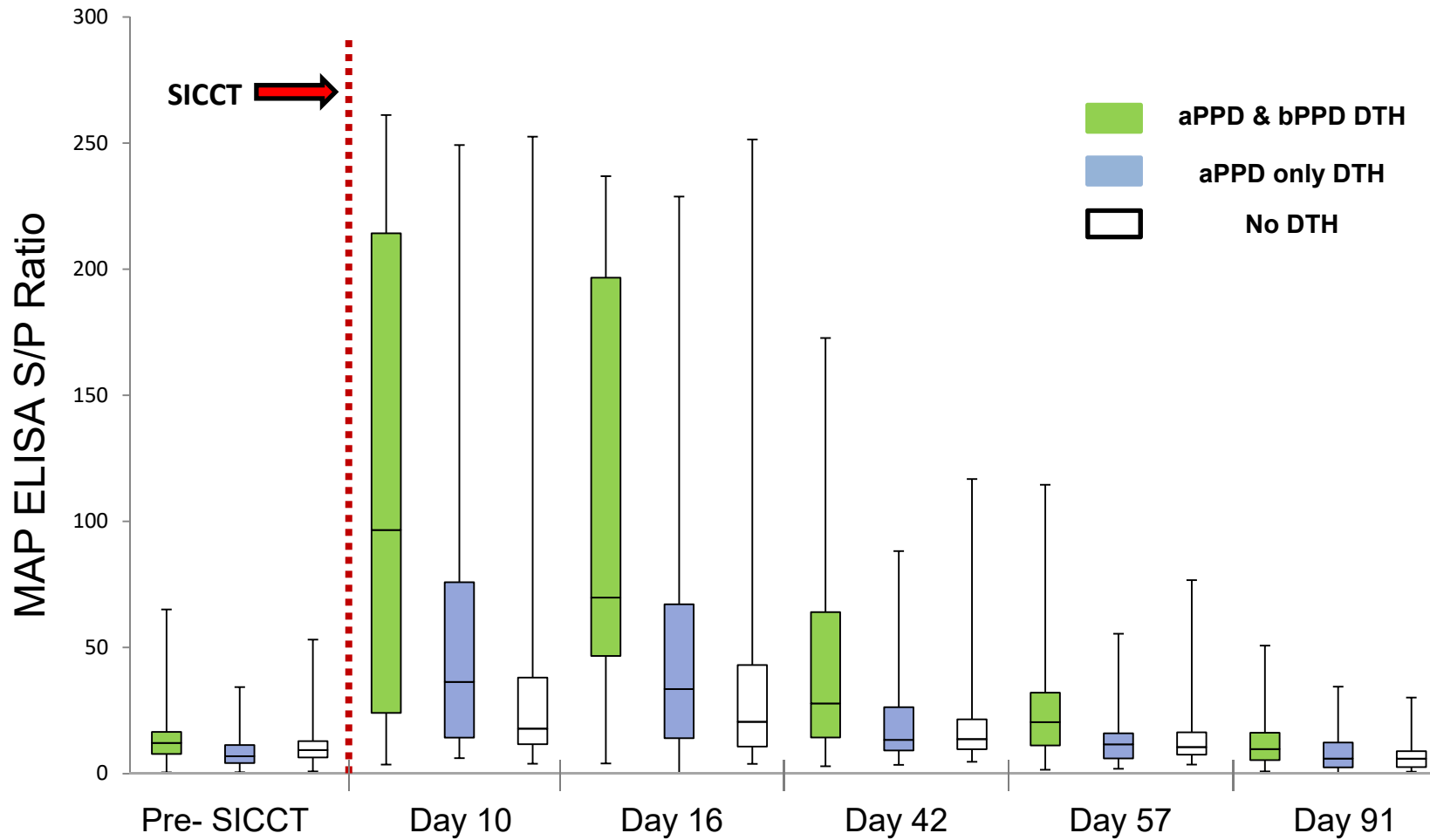
Associations between DTH response (mm), at each PPD administration site, and MAP ELISA S/P ratio post SICCT

Time	Site of PPD inoculation	Coefficient ^a	<i>P</i> Value	95% Confidence interval
Day 10 vs. Pre- SICCT	Avian	4.9	<0.001	3.0, 6.7
	Bovine	7.6	<0.001	3.9, 11.3
Day 16 vs. Pre- SICCT	Avian	5.3	<0.001	3.0, 7.8
	Bovine	5.2	<0.001	0.3, 10.1

^aCoefficient: represents the increase in MAP ELISA S/P ratio for every 1mm increase in DTH skin thickness response

DTH aPPD & bPPD : O.R. 3.9 times more likely to test MAP ELISA positive

Box plots: Differences in MAP S/P ratios between DTH categories



Discussion

Increased Sensitivity v's Decreased Specificity?

- Increased Sensitivity

- MAP + show DTH at both PPD administration sites
- aPPD & bPPD DTH cows > O.R.MAP+ post SICCT

- Decreased Specificity

- Culture positive animals: Not + at aPPD & bPPD sites



Conclusion

- Association between PPD hypersensitivity and MAP ELISA
- Improved sensitivity or decreased specificity ?
- Suggestive of decreased specificity



Questions ?

