Use of SCC data for selective dry cow therapy

Scott McDougall

Cognosco, Morrinsville, New Zealand

Outline

- Background
- Use of SCC data to select cows for dry off treatment
- Conclusions

"Antimicrobial resistance poses a **catastrophic threat**"

"If we don't act now, any one of us could go into hospital in 20 years for minor surgery and **die** because of an ordinary infection that can't be treated by antibiotics"

Professor Dame Sally Davies, England's Chief Medical Officer 2013

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Size of the AMR problem?

In the USA:

- 2 million people become infected with resistant bacteria/year
- 23,000 people die/year of resistant bacteria
- Cost of these infections $US 35 billion/year

(CDC 2013)

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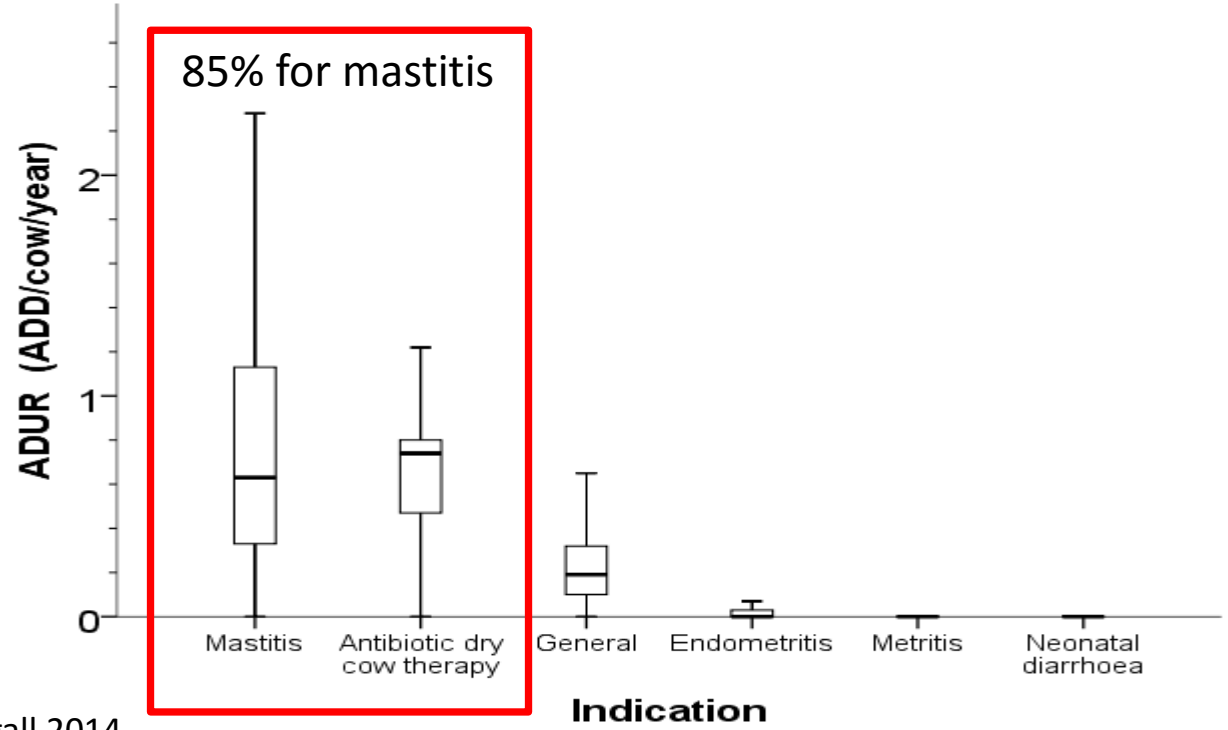
Antimicrobial usage in cattle in NZ

ADUR by indication (1,251 herd-seasons)



Compton & McDougall 2014

% of NZ herds (n=437) using various dry-off treatment strategies (2016)

Low SCC	High SCC	Selective	All cows	(Blanket)
Nil	DCT	14	DCT	52
ITS	DCT	3		
ITS	Combi	6	DCT+ ITS	14
DCT	Combi	2		

9% did not use any DCT (Organic or ITS only)

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Reducing antibiotic usage

- Internationally many industries moving away from blanket DCT
- But DCT is the largest single category of antibiotic use in the dairy industry in NZ
- Not every cow is infected at dry off
- For uninfected cows options include
  - No treatment
  - Internal teat sealants

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New Zealand Veterinary Association Statement (23 Nov 2016)

"By 2020, dry cow therapy will only be used in the treatment of existing intramammary infections"

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How does ITS compare with DCT or no treatment?

Outcome	Rx	RR vs ITS	95%CI
New IMI in dry	DCT	0.75	0.67-0.83
	Nothing	0.27	0.13-0.55
Clinical mastitis	DCT	0.71	0.62-0.82
	Nothing	0.52	0.37-0.75

Rabiee & Lean 2013 JDSc

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Outcome for cows (<200K) treated with ITS alone:

Study	No. 1/4 s	Major pathogens @ DO		Dry period clinical in existing infections		Cure of existing major pathogen infections	
		No.	%	No.	%	No.	%
1	1,301	22	1.7	0	0	14/18	77.8
2	2,409	29	1.3	1	3.4	27/29	93.1
3	945	21	2.2	1	4.8	16/17	94.1
Total	4,655	72	1.5	2	2.8	57/64	91.9

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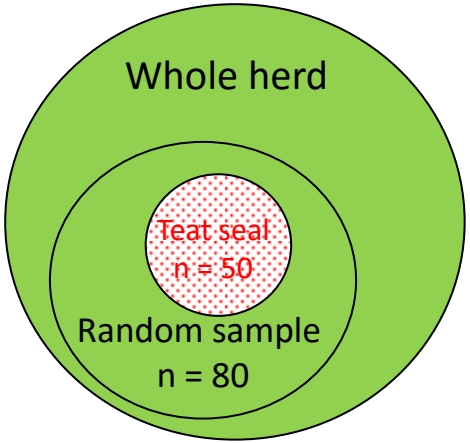
Practical issues with selective DCT

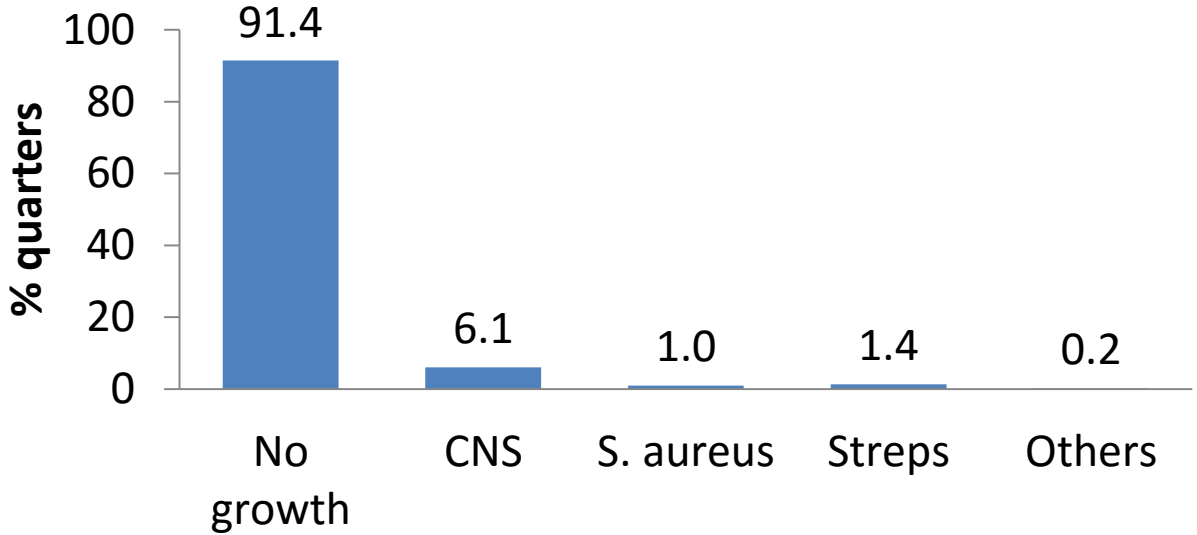
- **Which cows to DCT vs ITS?**
  - **SCC data vs other diagnostics?**
- How to identify cows at dry off itself and ensure correct treatment application and recording
- Maintaining hygiene with infusions with large numbers of cows?

Validation of herd test SCC
Sampling & scoring

- Prospective observational study
- 36 herds
  - North & South Islands of NZ
- Selected 100 cows at random
  - Aimed to sample 80
- ¼ level milk samples for microbiology
- RMT
- Teat seal ~ 50 low SCC cows



Quarter level microbiology (n=9,956)



- 8.6% infected
- 2.4% infected with a ‘major’ pathogen

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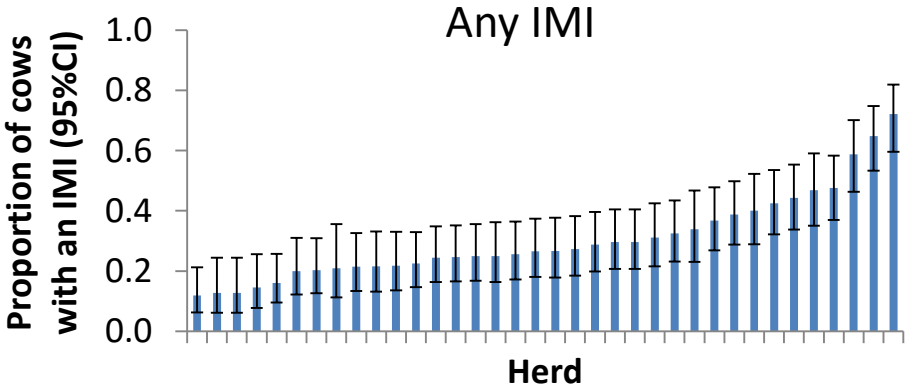
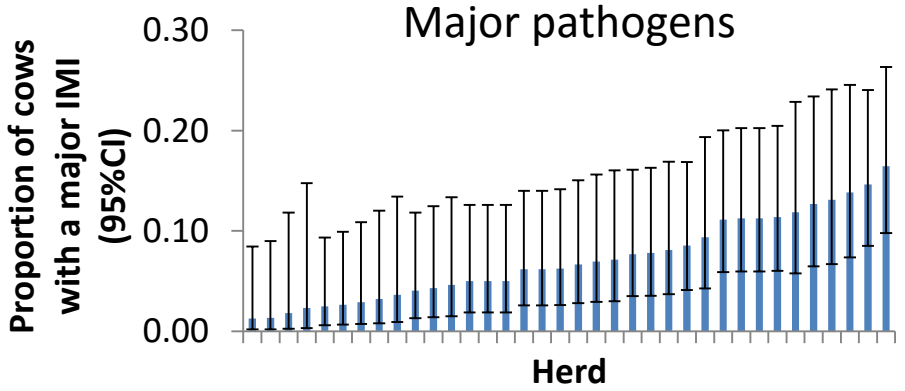
What is the infection prevalence at cow-level in NZ at dry off?





- 31% (95% CI = 25-37%) cows infected ≥1 glands
- 8% (95% CI= 6-10%) cows infected in ≥1 glands with a major pathogen
- Variation amongst herds in prevalence

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What is the effect of the maximum HT SCC cut-point?

(assume 500 cows to dry off with 7.5% cows infected with a major pathogen & if > cut-point = DCT, ≤ cut-point = ITS)

	Infected	*Uninfected*	total	Se	Sp	PPV	NPV
>125	**33**	***154***	**187**	0.88	0.67	0.17	0.99
<=125	**4**	*308*	312				
>150	**31**	***128***	**159**	0.85	0.72	0.19	0.98
<=150	**6**	*333*	339				
>175	**30**	***107***	**137**	0.80	0.77	0.21	0.98
<=175	**7**	*354*	361				
>200	**29**	***94***	**123**	0.78	0.79	0.23	0.98
<=200	**8**	*367*	375				
>225	**26**	***82***	**108**	0.71	0.82	0.24	0.97
<=225	**11**	*380*	391				

Would use 636 tubes of DCT at 150K cut-point

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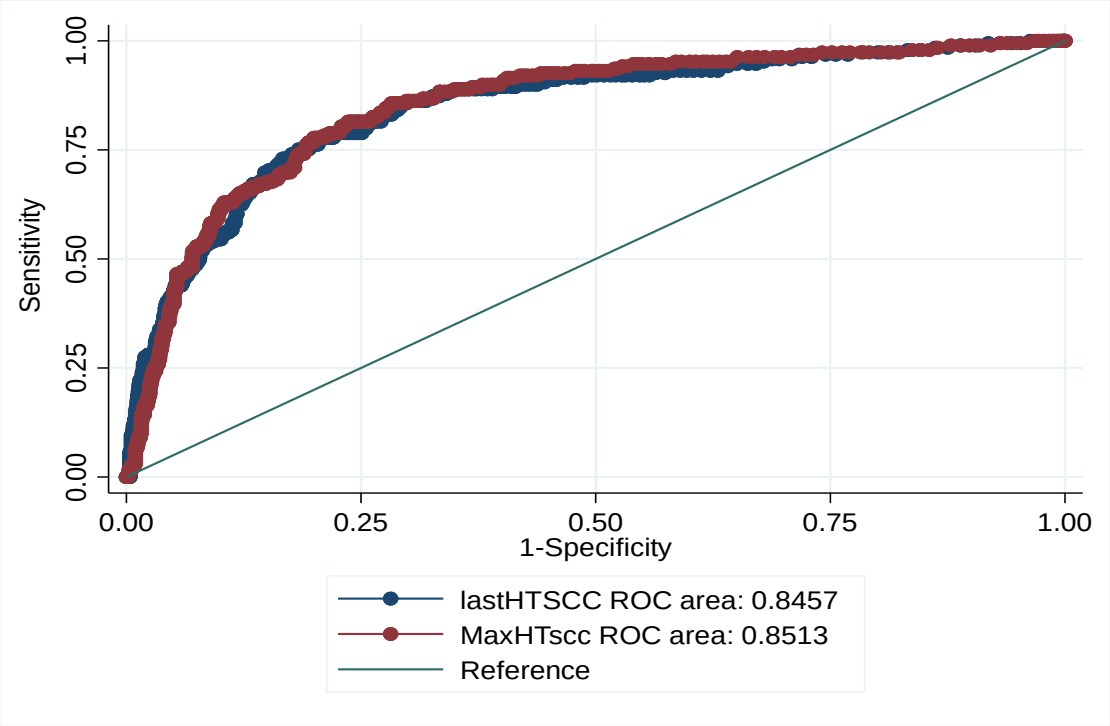
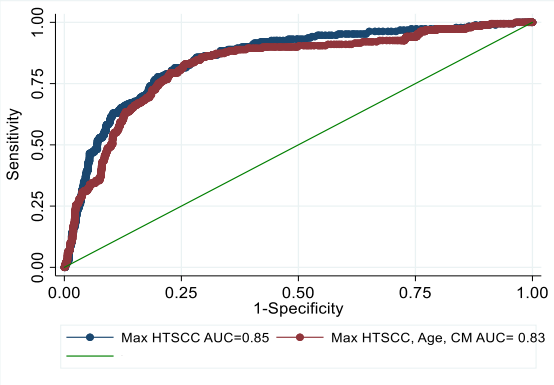
Categorising cows as likely infected?
Last & maximum herd test SCC equivalent



Adding age & clinical mastitis history does not improve predictive value



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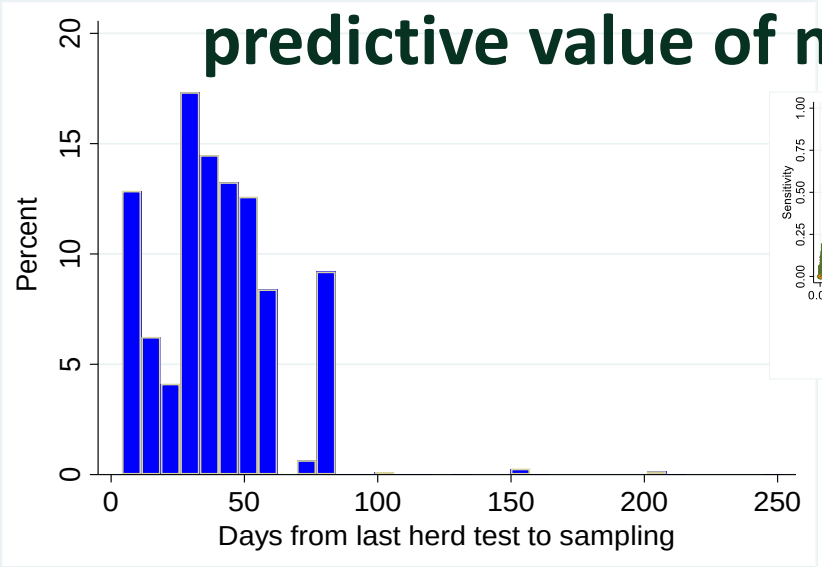
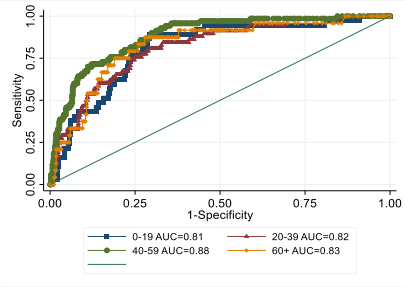
Interval from last herd test to dry off does not affect predictive value of maximum herd test SCC





Days from last herd test to dry off	# cows	AUC	95% CI SE	Low	High
0-19	496	0.81	0.03	0.74	0.88
20-39	933	0.82	0.03	0.76	0.87
40-59	807	0.88	0.02	0.84	0.92
60+	360	0.83	0.04	0.74	0.91

Summary & conclusions

- Herd test SCC is an effective way to identify infected cows
  - A single late lactation herd test is as predictive as multiple herd tests
  - Additional data (other herd test data, age, clinical mastitis history) do not improve predictive value of herd test SCC

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Thanks
Questions?