# Use of international clinical mastitis as independent trait in the USA evaluation system

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#### MASTITIS OVERVIEW



Evidence of selection goes back four decades

Unfavorable correlations with milk yield (0.24 - 0.55; Heringstad et al., 2000)

Low heritable trait (~3%)

Introduction of genomics in 2009





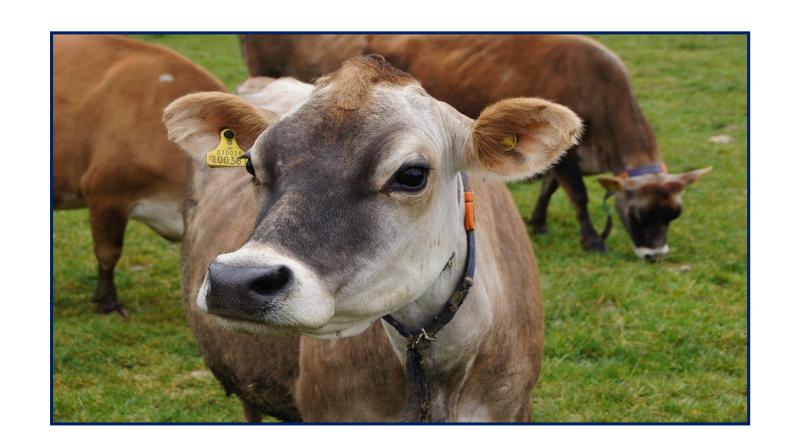
#### MAS IMPLEMENTATION IN THE US



Holstein -> April 2018



Jersey -> April 2020



PTA presented as % points of event resistance above or below breed average



#### PHENOTYPES PER ROUTINE RUN

Run	TOTAL	HOL	JER
1804r	1.8 M	1.8 M	_
1808r	2.0 M	2.0 M	_
1812r	2.2 M	2.2 M	_
1904r	2.4 M	2.4 M	_
1908r	2.6 M	2.6 M	_
1912r	2.8 M	2.8 M	_
2004r	4.0 M	3.2 M	382 K
2008r	4.4 M	3.7 M	478 K
2012r	4.6 M	3.9 M	520 K
2104r	5.1 M	4.2 M	582 K



# THE USE OF MAS FOREIGN INFORMATION

Domestic reference population enhancement

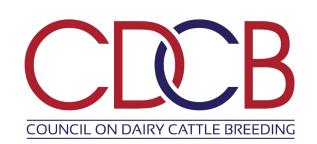
Infectious disease causing inflammation of the mammary gland

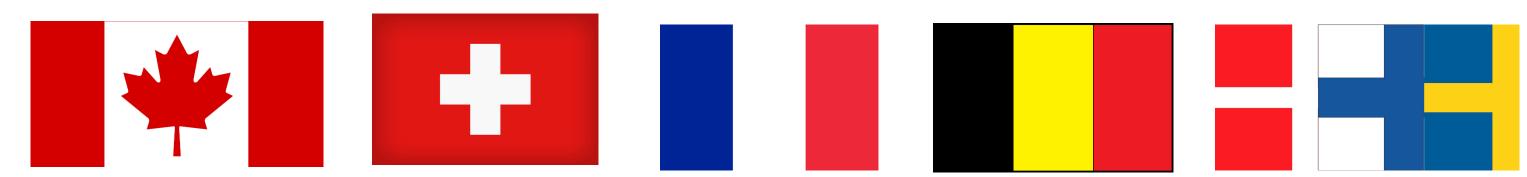
Countries exchange: pure clinical mastitis, SCS or clinical/subclinical mastitis

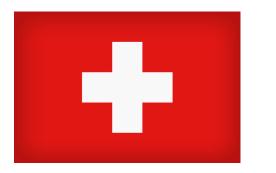


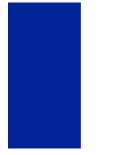
#### MAS EXCHANGE ISSUE

- Historical correlated SCS data may outweigh direct MAS
- Correlated SCS not to be used with direct MAS
  - Unless multi-trait models are being used...
- Limited use of bulls coming in US



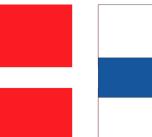
















# CLINICAL MASTITIS AS INDEPENDENT GROUP TRAIT



## CLINICAL MASTITIS AS AN INDEPENDENT TRAIT

- SNP training for clinical mastitis (STCM) to better estimate SNP effects
- Test run January 2021
- First release April 2021



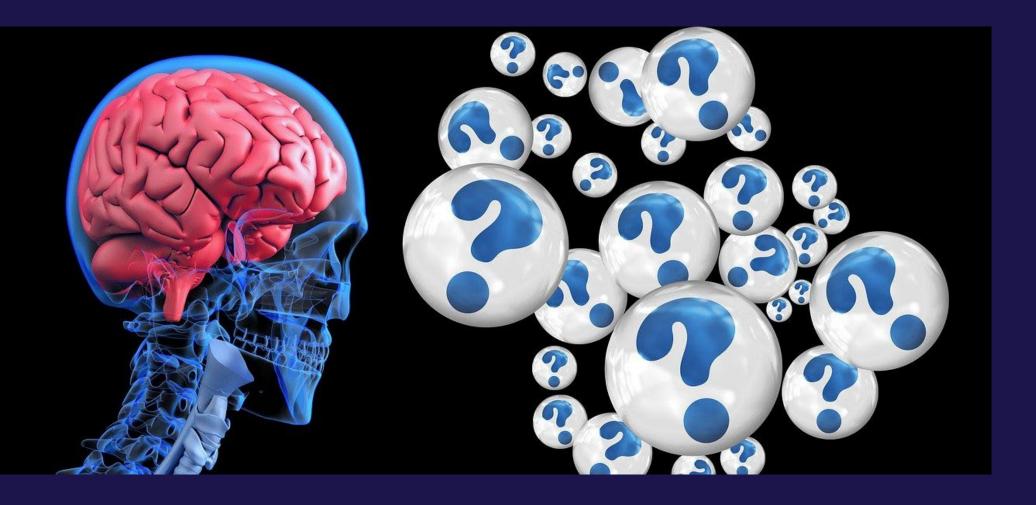


#### CLINICAL MASTITIS AS AN INDEPENDENT TRAIT

- STCM sent to Interbull as an independent group trait
- In US: MAS = STCM
- Usage criteria of MAS/STCM
  - STCM for genotyped bulls only
  - Combined SCS/MAS for non-genotyped bulls
- Most of participant countries accounted







## IMPACT ON US EVALUATIONS?

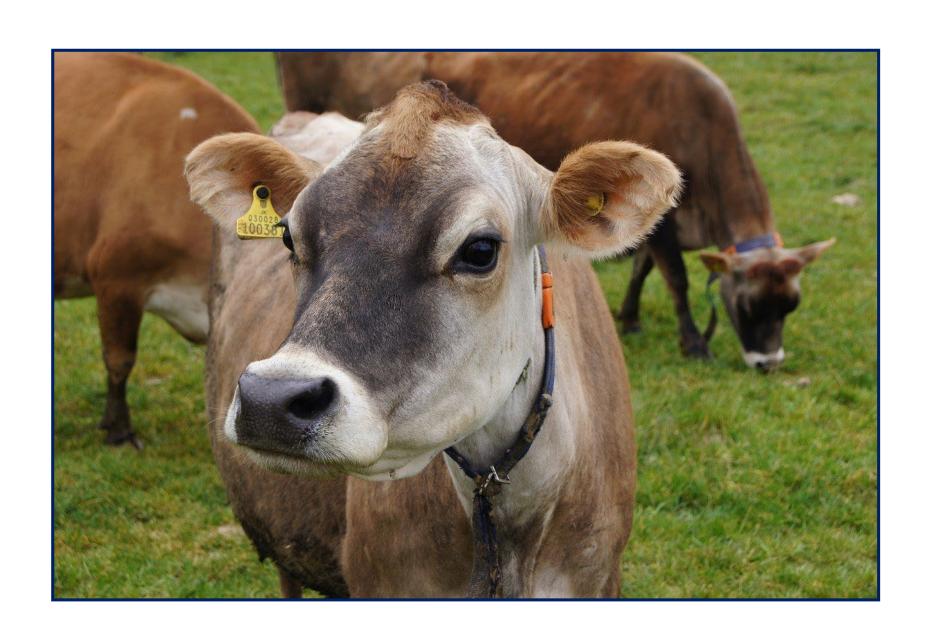


#### OBJECTIVES



- Compare PTA and REL values between 2012r and 2101t/2104r
- Pearson/Spearman and bias







#### SCENARIOS



All bulls

Genotyped bulls

High REL (>95%) genotyped bulls

Non-genotyped bulls



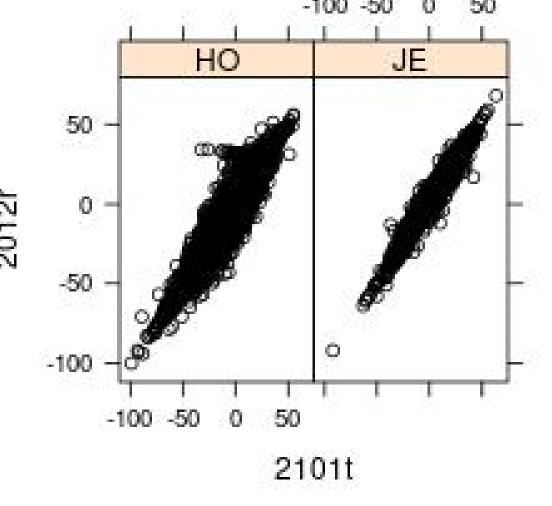
#### RESULTS

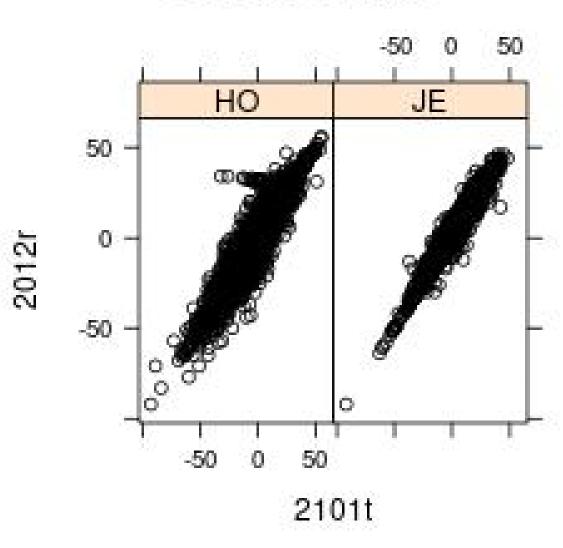
#### CORRELATIONS 2012r vs. 2101t

HOL			JER		
Bull scenarios	Pearson	Spearman	Bull scenarios	Pearson	Spearman
All (69,285)	0.99	0.99	AII (3,932)	0.98	0.98
Geno (12,307)	0.96	0.96	Geno (1,955)	0.97	0.97
REL >95% geno (425)	1.00	1.00	REL >95% geno (67)	1.00	1.00
Non-geno (56,978)	1.00	0.99	Non-geno (1,977)	1.00	1.00

#### -100 -50 0 JE HO 50 2012r 0 -50 -100

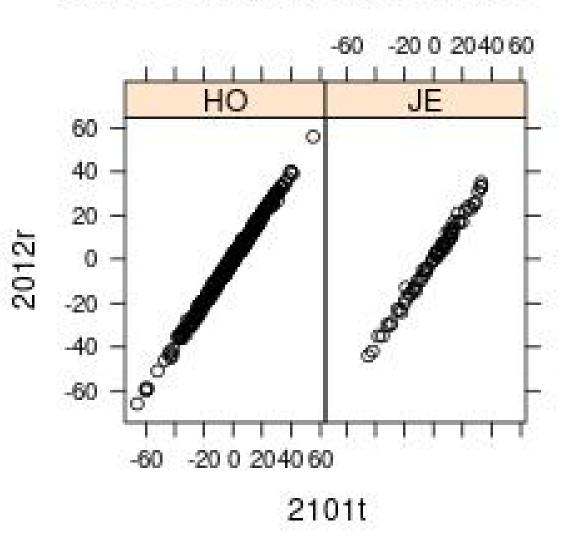
All bulls



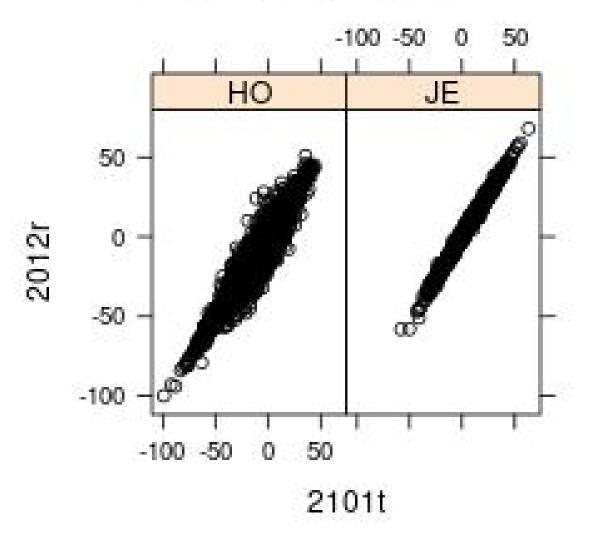


Genotyped bulls

REL >95% genotyped bulls



Non genotyped bulls





#### RESULTS

#### CORRELATIONS 2012r vs. 2104r

HOL			JER		
Bull scenario	Pearson	Spearman	Bull scenario	Pearson	Spearman
AII (67,742)	0.99	0.99	AII (2,648)	0.97	0.97
Geno (10,401)	0.94	0.93	Geno (672)	0.94	0.93
REL >95% geno (439)	0.99	0.99	REL >95% geno (68)	0.98	0.97
Non-geno (57,341)	1.00	1.00	Non-geno (1,976)	0.98	0.98

#### All bulls Genotyped bulls -100 -50 0 50 -100 -50 0 HO HO JE JE 50 50 2012r 2012r -100 -50 0 50 -100 -50 0 50 2104r 2104r REL >95% genotyped bulls Non genotyped bulls -100 -50 0 50 HO JE HO JE 50 40 20 2012r 2012r -20

-100

2104r

-100 -50 0

2104r



### BIAS

		2012r vs. 2101t	2012r vs. 2104r
Scenario	Breed	Bias (b1)	Bias (b1)
AII	HOL	1.01	0.97
Geno		0.99	0.89
REL >95% geno		0.99	0.90
Non geno		1.01	0.98
AII	JER	1.02	0.98
Geno		0.98	0.92
REL >95% geno		0.98	0.92
Non geno		1.06	0.99



#### TAKE HOME MESSAGES

Minor impact in US evaluations

Genetic progress

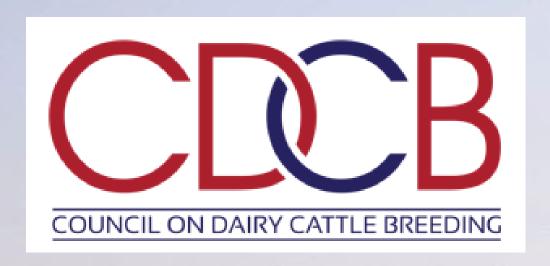


Reference population increase

 Interbull to keep track of STCM countries -> REL gain for bulls with STCM daughters



#### ACKNOWLEDGEMENTS





Dairy producers





