A tool to identify cows eligible for Selective Dry Cow Therapy (SDCT)

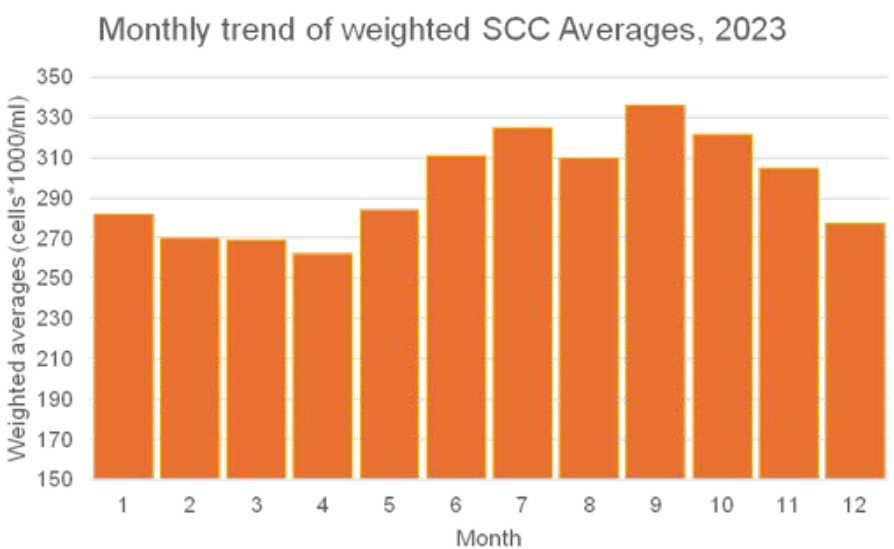
Mauro Fioretti [(1)], Lorenzo Pascarella [(1,2)], Caterina Melilli [(1)], Federica Luisi [(1,2)], Riccardo Negrini [(1,2)]

[1]*Associazione Italiana Allevatori (A.I.A.), via XXIV Maggio 44, Rome, Italy*

[2]*Dipartimento di Scienze animali, della nutrizione e degli alimenti, Università Cattolica del Sacro Cuore, Via E. Parmense, 29122 Piacenza, Italy*

Mastitis in Italy

- Timespan: last 2023 TD, 365 days back)
  - Mean of SCC annual weighted averages : 324 K cells /ml
  - Mean of annual percentage of recorded cows with cells > 200 K /ml : 28,7%



Dry period is a crucial phase for mastitis

During dry period :

- immune defenses decrease (Schukken et al., 2011)
- at the beginning, absence of physical barriers, such as keratin plugs at the level of the nipple sphincter, preventing the entry of mastitogenic agents (Schukken et al., 2011)

50% of cases of environmental mastitis in the first 100 days of lactation originate from infections contracted during the dry period (Green et al, 2002)

Prophylaxis approach: BDCT

(**Blanket Dry Cow Therapy, BDCT**)

- **Treats all quarters with antibiotics to**:
  - Eradicate existing infections at the time of dry-off.
  - Prevent new infections during the dry period.
- **Use an external or internal sealant** to prevent the entry of pathogens.

PROS:

All cows are treated

CONS:

High costs for antibiotics

High vet expenses

Antibiotic resistance

New EU legislation to avoid antibiotic resistence

Regulation **2019/6** on veterinary medicines:

- **Article 107(1)**: "*Antimicrobial drugs* ***are not used systematically nor employed to compensate for poor hygiene, inadequate zootechnical practices, lack of care, or even poor management of farms.***"

- **Article 107(3)**: "Antimicrobial drugs ***are not used for prophylaxis***, **except in exceptional cases**, for administration to a single animal or a limited number of animals

Selective Dry Cow Therapy (SDCT)

Criterion: *Treat with antibiotics* ***only cows showing infections symptoms at dry of***

PROS:

- **Decrease dramatically the use of antibiotics (and related costs)**

……..with BDCT :

- 70% of antibiotics in dairy farms are used for mastitis (van Werven, 2014)
- Of them, 40% at dry-off (Kuipers et al., 2016)

…….with SDCT :

- The use of antibiotic is reduced in a range 21-60% without compromising health status in next lactation (Zecconi et al 2020; Cameron et al.,2014; Kabera et al., 2019; Rowe et al., 2020a, Rowe et al., 2020b)

CONS:

- Need **robust criteria to identify cows requiring treatments**

SDCT ➔ TOOL

The tool rationale

a)DHI data to ***list the candidate lactating cows to be dried-off*** (pregnant / low production)

b) protocols (criteria on SCC and other info) to select cow ***to be treated based on SCC history***

•The tool is free available for 14.000 dairy recorded farms and 1.4M cows through the proprietary software Si@lleva.

A two steps approach

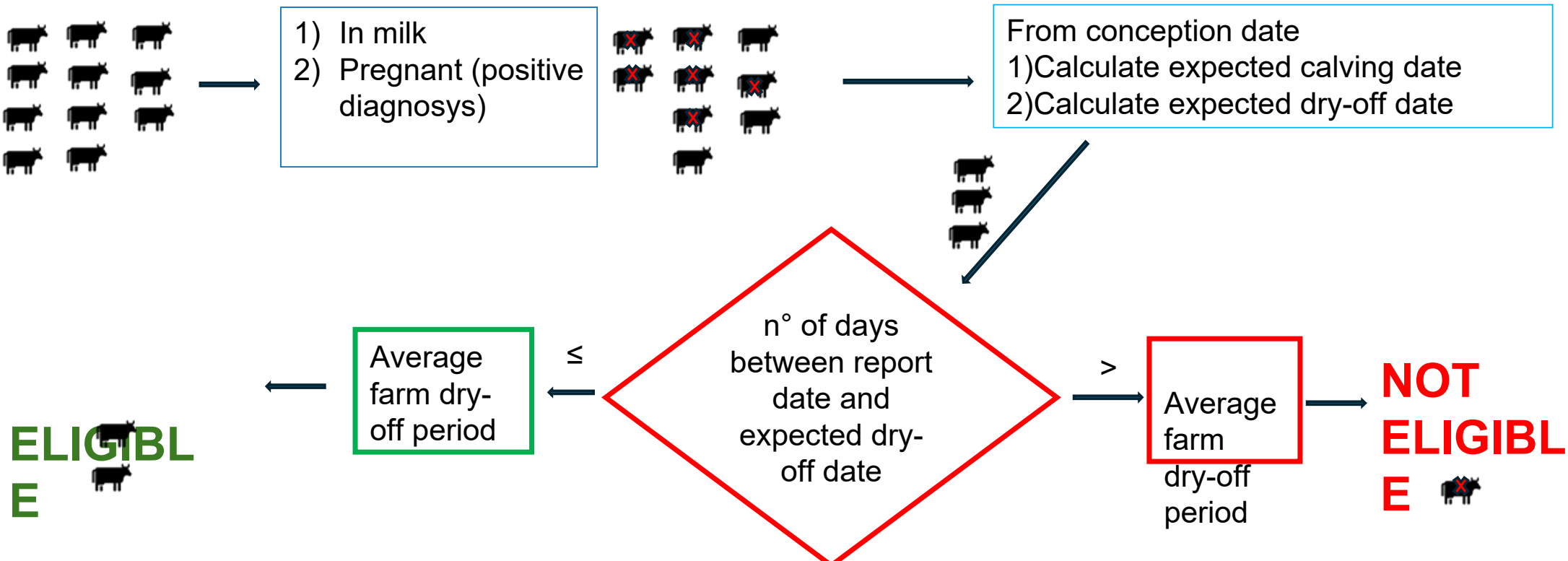
Step 1: IDENTIFY COWS ELIGIBLE TO BE DRIED-OFF IN A SPECIFIC DATE
by
- **PREGNANCY STATUS**
- **MILK YIELD**

Step 2: USE PROTOCOLS BASED ON DHI SCC DATA TO ELICIT SDCT COWS

- **OFFICIAL PROTOCOLS**: Complying with Regional Veterinary Official protocols
- **CUSTOMIZED PROTOCOLS**: Created by the user with farm-tailored criteria

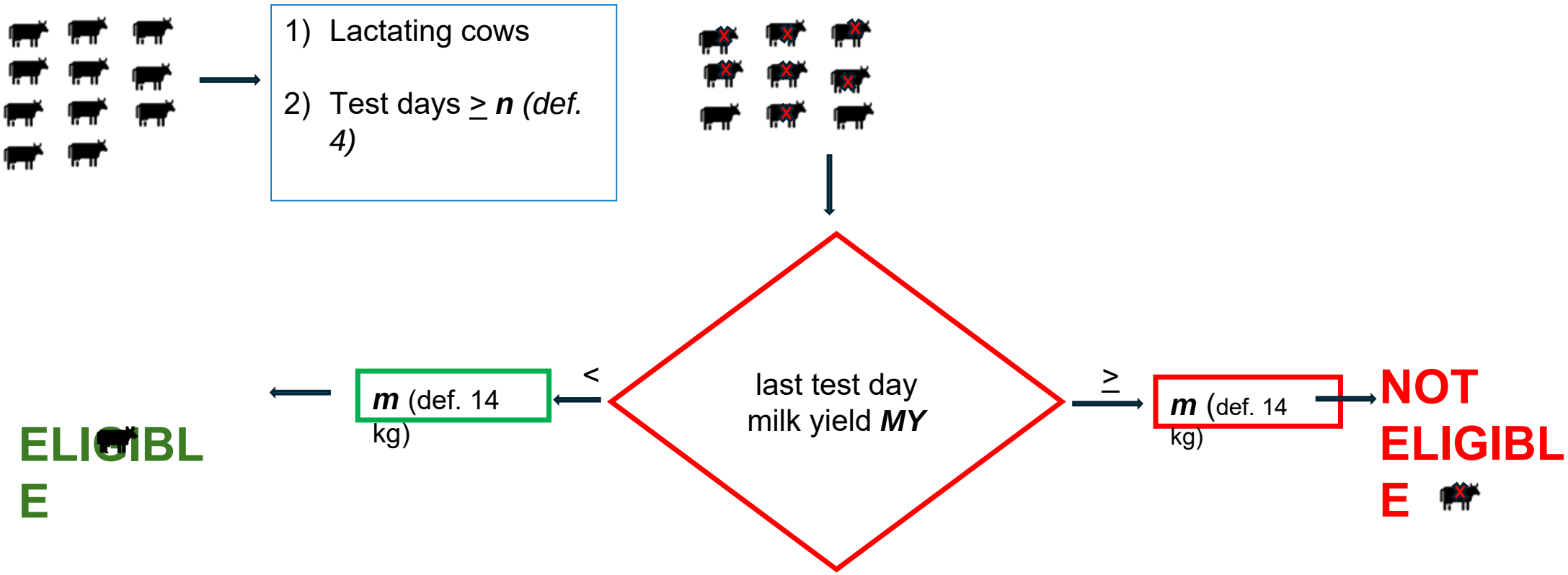
Step 1: Identify dry-off eligible cow at report date: pregnancy status

Parameters: 1) Average Gestation Length = 283 days (fixed) 2) Average farm dry-off period (customizable by farmer)
3) Report date



Step 1. Identify dry-off eligible cow at report date: milk yield

Parameters: 1) Threshold milk production ***m*** (def: 14 Kg) 2) At which ***n*** test day on start to search for low production (d
Variable : Milk yield at test day (**MY**)



Step 2: Protocol setting

Protocol details

				Primiparous		Pluriparous					
Protocol Code	Protocol Description	# TD to use	SCC limit	# TD to use	SCC limit	# TD to use	SCC limit	Average SCC	Mastitis Presence	Positive CMT	Positive Bacterial ex.
prova	SCC > 100.000 Primiparous, SCC > 200 pluriparous on at least on TD on last 3 TDs			3	100	3	200	YES			

The number of the latest test days included

The threshold value of somatic cells for primiparous and multiparous

Screening methods

Yes= Treat if the Average number of SCC is over the threshold

No= Treat if SCC is over the threshold in at least one TD among those included

Examples

Cow M43 eligible to dry-off for pregnancy status: parity 3, Threshold SCC count: 200K, SCC result for last 3 TDs:

Current TD	414K
TD -1	245K
TD -2	151K

→ Average SCC = 270 K → TREAT

Cow M25 eligible to dry-off for pregnancy status: parity 1, Threshold SCC count: 100K, SCC result for

Current TD	51K
-1	49K
-2	22K

→ Average SCC = 40,7 K → DON'T TREAT

Cow M85 eligible to dry-off for low production: parity 1, Threshold SCC count: 100K, SCC result for last

Current TD	85K
TD -1	158K
TD -2	309K

→ Average SCC = 184 K → TREAT

The report

LG01 - Asciutta Selettiva

ELIGIBLE TO BE DRIED OFF

Head to dry off: 3

		Farm ID	Official ID	Name	Last lactation Parity	Last lactation Calving Date	Last lactation DIM	Last TD Milk Kg	Last TD SCC	SCC prev. TDs SCC -1	SCC prev. TDs SCC -2	Predictions Dry-off Date	Predictions Next calv. Date	Predictions Dry-off days *	SDCT Treat	SDCT Reason Treatment	NOTES
		M43	IT0xxxxxxxxxxx7	GIOVANNA	3	10/06/2023	324	16,2	414	245 4	151 2	23/03/2024	11/06/2024	-43	YES	SCC average >200	
		M15	IT0xxxxxxxxxxx9	MARIA	3	25/03/2023	401	12,2	231 4	190 1	177 1	16/04/2024	05/07/2024	-67			
		M25	IT0xxxxxxxxxxx8		1	12/06/2023	322	26,0	51	49 1	22 1	29/04/2024	18/07/2024	-80			

Breed	Expected lactation length	Ave. gestation length
02	303	283

ELIGIBLE FOR LOW PRODUCTION AFTER n (3) TDs

Eligible Heads for low milk production: 1

		Farm ID	Official ID	Name	Last lactation Parity	Last lactation Calving Date	Last lactation DIM	Last TD Milk Kg	Last TD SCC	SCC prev. TDs SCC -1	SCC prev. TDs SCC -2	Predictions Dry-off Date	Predictions Next calv. Date	Predictions Dry-off days *	SDCT Treat	SDCT Reason Treatment	
		M11	IT0xxxxxxxxxxx0	CATERINA	1	05/10/2023	207	12,0	85 2	158 2	309 3				YES	SCC average >100	

Legend

*****	No calving/abortion communication
(*)	Days dry off (report print date - expected dry-off date)
P	Parked animal
1	Healthy/normal (from DSCC)
2	suspicious/ mastitis onset (from DSCC)
3	Mastitis (from DSCC)
4	Chronic/persistent mastitis (from DSCC)

LEGEND

Low production threshold

Breed	Milk Kg	Start TD for check low production
02	14,0	4

PROTOCOL DETAILS

Protocol details

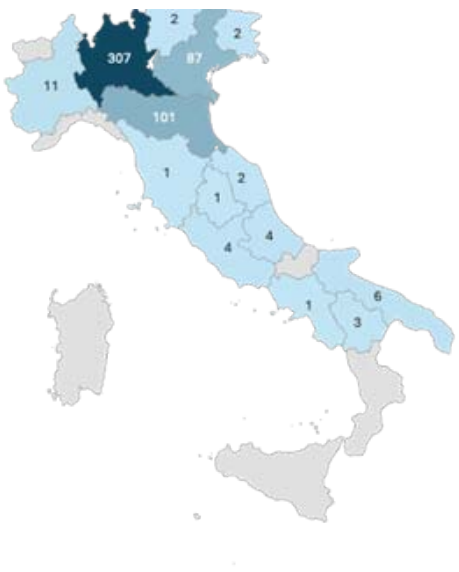
Protocol Code	Protocol Description	# TD to use	SCC limit	Primiparous # TD to use	Primiparous SCC limit	Pluriparous # TD to use	Pluriparous SCC limit	Average SCC	Mastitis Presence	Positive CMT	Positive Bacterial ex.
prova	SCC > 100.000 Primiparous, SCC > 200 pluriparous on at least on TD on last 3 TDs			3	100	3	200	YES			

Mastitis risk class from DSCC

DIM stage	SCC	DSCC (%)	Mastitis Risk Class	COLOUR
DIM <=100	<= 200.000 u/ml	≤ 66,3	Healthy/Normal	
		>66,3	Suspicious/ mastitis onset	
	> 200.000 u/ml	≤ 66,3	Chronic/persistent mastitis	
		>66,3	Mastitis	
100<DIM<=200	<= 200.000 u/ml	≤ 69,2	Healthy/Normal	
		>69,2	Suspicious/ mastitis onset	
	> 200.000 u/ml	≤ 69,2	Chronic/persistent mastitis	
		>69,2	Mastitis	
DIM>200	<= 200.000 u/ml	≤ 69,3	Healthy/Normal	
		>69,3	Suspicious/ mastitis onset	
	> 200.000 u/ml	≤ 69,3	Chronic/persistent mastitis	
		>69,3	Mastitis	

Tool diffusion among DHI Farm in Italy

- **533** dairy farms (3,8 %)
- **100K** milking cows (7%)



Conclusions

Aim of the tool:

- foster the adoption of SDCT
- help farmers/veterinarian to comply with EU indications about antimicrobic responsible use
- exploit DHI data

Cautions

- results are heavily protocols and parameters setting dependent
- information provided are based on risk analysis and not on direct diagnosis
- **the tool do not replace the veterinary service**


THANK YOU
AUDIENCE