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Milk production practices, udder health and the impact on milk quality, safety and processability in Rwanda

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LSIL 4th IP meeting in Rwanda

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RESEARCH TEAM

- Rwanda
  - Jean Baptiste NDAHETUYE (PhD candidate UR-CAVM/SLU): PI
  - Juvenal Djangwani, Msc. Assistant Lecturer UR-CAVM (Co-PI)
  - Anselme Shyaka, DVM, PhD, Head of Veterinary Department at UR-CAVM (Co-PI)

- Sweden
  - Renée Båge, Associate Professor (SLU) (Co-PI)
  - Karin Artursson, Professor, and Director of Research National Veterinary Institute (SVA) (Co-PI)
  - Ylva Persson, PhD, Associate, State Veterinarian, (SVA) (Co-PI)
  - Ann Nyman, PhD, Researcher, Epidemiologist, (SVA) (Co-PI)

PROJECT OBJECTIVES

- To evaluate udder health, milk quality, safety and suitability for processing in four milk shed in Rwanda

- To train best practices for good udder health and milk quality:
  - Dairy farmers, milk middlemen and paraveterinarians
  - Milk Collection Centers (MCC) managers/technicians, sector extensionists/veterinarians and students.

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1. TO EVALUATE UDDER HEALTH, MILK QUALITY, SAFETY AND SUITABILITY FOR PROCESSING IN FOUR MILK SHED IN RWANDA

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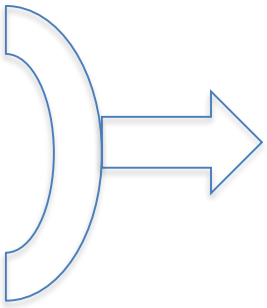
RELEVANCE OF MASTITIS FOR THE DAIRY INDUSTRY

- Inflammation of mammary gland: Clinical or subclinical mastitis (SCM)
- Mastitis is caused by a range of microorganisms and is multifactorial (Animal, Environmental and management factors)
- **Decreased milk yield**

9-45 % drop in milk production per infected quarter

- **Reduced milk quality**



Greatest economic losses
(70 % of the total losses, reduced quality leads to rejections)

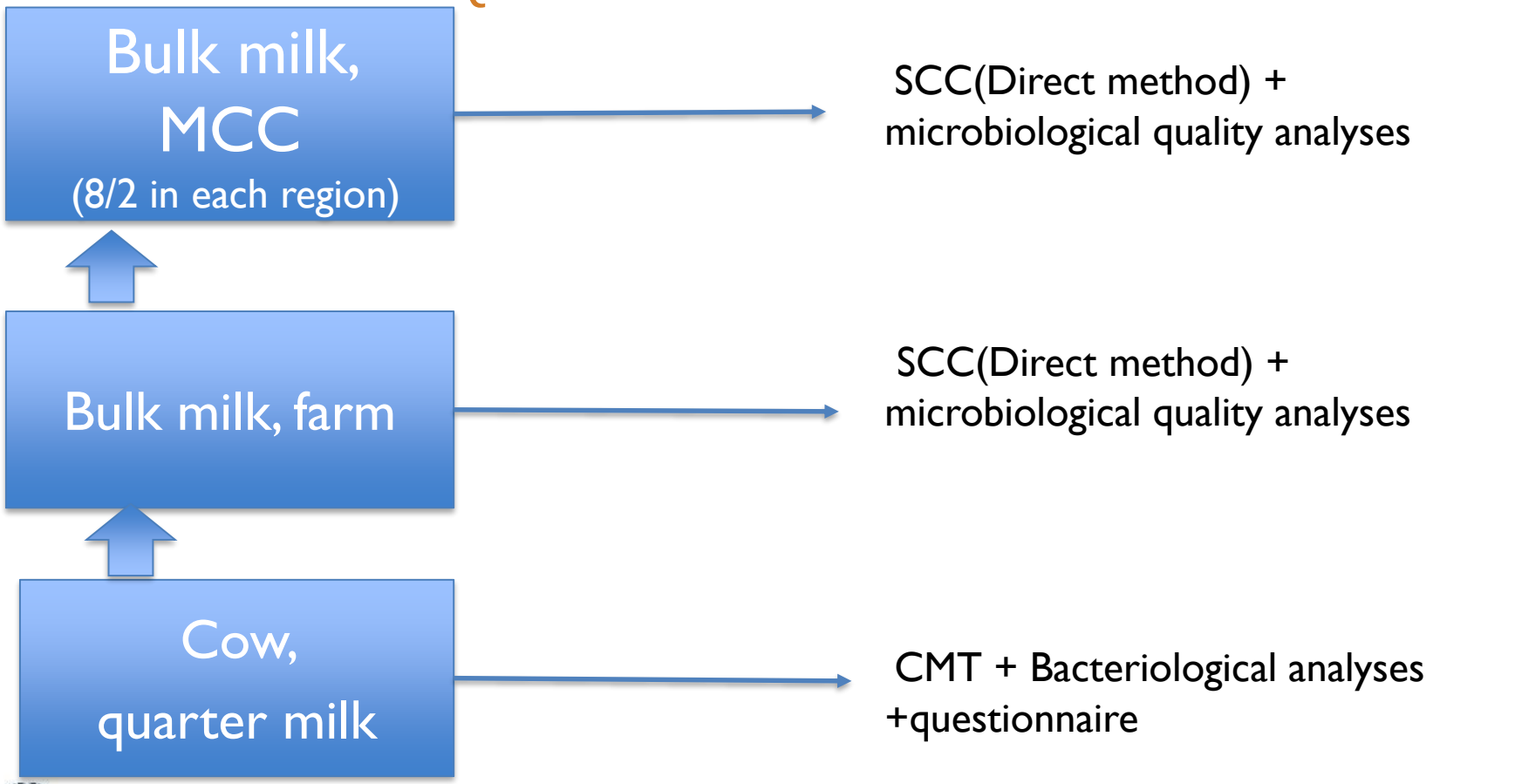
- Other sources of losses: Veterinary service, Drug, Extra labor, Early culling, discarded milk
- Risk for development of antimicrobial resistance

IMPACT OF MASTITIS ON MILK YIELD AND QUALITY

- Measurement of Somatic cell counts (SCC) is gold standard method for diagnosis of mastitis (SCC increases in milk at an infection which is reflected by an inflammation)
- Direct measurement of SCC: bulk milk, Objective, improve decision making
- Indirect with California mastitis test (CMT): Cow-side and may be subjective
- **Mastitis causes**: Reduced milk yield, change in milk composition, reduced cheese yield, reduced quality of milk products

DeLaval SCC counter

1. BASELINE DATA COLLECTION ON MASTITIS, MILK QUALITY AND SAFETY



EVALUATE UDDER HEALTH: PREVALENCE OF SUBCLINICAL MASTITIS (SCM)

Region	MCC	Total no. cows
East	1(Duphaco)	73
East	2 (Nyagatare)	75
North	3 (Nyankenke)	71
North	4(Gatuna)	66
West	5 (Mudende)	71
West	6 (Rubengera)	72
South	7 (Muyira)	75
South	8 (Rugobagoba)	74
	Rwanda	**577**

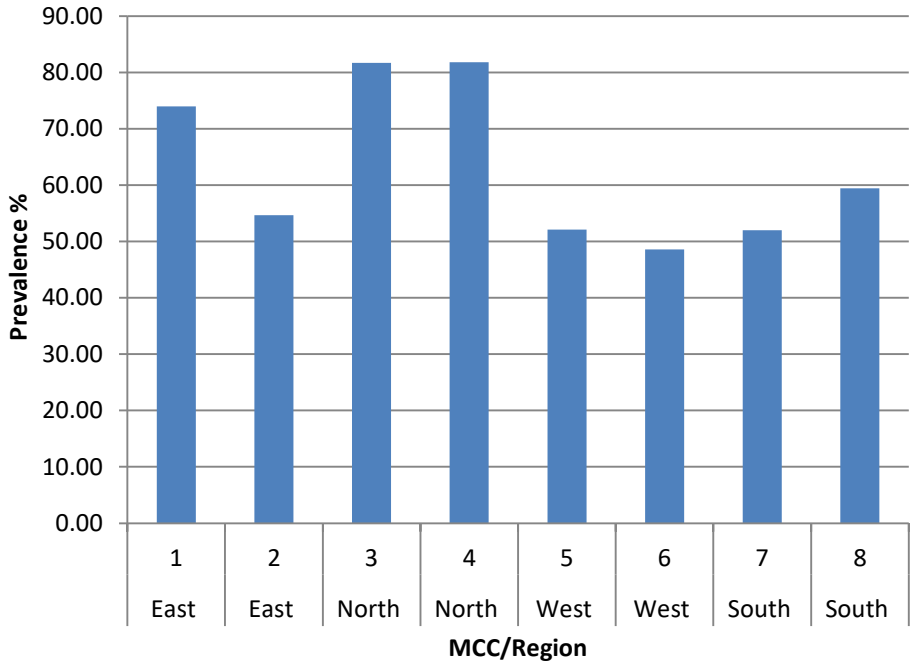
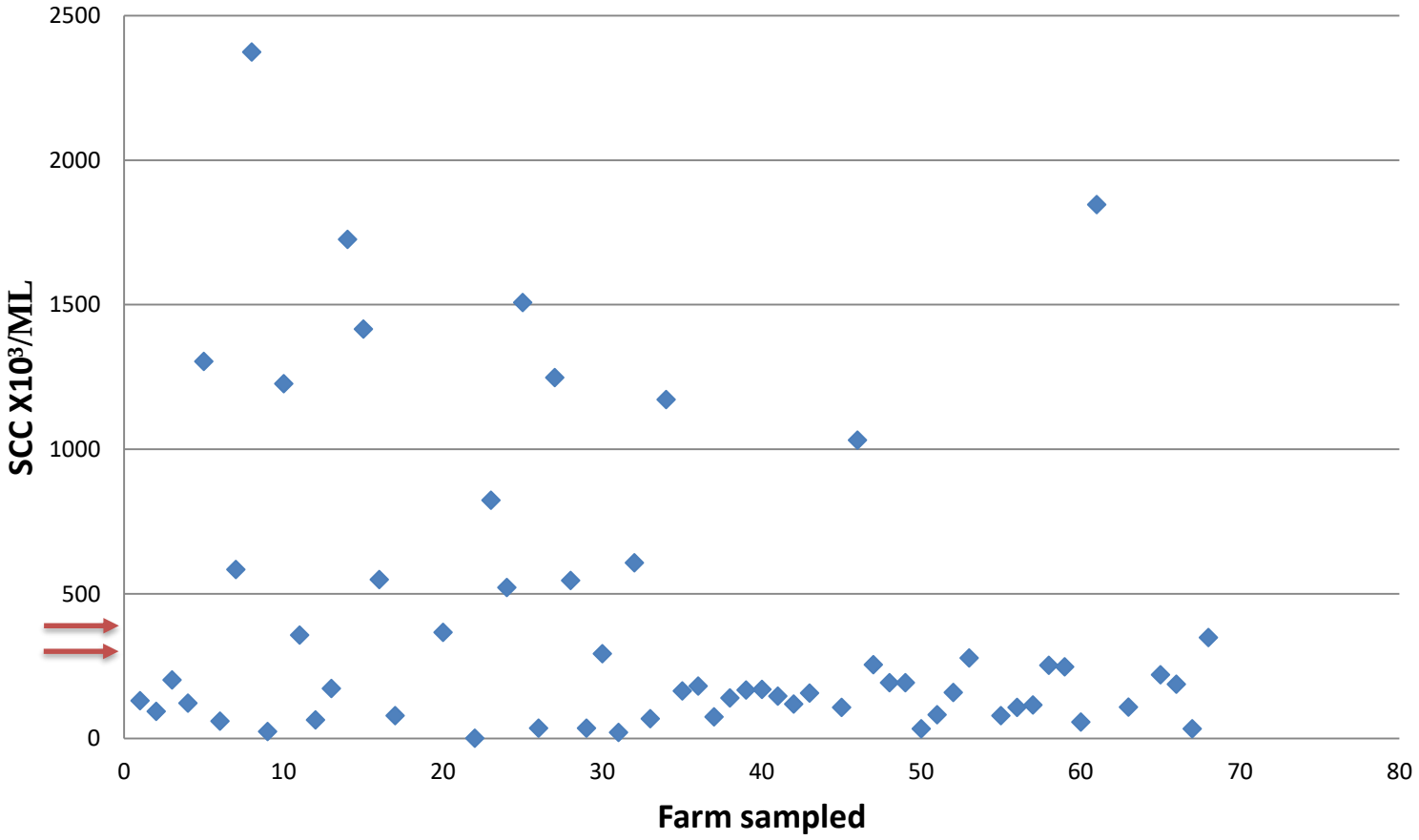
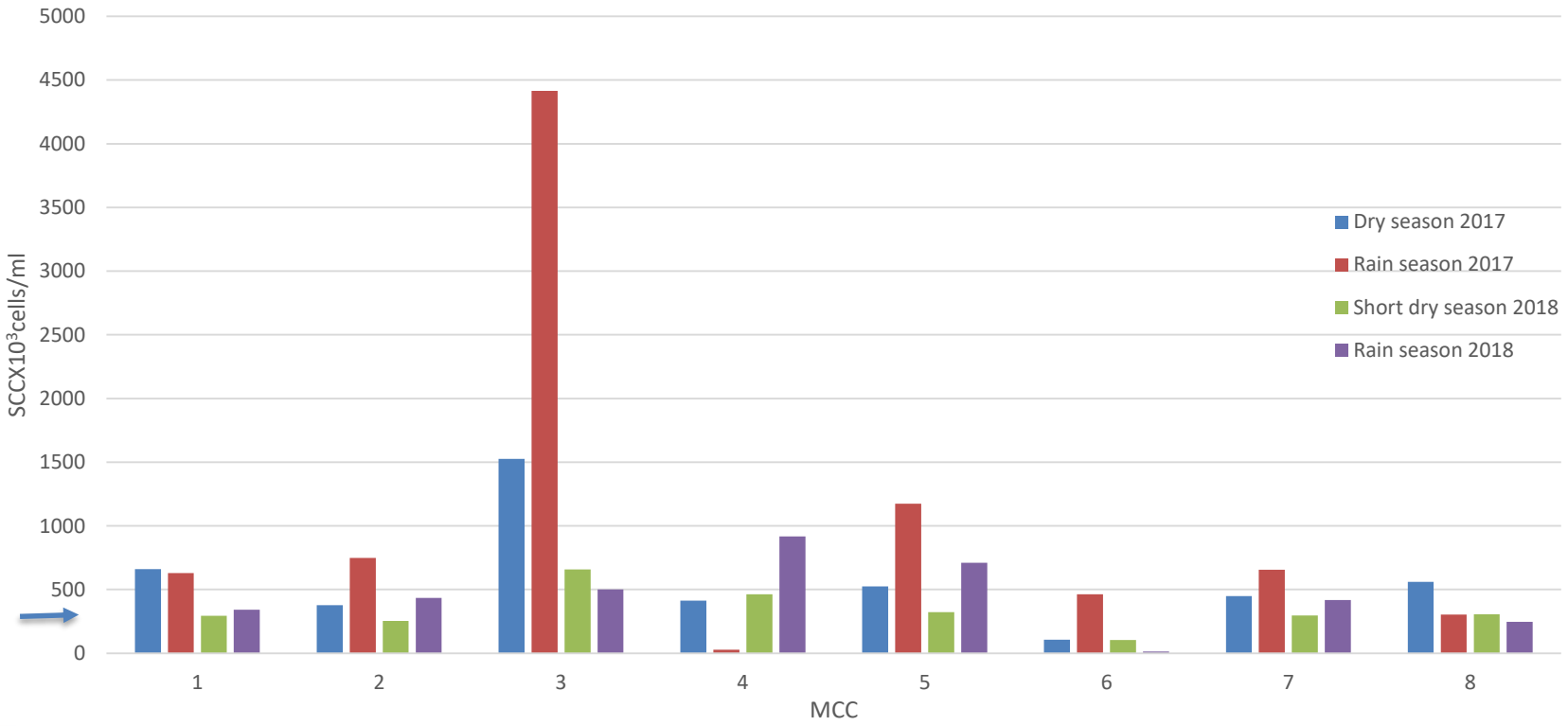


Fig 1: Prevalence of SCM % in selected regions

Bulk milk SCC at farm level in Nyankenke MCC

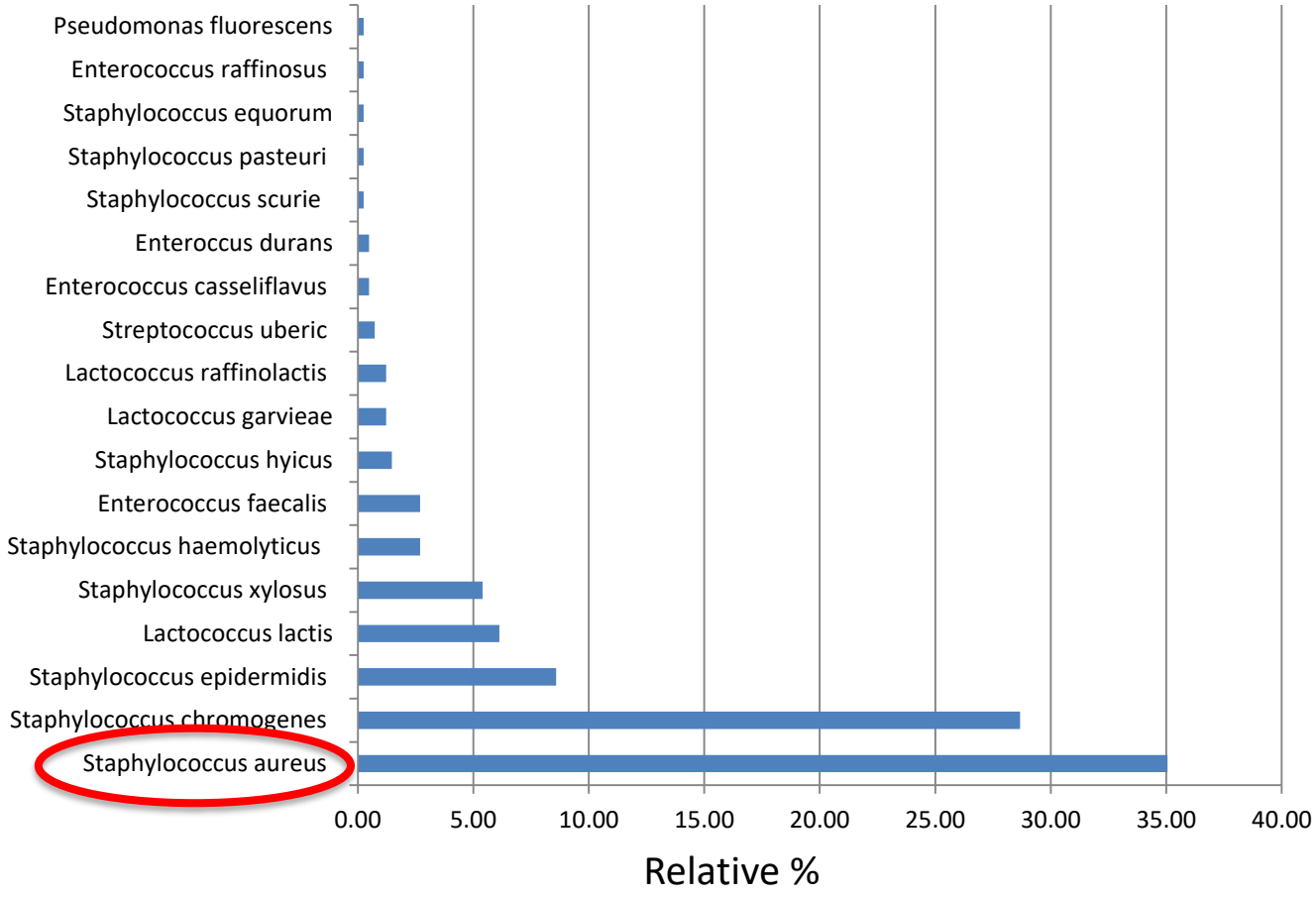


BULK SCC OF BULK MILK AT MCC LEVEL



- **Contagious microorganisms**
- Environmental microorganisms

Bacterial species in SCM cases in Rwanda

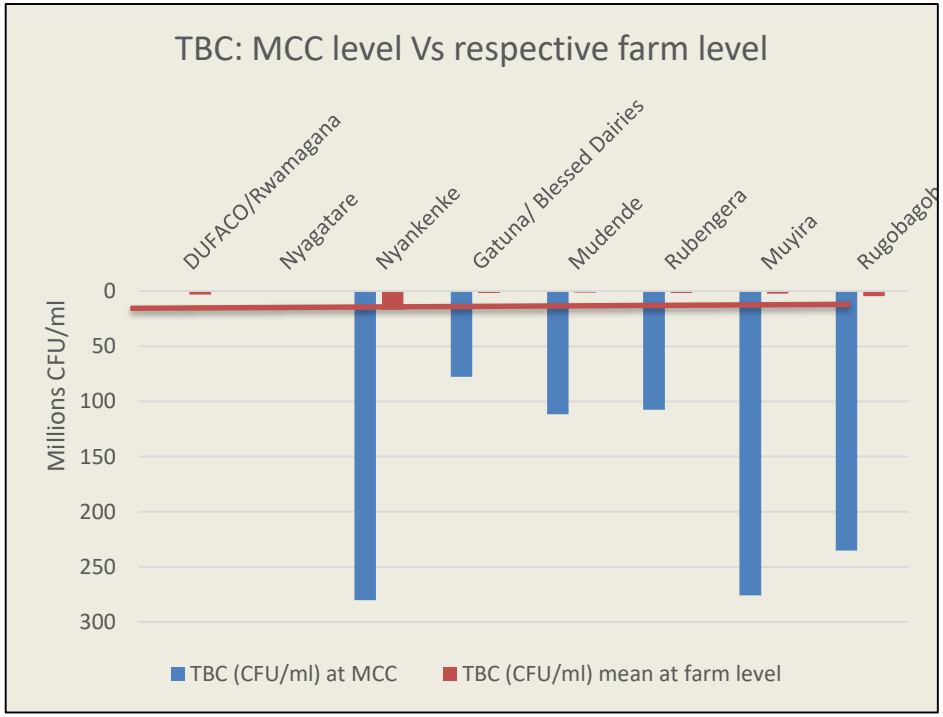


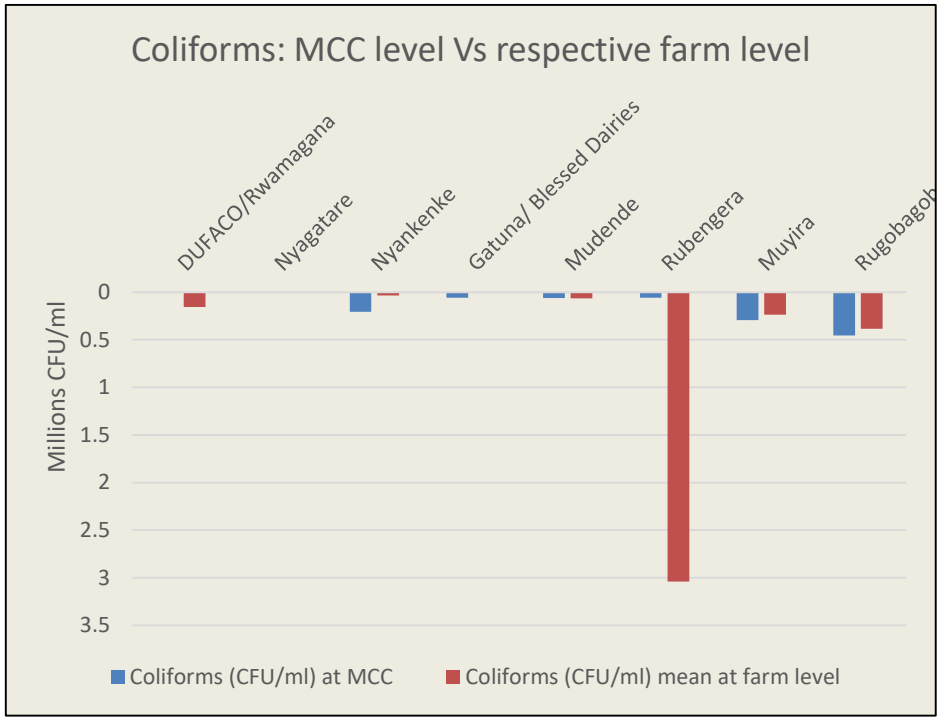
63.6 %
beta-lactamase positive
=penicillin resistant
N=327

RISK FACTORS ASSOCIATED WITH SCM

Factors associated with increased odd ratio of SCM were:

- Increasing stage of lactation
- Poor udder and legs hygiene
- No calf suckling the dam
- Not offering supplemental feeds to cows


TBC: MCC level Vs respective farm level
DUFACO/Rwamagana
Nyagatare
Nyankenke
Gatuna/ Blessed Dairies
Mudende
Rubengera
Muyira
Rugobagob
Millions CFU/ml
0
50
100
150
200
250
300
TBC (CFU/ml) at MCC
TBC (CFU/ml) mean at farm level


Coliforms: MCC level Vs respective farm level
DUFACO/Rwamagana
Nyagatare
Nyankenke
Gatuna/ Blessed Dairies
Mudende
Rubengera
Muyira
Rugobagob
Millions CFU/ml
0
0.5
1
1.5
2
2.5
3
3.5
Coliforms (CFU/ml) at MCC
Coliforms (CFU/ml) mean at farm level

MILK QUALITY AT FARM AND MCC LEVELS

- Generally: TBC increased from farms to respective MCC suggesting multiplication and/or additional contamination during transport
- The highest MCC TBC counts (MCC 3,7 & 8) correspond to MCCs where milk transporters to MCC are at least 87.5% middlemen
- Coliforms presence at farm and MCC calls for stringent hygiene protocol at both points
- Low levels of antimicrobial residues in milk (5 out of 408 on bulk milk from farm level, total absence at MCC level)

IMPLICATIONS OF RESEARCH FINDINGS ON MASTITIS PREVENTION AND CONTROL IN RWANDA

- Preventing and control mastitis will lead to increase in milk yield
- Contagious bacteria in mastitis cases implies spread from cow to cow during hand milking – decision making for optimal preventive routines
- High prevalence of penicillin resistance among prevalent udder pathogens may lead to treatment failure
- Few herds may contribute to high cell count of milk at MCC level, for successful mastitis control such herds must be identified
- Possible to produce milk with low SCC = good udder health

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TO TRAIN BEST PRACTICES FOR GOOD UDDER HEALTH AND POST HARVEST HANDLING OF MILK:

- Target trainees: farmers, model farmers, milk middlemen, Para-veterinarians and opinion leaders in the communities
- Mastitis prevention and control and proper milking routine
- Cow shed management
- Post harvest milk handling and milk safety

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TRAINING OF THE TRAINERS

- Mastitis etiology, diagnosis and effects on milk quality
- Preventive udder health and treatment strategies (Dr. Ylva Persson)
- Post-harvest handling of milk and milk quality testing
- Dairy herd reproduction management and milk productivity (Ass. Prof Renee Bage)

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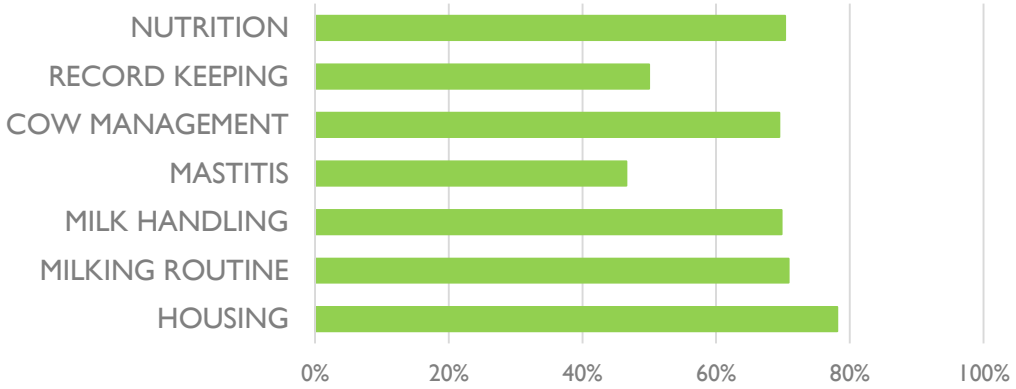
INTRODUCTION TO DAIRY ASSESSMENT AND ADVISORY TOOL

- Qualitative tool to monitor best practices to prevent and control mastitis, enhance milk quality and productivity
- Components to monitor includes:
  - Hygiene of housing, milking routine, milk handling, mastitis, cow management etc.
  - Each component is further divided into different element and are assessed **on scale** as to provide farmers their performance (serve as feedbacks to improve their practices), i.e.:



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DAIRY ASSESSMENT AND ADVISORY TOOL CONT.

4	Mastitis	47%	
	ASSESSMENT	SCORE (1-5)	SCALE
4.1	Control of contagious mastitis	40%	
1	Cows with contagious mastitis are milked last or in a separate milking place used for the infected cows.	2	1 – No; 3 – Contagious cows milked last; 5 – Contagious cows milked separately
2	Milk from infected quarters is discarded	2	1 – No; 3 - Kept separately and fed to calves; 5 – Yes
3	Teats are dipped in germicide after each milking	2	1 – No; 5 – Yes
4	Separate cup for infected cows/quarters	5	1 – No; 5 – Yes
5	Individual cloth/paper towels are used to wash/dry teats.	2	1 - Not washed; 2 - Washed, not dried; 3 - Dried with reusable cloth; 4 - Dried with other dispensable material (newspaper,etc); 5 - Dried with individual cloth or paper towel
4.2	Control of environmental mastitis	47%	
1	Teats are pre-dipped with germicide before milking	5	1 – No; 5 – Yes
2	Cows should be kept standing after milking (offer them feed)	1	1 – No; 5 – Yes
3	Practices to reduce stress are employed (proper handling, hoof care, climate season) considerations)	1	1 – No; 5 – Yes
4.3	Diagnosing mastitis	40%	
	Is CMT testing conducted on the farm?	2	1 - No; 2 - Once every 6 months; 3 - Once every 3 months 4 - Once every month; 5 - Once every 2 weeks
4.4	Treating sub-clinical mastitis	60%	
1	In case of subclinical mastitis, dry cow antibiotics are administered directly after the last milking before drying off. All four quarters treated	3	1 – No; 2 – Antibiotics are not applied aseptically, 3 – Only obviously affected quarters are treated, 4 – All four quarters treated aseptically
4.5	Treating clinical mastitis	40%	
1	Antibiotic treatment: cow is milked out and then given an intramammary infusion of antibiotic. Infused directly into the infected gland.	3	1 – Not treated; 2 – Antibiotic is not administered directly into affected quarter; 3 – Administered incorrectly but treatment length is respected; 4 - Administered adequately but treatment length is not respected; 5 - Administered adequately and treatment length is respected
2	Only acute (sudden onset) cases are treated with antibiotics.	1	1 – No animals treated; 2 - Only chronic cases are treated with antibiotics; 3 - Both acute and chronic are treated; 4 - Chronic cases are administered supportive treatment or culled if no longer economically viable; 5 - Dry cow therapy for chronic cases
3	Dry cow therapy for chronic cases		
4	Withdrawal period is checked and maintained for cows under treatment	1	1 – No; 3 - Kept separately and fed to calves; 5 – Yes

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RECOMMENDATIONS

- Adapt and disseminate the 10 point-mastitis control plan
- Incorporate SCC in MCC evaluation, whenever SCC of any MCC rises above standard limit (3 X 10^5 cells/ml RSB, or 4 X 10^5 cells/ml) limit, initiate interventions (screening cows, training etc.) at farm level
- Develop farm Standard Operating Procedures and use of dairy assessment and advisory tool to monitor, benchmark and provide feedbacks on dairy best practices for farmers
- Continual refresher training at both basic (farmers) and advance level (technicians, veterinarians) on mastitis control

ACKNOWLEDGEMENT

- Feed the Future Innovation Lab for Livestock Systems, Institute of Food and Agricultural Sciences
- National Veterinary Institute, SVA
- Swedish University of Agricultural Sciences, SLU
- University of Rwanda
- Milk Collection Centers
- Farmers

Murakoze Cyane = Thank You Very Much

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