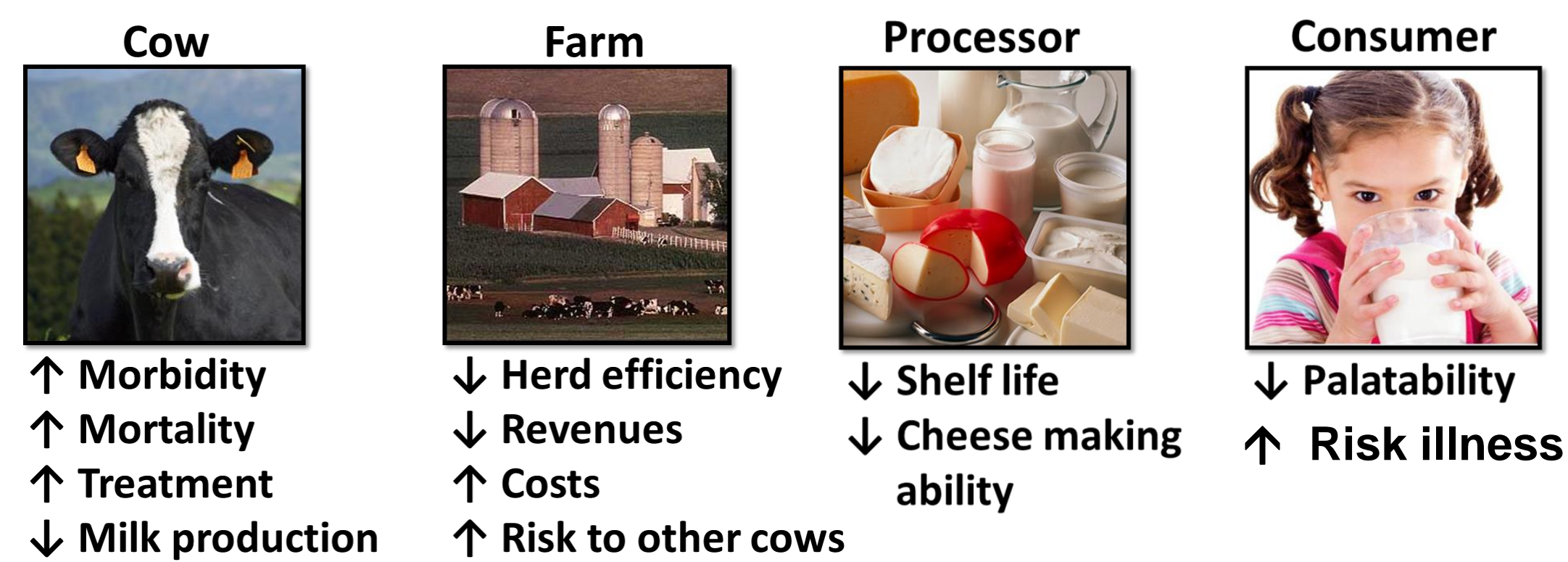


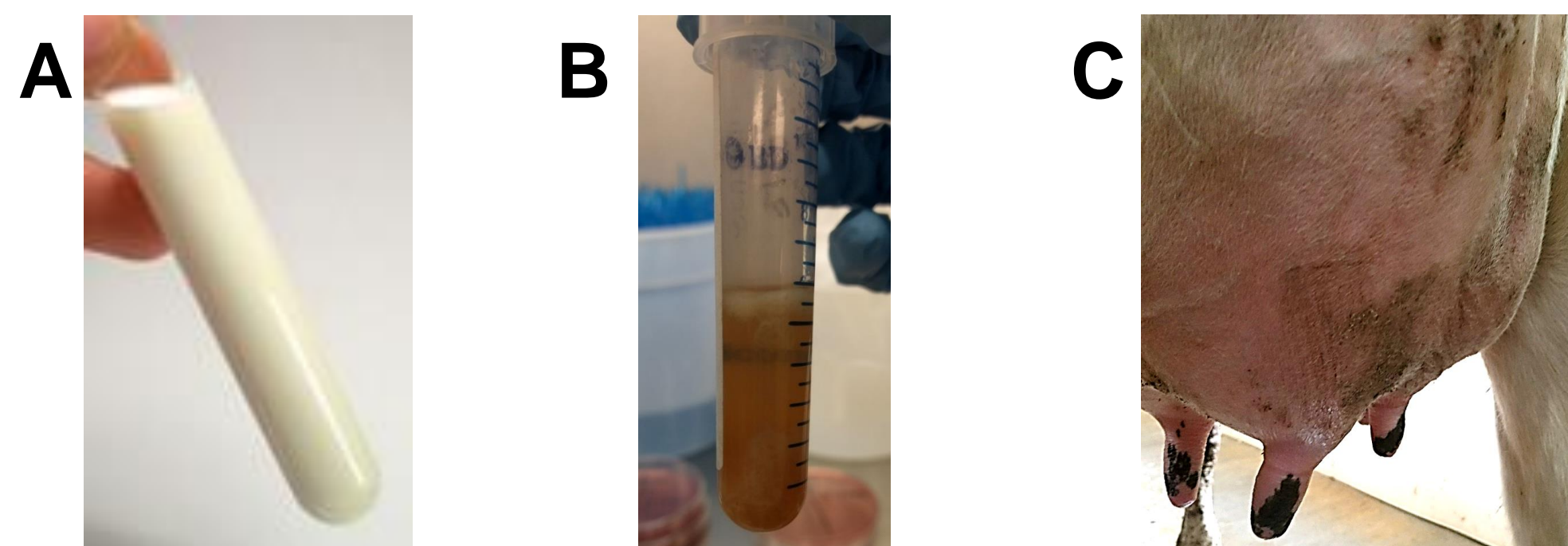


## Introduction

- Mastitis is the most prevalent and costly disease affecting the dairy industry
- It occurs when bacteria or other organisms invade the mammary gland causing inflammation and decreasing milk quality that affects multiple levels of the industry



- Subclinical mastitis- infection *without* any visible clinical signs (Photo A)
- Clinical mastitis- infection resulting in visible abnormalities in the milk or udder (Photo B)
- Example of an udder infected with mastitis (Photo C)



- Primary subclinical: *Streptococcus agalactiae*, *Staphylococcus aureus*, *Streptococcus dysgalactiae*, *Streptococcus uberis*, and other coagulase negative *Staphylococci*
- Primary clinical: *Streptococci*, *Staphylococci*, or coliforms. Coliforms most common cause of severe clinical mastitis
- Limited research available identifying the most frequently isolated mastitis pathogens in Tennessee. Knowing the types of pathogens present allows for effective changes in management practices as well as development of treatment plans

## Hypothesis

- I hypothesize that the most frequently isolated subclinical mastitis pathogens in Tennessee will be coagulase-negative *Staphylococci* and *Staphylococcus aureus* and the most frequently isolated clinical mastitis pathogens will be coliforms such as *Escherichia coli*. Furthermore, I hypothesize that major pathogens will occur more frequently in Spring than Fall.

## Objective

- To identify the most frequent mastitis causing pathogens for each type of mastitis, per farm, and between seasons.

## Experimental Design

- Milk samples (n=1231 subclinical, n=245 clinical) were obtained from 9 Tennessee dairy farms participating in the Southeast Quality Milk Initiative
- Subclinical samples from 10-20 cows per herd per visit producing milk with somatic cell counts over 400,000 cells/ml (somatic cell count >200,000 cells/ml = active infection)
- Subclinical samples were first taken in February/March 2016 and then September/October 2016.
- Clinical mastitis samples were submitted by the farmers.

2. Milk samples were plated on BBL TSA II agar plates with 5% sheep's blood and BBL MacConkey agar plates to obtain bacterial colonies (Blood agar pictured on left)

3. Gram staining and various biochemical tests were performed to determine the types of organisms present using National Mastitis Council guidelines

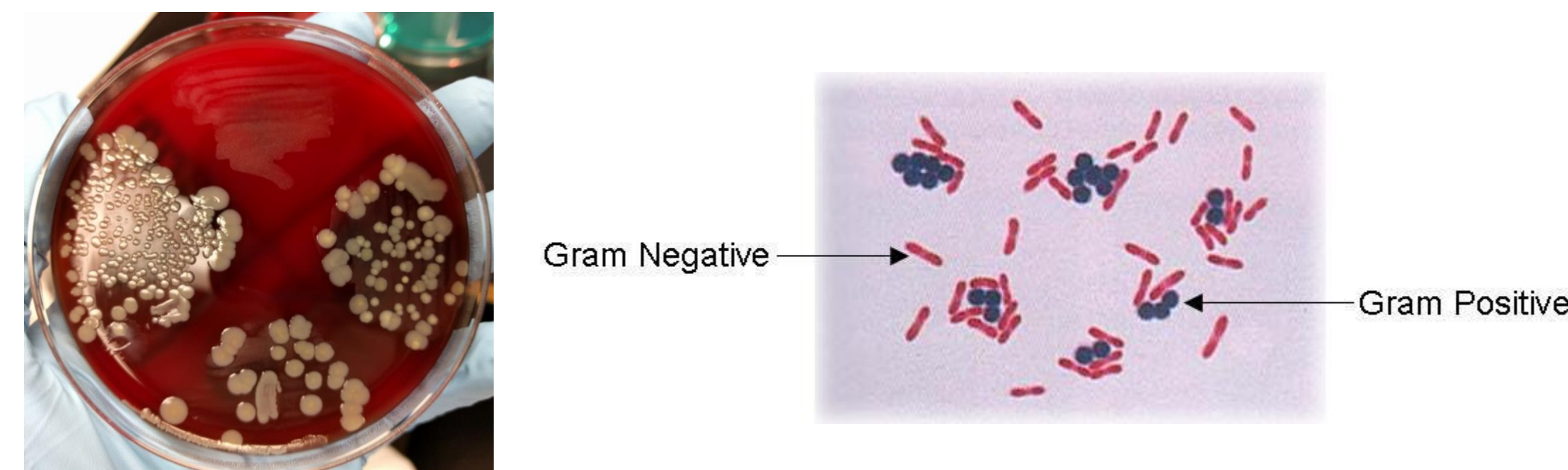
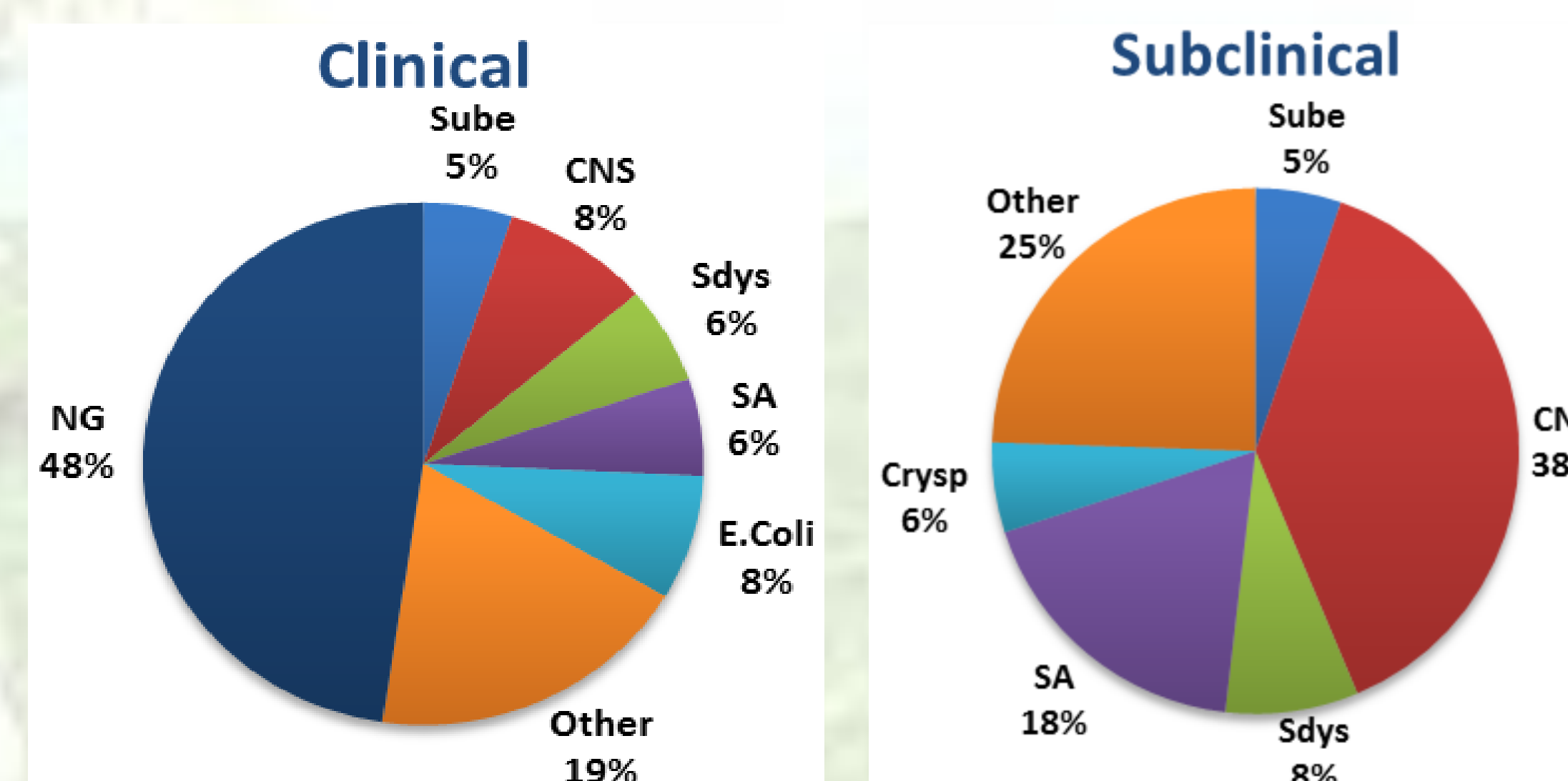


Table 1: Codes for organisms represented in the research data.

Code	Organism	Code	Organism
CNS	Coagulase-Negative <i>Staphylococci</i>	Other	Other (<5%)
Crysp	<i>Corynebacterium</i> species	SA	<i>Staphylococcus aureus</i>
E.Coli	<i>Escherichia coli</i>	Sdys	<i>Streptococcus dysgalactiae</i>
Ent spp	<i>Enterococcus</i> species	Ser spp	<i>Serratia</i> species
EnvS	Environmental <i>Streptococci</i>	Sube	<i>Streptococcus uberis</i>
Llac	<i>Lactococcus lactis</i>	Yeast	Yeast
NG	No growth		

## Results & Discussion

Figure 1: Prevalence of microbes for clinical and subclinical mastitis milk samples. Microbes with a prevalence of < 5% were grouped under "Other." There were 19 "Other" species for clinical and 27 "Other" species for subclinical.



- Top three clinical mastitis organisms isolated were coagulase-negative *Staphylococci* (8.85%), *Escherichia coli* (7.96%), and *Staphylococcus aureus*/*Streptococcus dysgalactiae* (6.19% each). The most common result was no growth (48%) and typically suggests the infection was eliminated by the cow.
- Overall, 43.14% of quarters had subclinical infections. The top three subclinical pathogens isolated were coagulase-negative *Staphylococci* (38.42%), *Staphylococcus aureus* (18.16%), and *Streptococcus dysgalactiae* (8.16%)
- Regardless of the type of infection, the most frequently isolated pathogen overall was coagulase-negative *Staphylococci*.

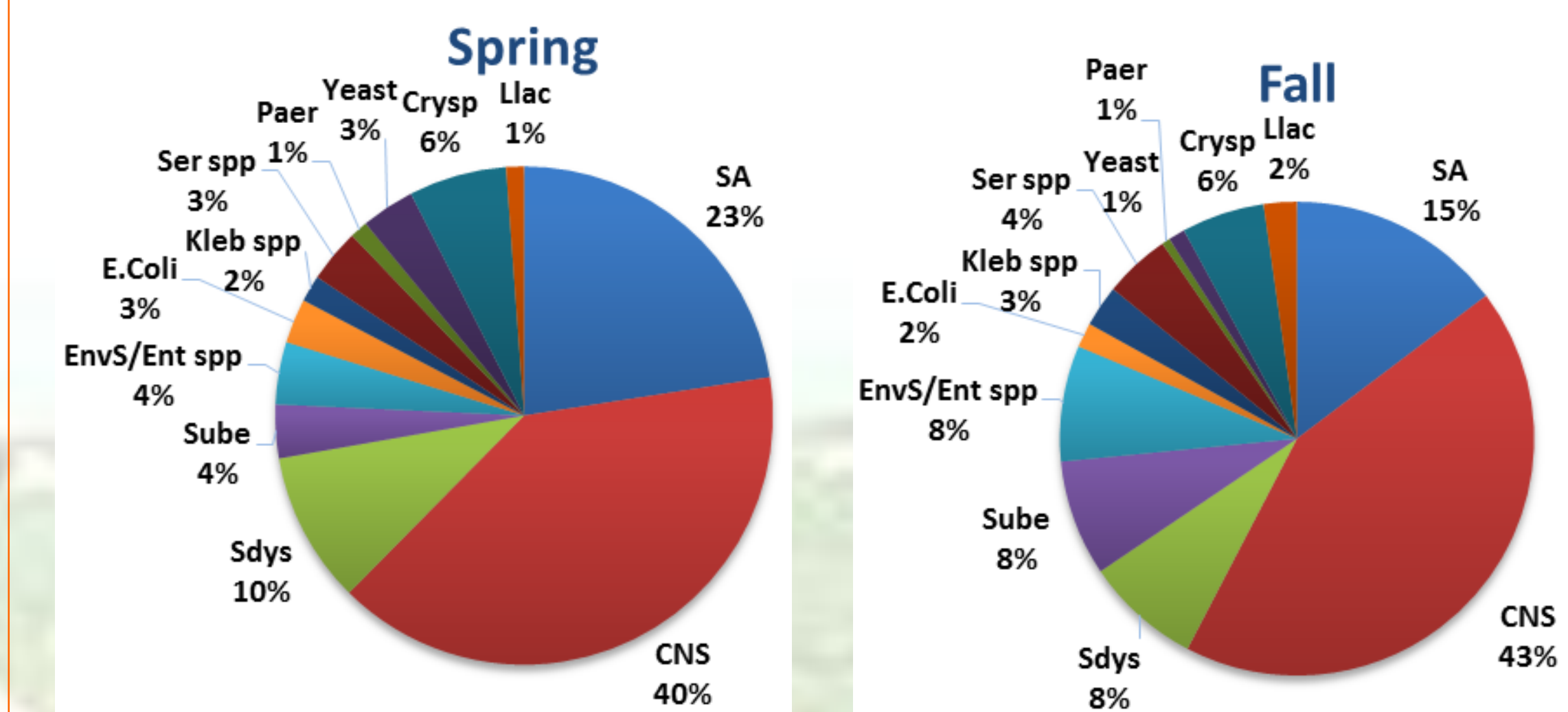
Table 2: Prevalence of microbes from subclinical mastitis samples compared across the nine Tennessee dairy herds sampled.

Herd #	SA	CNS	Sdys	Sube	EnvS/Ent spp
Herd 1	9.26%	25.93%	7.41%	7.41%	1.85%
Herd 2	6.25%	25%	0%	9.38%	9.38%
Herd 3	15.58%	18.18%	7.79%	5.19%	3.90%
Herd 4	13.89%	44.44%	5.56%	0%	2.78%
Herd 5	3.57%	23.21%	0%	0%	5.36%
Herd 6	7.14%	19.64%	8.93%	3.57%	0.00%
Herd 7	18.06%	25.00%	11.11%	0%	5.56%
Herd 8	17.07%	36.59%	7.32%	0%	0.00%
Herd 9	14.49%	28.99%	1.45%	10.14%	7.25%

Herd #	E.Coli	Ser spp	Yeast	Crysp	Llac
Herd 1	0.00%	0.00%	1.85%	5.56%	0.00%
Herd 2	0.00%	3.13%	3.13%	15.63%	6.25%
Herd 3	5.19%	6.49%	0.00%	1.30%	0.00%
Herd 4	0.00%	1.39%	0.00%	0.00%	2.78%
Herd 5	3.57%	12.50%	10.71%	0.00%	3.57%
Herd 6	0.00%	0.00%	0.00%	8.93%	0.00%
Herd 7	0.00%	0.00%	0.00%	8.33%	0.00%
Herd 8	4.88%	0.00%	0.00%	0.00%	0.00%
Herd 9	0.00%	0.00%	0.00%	1.45%	0.00%

- The major pathogens were consistent across the 9 farms
- Herd 2 had high incidence of *Corynebacterium* species
- Herd 5 had high incidence of *Serratia* species and Yeast

Figure 2: Prevalence of microbes from subclinical mastitis samples separated by sampling period (Fall vs. Spring)



- Spring: 307 of the 628 quarters were infected (48.89%)
- Fall: 217 of the 547 quarters were infected (39.67%)
- Incidence of major pathogens similar between Fall and Spring

## References

- Erskine, Ronald J. DVM. Mastitis in Cattle. Merck Veterinary Manual
- NMC, N. M. C. 1999. Laboratory handbook on bovine mastitis. 2nd ed. National Mastitis Council, Madison, WI

## Acknowledgements

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