

URECA Proposal submitted by -----

Faculty Mentors: Dr. Jessica Carter and Dr. Maegan Hollis

Project Title: Evaluation of breed, milk production, and udder characteristics on somatic cell count and udder pathogens in lactating Holstein and Jersey cows.

Introduction

Mastitis, a common problem in dairy cows, is inflammation in the udder that is usually caused by bacteria entering their system. It is indicated by the presence of somatic, or body, cells that result from the body's attempts to fight infection. A higher somatic cell count (SCC) is indicative of a higher number of bacteria in the udder (Sharma, 2011). SCC can be divided into two types: subclinical (when the animal only has an elevated SCC and no visual symptoms) and clinical (when the animal exhibits both higher SCCs and symptoms). Symptoms of clinical mastitis include clots in the milk, bloody or pink milk, redness and/or inflamed udders, lowered milk output, lack of appetite, etc. Furthermore, this condition can have many economic ramifications. These include a lowered output of milk, obviously, which results in fewer profits (Geary et al., 2013). The farmer may have to dump the cow's milk for a period of time and possibly cull the cow. Prevalence of mastitis also leads to a higher bulk tank SCC. Bulk tank measurements must remain below 750,000 cells/ml in order to sell the milk to a processor, but most milk cooperatives prefer to purchase milk that is below 400,000 cells/ml and will offer premiums to producers who consistently sell milk with a lower SCC. Milk samples will be cultured in order to determine which bacterial species are present and so that the cow can be treated and/or managed correctly to reduce SCC and clear up any infection.

Objective

The objective of this project is to examine the impacts of breed, milk production characteristics and udder measurements on SCC (cells/ml) and udder pathogens in the MTSU dairy herd.

Methodology

Two groups of cattle (12 Holstein and 12 Jersey; 24 total) will be evaluated for a 6 week period to assess the effects of breed, daily milk yield, days in milk (DIM), and udder measurements on SCC and udder pathogens. We will measure SCC weekly by collecting milk samples during one milking using a DeLaval Cell Counter. If SCC is greater than 350,000 cells/ml the milk sample will be cultured to determine which bacteria are present. Milk samples that are cultured will be put on a Tri-plate agar that will help determine which species of bacteria are present. The cows also will be evaluated using a multi-zone hygiene scoring system for udder cleanliness (Cook, 2002; 1= very clean and 4= very dirty). We will evaluate milking speed and conductivity and take udder measurements (Blottner et. al. 2011, Sahu et al., 2018). We will examine the correlations between the physical and genetic factors studied and the species of bacteria that cause the mastitis. Data will be compiled into a Mixed Model procedure with repeated measures using breed as the main effect and analyzed using SAS software.

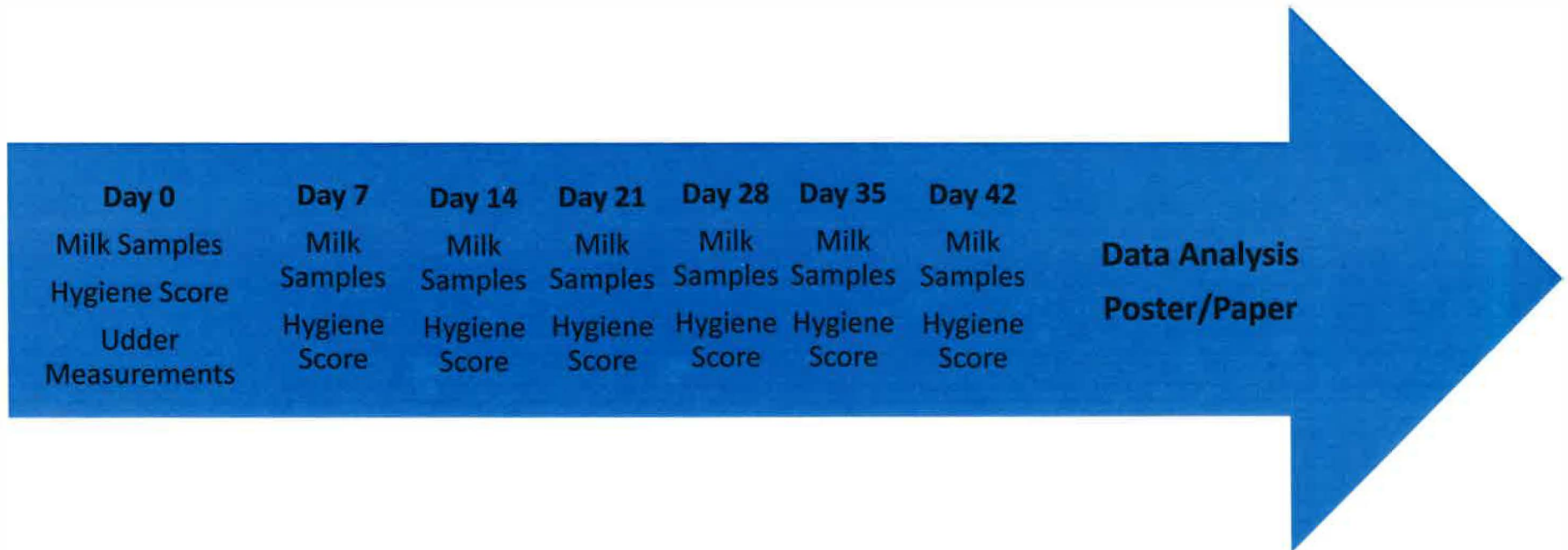
Description of Duties: Student will be responsible for collecting milk samples once per week for testing of SCC and will culture milk samples from cows with a high SCC (>350,000 cells/ml). She will collect hygiene scores on the cows during milking time once per week and take udder measurements at the beginning of the project. Data will be downloaded from Afimilk software to record daily milk yield, conductivity, and milking speed. Student will compile this data over a 6-week period. This is the first URECA submission for student.

Role of Mentors: Dr. Carter and Dr. Hollis will assist with collecting data and will train student on hygiene scoring. They will also assist with data management, interpretation, and statistical analysis.

References

- Blottner, S., B.J. Heins, M.Wensch-Dorendorf, L.B. Hansen, and H. H. Swaive. 2011. A comparison between purebred Holstein and Brown Swiss x Holstein cows for milk production, somatic cell score, milking speed, and udder measurements in the first 3 lactations. *J. Dairy Sci.* 94:5212-5216.
- Cook, N.B. 2002. The influence of barn design on dairy cow hygiene, lameness, and udder health. Pages 97-103 in Proc. Of the 35th Ann. Con. Amer. Bov. Pract., Madison, WI. Amer. Assoc. Bov. Pract., Rome, GA.
- Geary, U., N. Lopez-Villalobos, B. O'Brien, D.J. Garrick, & L. Shalloo. (2013). Examining the impact of mastitis on the profitability of the Irish dairy industry. *Irish Journal of Agricultural and Food Research*, (2), 135. Retrieved from <https://ezproxy.mtsu.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=edsjsr&AN=edsjsr.23631026&site=eds-live&scope=site>.
- Sahu, S., Nanavati, S., Tomar, S. S., Yadav, D. S., Jamra, M. S., & Sulya, V. (2018). Association between Somatic Cell Count, Electric Conductivity and pH in Diagnosis of Subclinical Mastitis in Crossbred Cows. *Indian Journal of Veterinary Sciences & Biotechnology*, 13(3), 90. Retrieved from <https://ezproxy.mtsu.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=edb&AN=130340124&site=eds-live&scope=site>.
- Sharma, N., Singh, N. K., & Bhadwal, M. S. (2011). Relationship of somatic cell count and mastitis: an overview. *Asian - Australasian Journal of Animal Sciences*, (3), 429. Retrieved from <https://ezproxy.mtsu.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=edsgao&AN=edsgcl.250999930&site=eds-live&scope=site>.

Timeline for Project*:



*Daily milk yield, conductivity, parity, and milking speed data recorded from Afimilk database weekly

URECA BUDGET

(To be developed in consultation with faculty mentor)

Stipend

URECA Assistant (designed for one semester) Hours expected: 60 hours Stipend: \$500

Other Expenses

Many proposals do not warrant other expenses. If the project requires supplies and/or travel funding, departmental support is expected, especially for research that counts toward course credit.

SUPPLIES: All requested supply funds must be associated directly with the proposed project and be clearly and fully documented. This documentation should include a justification (explanation of why the supplies are necessary) and proof of costs (copy of webpage or catalog page). Awards for supplies are limited to \$300.

Expense Item	Estimated Cost (should include estimated shipping)
Cassettes for Somatic Cell Count test, box of 72	\$ 184.25
Tri-plate agar for milk cultures, \$3.15 ea. + \$20 shipping (30)	\$ 114.50
	\$
	\$
Total Other Expenses	\$ 298.75

TRAVEL: All requested travel funds must be associated directly with the proposed project and be clearly and fully documented. This documentation should include a justification (explanation of why the travel is necessary) and a Travel Authorization form which can be found at <http://www.mtsu.edu/boffice/forms.php#as>. Travel funds are limited to \$400 for domestic travel and \$500 for international travel. Requests for travel to present results should not be included with this application.

Budget Justification

Supplies are being requested for the following:

1. Cassettes for Somatic Cell Count test of milk; the cassettes for our DeLaval Cell Counter are single use and cost \$2.56/sample or \$184.25 per box of 72. Total cost of cassettes is \$368.64 (144 samples x \$2.56 ea.).
2. Tri-plate with 3 types of agar to test for bacterial species in milk. Cost is \$3.15 each. Total cost of Tri-plates is estimated to be \$209 (~60 samples during the project x \$3.15 plus \$20 shipping).

	Amount
Total Project Cost:	\$577.64
Funds request from URECA	\$298.75
Remaining funds to be covered by department or grant:	\$278.89

**Easy Culture Order Form University of Minnesota Veterinary Diagnostic Laboratory
Laboratory for Udder Health 1333 Gortner Avenue St. Paul MN 55108**

Orders may be placed by:
Phone: 612-625-7053
Fax: 612-624-4824
Email: mastlab@umn.edu

Orders are shipped out Monday-Wednesday to ensure packages are not in transit over weekends.

Orders for **in-stock** items received **prior to 9:00am** will ship same-day.

We guarantee 8 weeks from receipt of TRI, BI, Factor™, 4Cast™ and Focus™ plates prior to expiration.

We guarantee 4 weeks from receipt of MacConkey and Blood plates prior to expiration.

MinnesotaEasy™ MTKT media has a new name: MinnesotaEasy™ Focus™
Now Introducing MinnesotaEasy™ 4Cast plate: To be used to screen cows prior to dry-off.

Prices below do not include shipping charges, which will be billed to the customer.

Item	Unit Price	Quantity	Total Price
MinnesotaEasy® Culture System Handbook-English	\$0.00		\$0.00
MinnesotaEasy® Culture System Handbook-Spanish	\$0.00		\$0.00
MinnesotaEasy® 4Cast Quick Start Guide	\$0.00		\$0.00
4Cast™ Plate (4-Section Selective Dry Cow Therapy) (18ml/plate)	\$2.25		
Tri-Plate (Factor™-MacConkey-Focus™) (18ml /plate)	\$3.15		
Bi-Plate (Factor™-MacConkey) (18ml /plate)	\$2.00		
Factor® Plate (18ml/plate)	\$1.75		
Focus™ Plate (18ml/plate)	\$1.75		
MacConkey Plate (18ml/plate)	\$1.20		
Blood Plate (18ml/plate)	\$1.20		
Coagulase Tube-Individual Tube (0.5ml/tube)	\$1.75		
Bottle of 15 ml dehydrated Coagulase Plasma	\$32.00		
Pack of 125 Sterile 5ml Tubes	\$25.00		
Pack of 100 Sterile Swabs	\$1.50		
Box of 100 Sterile Swabs (2/pk)	\$11.00		
Pack of 50 Sterile Inoculating Loops	\$5.00		
Milk Sample Mailer (holds 75 2oz vials + large ice packs)	\$8.00		
Milk Sample Mailer (holds 10 2oz vials + small ice pack)	\$8.00		
2 oz Milk Vials	\$0.30		
TOTAL:			

Customer Shipping Information:	Customer Billing Information:
Company: <input type="text"/>	Company: <input type="text"/>
Contact: <input type="text"/>	Contact: <input type="text"/>
Address: <input type="text"/>	Address: <input type="text"/>
Phone: <input type="text"/>	Phone: <input type="text"/>
Email: <input type="text"/>	Email: <input type="text"/>

Replacement Policy: If you received plates that are damaged or become contaminated prior to the expiration date, please contact the Laboratory for Udder Health at 612-625-7053 and we will ship replacement plates to you at no charge. You may be asked to supply information about the lot number and the nature of the contamination for QC purposes.

Middle Tennessee Dairy Service, Inc.

8003 Old Woodbury Pike

Readyville, TN 37149

615-893-2526

Invoice

Date	Invoice #
1/23/2019	5754

Bill To

MTSU Dairy Unit
Cope Admin. Bldg. - Room 106
Attn: Accounts Payable
Murfreesboro, TN 37132

Ship To

MTSU Dairy Unit
Cope Admin. Bldg. - Room 106
Attn: Accounts Payable
Murfreesboro, TN 37132

Memo	P.O. Number	Terms	Sales Person	Account #
		Due by 22nd	5	MTSU

Item Code	Quantity	Description	Price Each	Amount
92865881	1	DCC, Cassette, Bx/72	184.25	184.25

Accounts Over 30 Days Subject to 18% Interest & Attorney Fees.

Keeping Your Dairy Profitable!

Total	\$184.25
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E-mail

mtds@midtdairy.com

Fax #

615-893-1131