



Northern New York Agricultural Development Program
2017-2018 Project Final Report

**Calf Health Treatment Protocols, Compliance
and Economic Impact on NNY Dairy Farms**

Project Leader(s):

- Kimberley Morrill, Ph.D., Regional Dairy Specialist, Cornell University, CCE St. Lawrence County, 2043B ST HWY 68, Canton, NY 13617; cell: 603-568-1404, kmm434@cornell.edu
- Robert Lynch, Dairy Herd Health & Management Specialist, PRO-DAIRY Program, Cornell University, Ithaca, NY

Collaborators:

- Lindsay Ferlito, Regional Dairy Specialist, Cornell University
- 8 dairy farmers in Northern New York

Introduction:

The U.S. dairy industry is committed to producing safe, abundant and affordable milk and dairy beef of the highest quality. Healthy animals represent safe food, and disease prevention is the key to keeping calves and cows healthy. Among the measures available to treat and prevent the outbreak and spread of animal diseases in the nation's dairy cattle, the responsible use of antibiotics has a positive effect on animal health and well-being while keeping the milk supply safe for everyone. When dairy animals get sick and treatment is necessary, producers and veterinarians use drugs judiciously. Antibiotics should be used appropriately to prevent residues from occurring in milk or dairy beef sent to market.

Antimicrobial resistance and prudent antimicrobial use are two global issues that are continuing to receive increased attention in both humans and animals. Antimicrobials are of great importance in modern human and veterinary medicine, however, overuse and/or inappropriate use has been linked to antimicrobial resistance. Resistance can lead to suboptimal treatment results of bacterial infections. Due to several incidents of methicillin-resistant *Staphylococcus aureus* (MRSA) and extended spectrum betalactamase-producing bacteria (ESBLs), antimicrobial resistance and antibiotic usage have gained increased attention. It is debatable whether or not antimicrobial resistance observed in pathogens in animals will be transmitted to humans, but the transmission definitely is possible, either through direct contact or via the food chain. Although recent sequence-based population level studies indicate that relatively little transmission occurs among animal species and between animals and humans, responsible antimicrobial use in food animals is paramount for maintaining animal health and possibly human health.

Prudent use of antimicrobials is of great importance for dairy farms. This project addressed the use of antibiotics for calf health. The first step is focusing on prevention, then controlling new infections and reducing the risk of spreading the infection to herdmates. Treatment protocols, and compliance, are important to optimize cure and minimize recurrent episodes.

According to the most recent USDA National Animal Health Monitoring System (NAHMS) report, 12.47% of pre-weaned heifers in the U.S. are affected by respiratory illness, with 93.4% of these calves being treated with antibiotics. To provide local data, 13.33% of calves in the six Northern New York counties had a respiratory challenge in June 2015, while 14.54% of calves had a respiratory illness in the winter of 2016-2017. During both of these studies respiratory illness affected up to 50% of the calves on a per farm basis.

Calf respiratory disease is associated with decreased average daily weight gain, increased age at first calving, decreased milk production in first lactation, and increased culling in the first 30 days after first lactation. All of these factors lead to an increase cost of production and decreased revenue.

Often time we do not think about the treatment protocol or the cost of treatment and the long-term impact treatment due to illness may have on a dairy operation. Proper treatment protocols ensure that cattle are treated in a manner that is legal, minimize the risk of residues, and fit the illness. Not following proper protocols can lead to an increase in residue risk, an increase in cost, an increase in time treated and overuse of antibiotics.

Project Objectives:

- Determine protocol compliance for calfhoo d illnesses on NNY dairy farms
- Determine the treatment cost associated with calfhoo d illness
- Bring awareness to antibiotic stewardship to increase consumer confidence in our food supply

Materials & Methods:

Farm Selection: Farms were selected based on three criteria:

- written youngstock treatment protocols for respiratory and scours,
- written or electronic youngstock treatment records that include animal ID, reason for treatment, date of treatment, drug used and dosage; and
- allowing access to protocols and treatment records.

Treatment protocols were collected from all eight participating farms to compare to actual treatment records and determine if an animal was treated per protocol. Animals were classified as not on protocol for the following reasons:

- if the drug listed on the treatment record did not match the drug listed on the written farm protocol,
- if the treatment was not provided for the full duration as written on the protocol, and
- if the correct dosage of the drug was not provided.

Treatment records (paper and/or electronic) were collected from all farms. Records were reviewed for protocol compliance to evaluate the total number and percentage of youngstock treated per farm, the number and percentage of pre-weaned heifers treated per farm, and the number of times an individual animal was treated over the 8-month period of the study (January 1, 2018 to October 31, 2018).

During the review of records, events were standardized to “respiratory, scours, navel, metaphylaxis and other.” The other category included bloat, joint-ill, pink eye, ear infection, and arthritis. If multiple treatments were provided to the animal for the same bout of illness it was

considered one event (i.e., a five-day treatment for a navel infection = 1 event). Pneumonia treatments that occurred more than 7 days apart were considered two different events. Electrolyte usage that was recorded by the farm was identified as a treatment. Electrolyte usage that was recorded as a treatment was included in the total number of treatments, but not included in the financial analysis.

Financial Analysis: To standardize the treatment price across participating farms, costs were determined for each treatment based on the purchase price from Valley Veterinary Supply. A cost of individual treatment, and total treatment cost/calf was then calculated. It is important to note that only drug cost was included in the calculation of cost.

Results & Discussion:

A total of 6,255 treatment records, from 2,618 non-lactating heifers, were collected from eight Northern New York dairy farms between January 1, 2018 to August 31, 2018. Average herdsize was 1,836 mature cows (SD = 971.64) with a range of 709 to 3,240. Average size of the heifer herd was 2,056 (SD = 771.39) with a range from 810 to 3,006. In total, this study represents approximately 14,391 non-lactating animals.

Average herdsize reported in this study is greater than many NNY herds. This is because all small farms that were contacted to participate in the study did not reach at least one of the three criteria. There were additional medium and large farms that were contacted but they either did not meet the criteria, or were not interested in participating. The original goal of 15 farms was not met and it was a challenge to enroll eight farms. Even after assurance that data would be blinded, farms that met all the criteria, but did not want to enroll, cited confidentiality as their primary concern for not participating.

A total of 5,732 (91.59%) of treatments were given to non-lactating heifers, according to the written on-farm protocol (Table 1).

Compliance:

- Compliance across herds ranged from 73.58 to 100% (Table 2).
- Protocol compliance was similar across treatment events (Table 3), and ranged from 90.03% compliance for pneumonia to 100% compliance for treatments categorized in other.
- Compliance to treatment protocols was very high in this study. It is important to note that the farm that had 100% compliance was recording all events and treatments in Dairy Comp 305, and there were no written records.

This observation study only compared records to protocols; we did not evaluate how accurate the records were on the farm; i.e., did the treatment record match what was actually provided to the calf? It is also important to note that three farms did not report any treatment events for calves less than 31 days of age. This does not mean the farm did not have any sick calves <31 days old, but suggests that treatment records were not kept for calves <31 days of age.

Age and Treatment by Illness:

- Average age of treatment was 77 days of age (range = 0 to 626), Table 4). The largest number of calves were treated, primarily for scours, between 8 to 31 days, and for pneumonia between 61 to 120 days (Table 5; Figure 1).
- Only 14 heifers were treated after 365 days of age, 9 for pneumonia and 5 for “other.”

- Treatment of navel infections occurred early in life, with an average of 12.19 days of age, but ranging from 3 to 73 days (Table 5).
- Scour treatments occurred within the first few months of life, with an average age of 13.05 days of age, but ranged from 0 to 104 days.

Treatment Frequency and Costs:

- Calves were treated for an average of 2.19 events over the 8-month period with a range of 1 to 9 different events.
- Average treatment cost per event was \$8.08 per animal, with a range of \$0.09 to \$34.28 (Table 6).
- Average total cost of treatment(s) per animal over the 8-month period was \$18.17 with a range of \$0.20 to \$129.10.
- Average event treatment cost ranged from \$1.12 for scours (range \$0.35 to 29.12) and navel infections (range = \$0.20 to \$29.12) to \$9.08 for pneumonia (range = \$ 0.09 to \$34.28) and \$9.57 for metaphylaxis (\$0.489 to \$9.79).

It is important to note that for treatment cost we only evaluated the cost of the drug that was administered. We did not include costs associated with labor, supplies (needle, syringe, IV tube...), lost future milk production, increased cost of heifer rearing related to losses in feed efficiency, growth rates, as well as costs related to developing carrier animals and risk of relapse.

Conclusions/Outcomes/Impacts :

The two greatest challenges with this project were identifying, and subsequently enrolling, farms that had written calf treatment protocols, and accurate calf treatment records that included ID, date of treatment, reason treated, drug administered and dosage. Many farms did not have written calf treatment protocols; for those that did, many either did not keep calf treatment records, or kept very minimal records that did not include necessary information.

The lack of written calf treatment protocols and treatment records is a critical area for educational outreach regarding how to enhance animal welfare, farm efficiency, and consumer confidence in dairy products. To support that type of educational outreach, this study provided that outreach opportunity and demonstrates that with both written treatment protocols and written treatment records protocol compliance is high. The project leaders were able to help numerous producers develop treatment protocols and facilitate the conversations between the producer and veterinarian to fully develop, write, and implement proper treatment protocols, and use treatment records. Additionally, presentations at regional dairy meetings (see Outreach section) provided additional educational opportunities re: the importance of proper record keeping and the application of proper treatment protocols.

Calfhood illnesses appeared at two primary times: 8 to 31 days, and again at 61 to 120 days. The early timeframe issue was primarily scours; the later, pneumonia. The majority of calves experienced at least two different illness events, with a small number of calves having as many as 9 different illness events. Average treatment cost per calf per event was \$8.08, but overall treatment cost per calf over the 8-month period was \$18.17.

Outreach:

The results of this Calf Health Treatment Protocols, Compliance and Economic Impact on NNY Dairy Farms project were shared at the Lewis County Day program (1/15/2019) and the Jefferson County Dairy Day program (1/16/2019), and will be shared at the Franklin County

Dairy Day program (2/14/2019) and St. Lawrence County Dairy Day program. Additionally, there will be at least one, if not two, articles written about this project to include in the North Country Ag Advisor, and an abstract written and submitted to the American Dairy Science Association (ADSA) to be considered for a presentation at the ADSA meeting in June 2019.

One-on-one outreach occurred on many farms and following multiple dairy meetings. This outreach included discussion of treatment protocols and records, and conversations with the herd veterinarian and/or the state veterinarian on developing treatment protocols.

Next Steps:

I would like to continue working with the participating eight farms to follow the treatment records out to have a full 12 months' worth of data for each farm and for each animal. This will allow us to draw a better conclusion on the number of times a calf is treated in the first year of life and the treatment cost. Right now we have 8 months' worth of data, but this includes records for animals born before 01/01/2018 and animals born up to 8/20/2018.

Outreach is still needed to help farmers write treatment protocols and to explain the critical value of keeping individual calf treatment records.

Acknowledgments:

Thank you to NNYADP for the continued funding of this project and to the dairy producers across Northern NY who have been receptive to the project.

For More Information:

- Kimberley Morrill, Ph.D., Regional Dairy Specialist, Cornell University, CCE St. Lawrence County, 2043B ST HWY 68, Canton, NY 13617; cell: 603-568-1404, kmm434@cornell.edu

APPENDIX: Tables and Figures

- Table 1.** Total number & percentage of non-lactating treatments that followed on-farm protocol
- Table 2.** Total number of treatments "on-protocol" by farm and event
- Table 3.** Number & percentage of all treatments by event that were "on-protocol"
- Table 4.** Average Age (days) at Onset of Event by Illness Type
- Table 5.** Total Number of Treatments by Age of Animal by Farm and Event
- Table 6.** Average Cost of Treatment by Illness & Overall Total Treatment Cost Per Calf

Figure 1. Number of Animals Receiving Treatment By Age at Time of Event

Table 1. Total number and percentage of non-lactating treatments that followed the on-farm protocol, Calf Health Treatment Protocols, Compliance and Economic Impact on NNY Dairy Farms, NNYADP Project, 2018-2019.

	Treatment followed on-farm protocol		
	Yes	No	
Treatments (n)	5732	523	6255
Treatments (%)	91.64	8.36	

Table 2. Total number of treatments "on-protocol" by farm and event, Calf Health Treatment Protocols, Compliance and Economic Impact on NNY Dairy Farms, NNYADP Project, 2018-2019.

Farm	Event	Was treatment "on-protocol"?		Total n
		Yes n	No n	
1	Pneumonia	146	51	197
	Navel	35	.	35
	Scours	.	14	14
	Subtotal (n, %)	181 (75.58)	65 (26.42)	246
2	Metaphylaxis	54	5	59
	Pneumonia	218	10	228
	Scours	131	.	131
	Navel	353	8	361
Subtotal (n, %)	756 (96.92)	24 (3.08)	780	
3	Metaphylaxis	279	.	279
	Pneumonia	42	.	42
	Subtotal (n, %)	321 (100)	.	321
4	Metaphylaxis	325	41	366
	Pneumonia	57	2	59
	Subtotal (n, %)	382 (89.88)	43 (10.12)	425
5	Metaphylaxis	119	.	119
	Pneumonia	7	2	9
	Subtotal (n, %)	126 (98.44)	2 (1.56)	128
6	Pneumonia	446	.	446
	Scours	.	10	10
	Navel	5	.	5
	Other	278	.	278
	Subtotal (n, %)	729 (98.65)	10 (1.35)	739
7	Pneumonia	2619	363	2982
	Scours	280	15	295
	Subtotal (n, %)	2899 (88.47)	378 (11.53)	3277
8	Pneumonia	341	1	342
	Subtotal (n, %)	341 (99.71)	1 (0.20)	342
Total for all farms (n)		5732	523	6255
Total for all farms (%)		91.64	8.36	

Table 3. Number and percentage of all treatments by event that were "on-protocol," Calf Health Treatment Protocols, Compliance and Economic Impact on NNY Dairy Farms, NNYADP Project, 2018-2019.

	Event														
	Metaphylaxis			Pneumonia			Scours			Navel			Other		
	On-protocol		Subtotal	On-protocol		Subtotal	On-protocol		Subtotal	On-protocol		Subtotal	On-protocol		Subtotal
Yes	No	Yes		No	Yes		No	Yes		No	Yes		No		
Treatments (n)	777	46	823	3876	429	4305	446	26	472	358	22	380	278	0	278
Treatments (%)	94.41	5.59		90.03	9.97		94.49	5.51		94.21	5.79		100.00	0	

Table 4. Average Age (days) at Onset of Event by Illness Type, Calf Health Treatment Protocols, Compliance and Economic Impact on NNY Dairy Farms, NNYADP Project, 2018-2019.

Illness	n	mean	SD	Low	High
Pneumonia	4304	82.76	65.12	0	626
Scours	471	13.05	10.52	0	104
Metaphylaxis	823	73.24	20.34	0	112
Navel	365	12.19	12.19	3	73
Other ¹	278	209	73.95	93	444
Overall	6241	77.74	67.76	0	626

¹ Other includes: bloat, joint-ill, pink eye, ear infection and arthritis.

Table 5. Total Number of Treatments by Age of Animal by Farm and Event, Calf Health Treatment Protocols, Compliance and Economic Impact on NNY Dairy Farms, NNYADP Project, 2018-2019.

Farm	Event	Age of heifer (days)						Total n
		<8	8 to 31	32 to 60	61 to 120	120 to 365	>365	
		n	n	n	n	n	n	
1	Pneumonia	3	59	66	39	29	1	197
	Scours	10	24	1	.	.	.	35
	Navel	.	11	3	.	.	.	14
	Subtotal	13	94	70	39	29	1	246
2	Metaphylaxis	33	25	1	.	.	.	59
	Pneumonia	14	103	45	18	48	.	228
	Scours	51	77	1	3	.	.	132
	Navel	69	283	4	5	.	.	361
	Subtotal	167	488	51	26	48	.	780
3	Metaphylaxis	.	.	.	279	.	.	279
	Pneumonia	.	.	.	30	12	.	42
	Subtotal	.	.	.	309	12	.	321
4	Metaphylaxis	.	.	4	362	.	.	366
	Pneumonia	.	.	.	53	6	.	59
	Subtotal	.	.	4	415	6	.	425
5	Metaphylaxis	.	.	1	118	.	.	119
	Pneumonia	.	.	.	5	3	1	9
	Subtotal	.	.	1	123	3	1	128
6	Pneumonia	.	4	12	152	276	2	446
	Scours	1	9	10
	Navel	2	2	1	.	.	.	5
	Other	.	.	.	21	252	5	278
	Subtotal	3	15	13	173	528	7	739
7	Pneumonia	66	883	441	874	743	5	2982
	Scours	25	266	2	2	.	.	295
	Subtotal	91	1149	413	876	743	5	3277
8	Pneumonia	.	58	250	28	6	.	342
	Subtotal	.	58	250	28	6	.	342
Total for all farms		274	1804	802	1989	1375	14	6258

Table 6. Average Cost of Treatment by Illness and Overall Total Treatment Cost Per Calf, Calf Health Treatment Protocols, Compliance and Economic Impact on NNY Dairy Farms, NNYADP Project, 2018-2019.

Reason	n	mean	SD	Low	High
Pneumonia	4301	9.077	6.91	0.09	34.28
Scours	213	1.12	3.76	0.36	29.12
Metaphylaxis	777	11.16	4.62	0.48	9.79
Navel	380	1.12	0.15	0.09	1.15
Other	210	1.87	0.88	0.45	4.8
Overall	5881	8.08	6.55	0.09	34.28
Total cost of treatment per calf	2618	18.17	12.86	0.2	129.11

Figure 1. Number of Animals Receiving Treatment By Age at Time of Event, Calf Health Treatment Protocols, Compliance and Economic Impact on NNY Dairy Farms, NNYADP Project, 2018-2019.

