FARM REPORT

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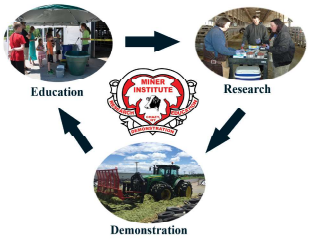

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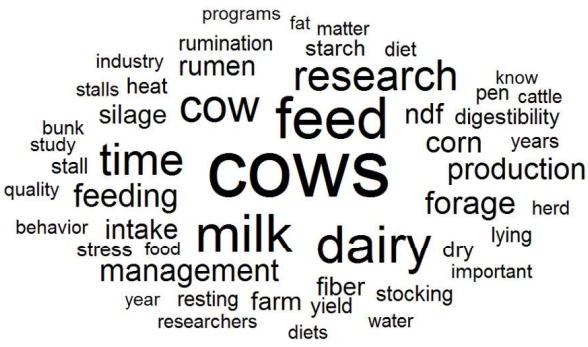
FROM THE PRESIDENT'S DESK: ENJOY YOUR RETIREMENT DR. GRANT! IT'S WELL DESERVED

Happy New Year! It's the year of change for Miner Institute. Rick Grant retired at the end of December after 20+ years of commitment to William Miner's vision of "science and technology in the service of agriculture and the environment".



The most-frequently used words in Rick Grant's Farm Report articles.

Over 19 years ago, Rick took a chance on me, a newly minted PhD, to help grow the dairy cattle research program. I am grateful for Rick's mentorship over the years, especially during the long hours we spent riding in a car, truck, or plane on the way to a meeting of some sort. Rick always had some bit of knowledge to share which was typically sandwiched with a bit of sarcastic humor. Rick provided us, the staff and students of Miner, with lots of good advice over the years. The most common one shared was "Bring No Shame Upon the Institute". Recently at a Miner party where Rick's retirement was recognized, Rick shared that I was the one that came closest to NOT following that advice a time or too. In my defense, William Miner's birthday should always be celebrated. Now as President, I will do my best to follow that advice.

As a fun way to review Rick's impact on the dairy industry while at Miner, a few of us from the Institute as well as some former graduate students working in the feed industry (thanks Melissa Carabeau and Mac Campbell) compiled and read 20+ years of Rick's "From the President's Desk" articles. For you loyal readers, you read 247 articles written by Rick. Amazingly, Rick only missed 1 article deadline during a Japan trip in his first year. Ev Thomas, our Crops Dude and Farm Report editor, wrote a tongue in cheek nutrition article for Rick. Needless to say, Rick never missed another deadline.

"Rick's significant impact on the dairy industry reaches all the way from Japan, to the local farms right here in the North Country, and everywhere in between. This global reach

See **GRANT**, Page 6

THE ECONOMICS OF HERD GENOTYPING

The use of beef semen on dairy herds is exponentially growing. The National Association of Animal Breeders reported that in 2022 the sales of beef on dairy semen were up by roughly 718,000 units for use in the U.S. and for export. Using beef semen on dairies can be beneficial for two reasons: 1. A crossbred calf, heifer, or bull will typically bring in more money at market than a Holstein calf of either sex. The USDA's November National Dairy Comprehensive Report had the price of Holstein bull calves ranging from $275 to 350 per cwt, and Holstein heifers from $120 to175/cwt. Meanwhile, livestock auctions near Miner Institute have seen 3-5 day-old beef cross calves selling for as high as $900. 2. Preserving sexed Holstein semen for genetically superior cows and using beef semen for inferior cows can rapidly increase the rate of genetic gain on a farm and improve the quality of replacement animals. Strategically deciding which animals are bred to beef and which are bred to sexed semen is when this approach becomes most profitable. Identifying your farm's overall genetic goals and preferences can help you identify which cow genetics you want to keep in the herd.

Genotyping is a process that uses laboratory testing and analysis to create a precise picture of DNA. In the dairy world, the first genomic evaluation for Holsteins and Jerseys was released in January 2009, and since then the utilization of this technology has resulted in great genetic gain. Genotyping allows for a more accurate prediction of animals' merit and can be used to advance farmers breeding strategies. Thus, a process like this can be an incredibly useful management tool that helps farmers decide which cows are most valuable and should be bred with sexed semen.

Genomic testing of course requires a monetary cost, but the information it provides has potential to bring in additional profit for farms, so is it worth it? An article recently published in the Journal of Dairy Science assessed "The economic benefit of herd genotyping and using sexed semen for pure and beef-on-dairy breeding in dairy herds". This article was published by researchers from Germany and is somewhat specific for genetics of cows in Germany as it utilizes the German merit index. However, results from this study still provide useful information regarding economics of herd genotyping and the researchers state that the model can be easily adapted to other countries and dairy breeds. All monetary values reported in this article were converted from euros to U.S. dollars.

The researchers derived formulas that they used to predict the net benefit per cow that results from from participating in herd genotyping and from strategic use of sexed beef semen. The farm evaluated by this model was an example of a typical German Holstein farm with 100 cows. The model evaluated eight different scenarios which were then compared to a reference scenario which assumed that the herd was not genotyped, and that all cows were bred with unsexed dairy semen.

The scenarios evaluated by the model are as follows:

- A1: The herd was genotyped. No restrictions on the proportion of cows and heifers bred to specific semen.
- A2: The herd was not genotyped. No restrictions on the proportion of cows and heifers bred to specific semen.
- A3: No restrictions on genotyping. Heifers were not bred with beef semen.
- A3*: No restrictions on genotyping. Heifers were not bred with beef semen. Extra heifer calves were sold for replacement (all other scenarios assume calves were sold for fattening).
- A4: Genotyping was not determined to be beneficial or not. Heifers were not bred with beef semen, and cows were not bred with sexed semen.
- A5: The herd was genotyped. Exclusive use of unsexed Holstein semen.
- B1 and B2 were used for analyzing how much genetic standard deviation in the selection index could drop until herd genotyping would no longer be beneficial over selection using pedigree based estimated breeding values (EBV). The genetic standard deviation in the selection index was $294.

- Both scenarios did not breed heifers to beef.
- The herd was genotyped in B1 but not in B2.

The scenario that generated the most net profit per cow compared to the reference scenario was A1, where the herd was genotyped, and cows and heifers could be bred with any semen. Scenario A1 generated $54.74 more net profit per cow; however, herd genotyping was only partly responsible for this increase ($25.22). In A1, 49.6% of heifers and 11.3% cows with the highest genetic merit were bred to female sexed semen. This practice increased the true breeding value of the purebred heifer calves, accelerating genetic gain leading to additional $46.99 of revenue. Breeding the cows and heifers with the lowest EBV to beef brought in an additional $25.87 of revenue from the sale of beef x dairy cross calves. In scenario A2, without herd genotyping net profit was only increased by $32.25, mainly due to increased revenue from

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GOOD STUFF

I'm a collector; not of stamps or other common "collectibles" but of interesting tidbits including some that have nothing to do with farming. Here are a few for your reading pleasure:

- During WWII color-blind men sometimes accompanied the flight crew as spotters on bombing missions. Because of their sight defect they weren't fooled by the camouflage used to hide anti-aircraft guns. Their "handicap" saved the lives of countless airmen. Instead of "disabled", these brave men were "differently abled".

- Aeschylus was an ancient Greek playwright, often recognized as the "Father of tragedy". He died when an eagle dropped a tortoise on his bald head, thinking it was a rock. According to the Roman author Pliny the Elder, Aeschylus had been staying out in the open to avoid a prophecy that he would be killed by a falling object.

- At its peak growth the U.S. corn crop produces 40% more oxygen than the Amazon rain forest.

— E.T.

NOBODY ASKED MY OPINION, BUT…

This occasional entry is dedicated to the memory of Jimmy Cannon, a N.Y. sportswriter who also was a World War II combat correspondent with Goerge Patton's Third Army in Europe. Cannon would occasionally begin his daily column in the New York Journal-American with "Nobody asked me, but…" and then would give his opinions on a wide range of topics inside and outside the world of sports. Jimmy died 50 years ago this month, but his legacy lives on.

- … a positive attitude may not solve all your problems, but it will annoy enough people to make it worth the effort.
- …while they say that married men live longer than single guys, maybe it just seems like it.
- …aging gracefully is simply a nice way of saying that you're slowly looking worse.
- …helpful suggestion to husbands: If your wife isn't talking to you, tighten all the lids in the house--sooner or later she'll have to ask for your help.

— Ev Thomas

GENOTYPE, Continued from Page 2

sale of crossbred calves. Scenario A3 did not breed heifers to beef to evaluate the economics as breeding heifers to beef can lead to higher stillbirth rates. The researchers found that not breeding any heifers to beef would only decrease net profit by $1.62. Results from scenario A3 also revealed that breeding at least 10.3% of the highest genetic merit cows to sexed semen was ideal. In scenario A3*, extra Holstein heifers not needed for replacement on the farm, were sold for replacement rather than fattening. This resulted in additional revenue of about $217.82 from selling a heifer calf as replacement instead of fattening. Not breeding any cows to sexed semen, as was done in scenario 4, reduced net profit by $3.35 per cow.

The researchers concluded that breeding the top 10 to 30% of a herd to female-sexed Holstein semen was optimum, depending on a farm's replacement rate. A higher increase in net profit is achievable through herd genotyping and optimized semen allocation, the lower the replacement rate is. Overall, it was concluded that participating in a herd genotyping program can be profitable because additional revenues brought in from genetic gain and sales of dairy x beef calf crosses more than compensated for the cost of genotyping.

The number of genotypes evaluated is increasing both domestically and internationally. Genomic testing now has evaluations for things like feed efficiency, cow livability, some health traits, and more. To find out more about genotyping your herd consider consulting with your semen provider. The Holstein association offers genetic testing programs as well as USA Cattle Genetics.

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CORN SILAGE HYBRID TRIAL RESULTS

The New York and Vermont Corn Silage Hybrid Evaluation report is available online, summarizing the results of the 2023 trials under the leadership of Joe Lawrence et al. This is a comprehensive analysis of corn hybrids harvested for silage in several locations. Seed companies enter their hybrids in the trials, paying a fee for each entry. To download the report: 2023-NY_VT-Corn-Silage-Hybrid-Evaluation-Report-11.10.2023.pdf (bpb-us-e1.wpmucdn.com)

For many years I've told farmers that with the exception of BMR, almost all corn hybrids harvested for silage fall within a narrow range for NDFD, with a much wider range for yield. Spoiler Alert: The 2023 NY-Vermont results follow this long-term pattern.

I focused on two sites-- Alburgh, VT and Madrid, NY –with growing conditions typical of Northern NY. For the 39 hybrids entered in the 85–98-day Relative Maturity (RM) trial in Alburgh there was only a 5.1 % -point difference in NDFD between the top and bottom hybrids. In the 99-110 RM trial (36 hybrids) the range was 7.3 % points, with one exception: the only BMR hybrid entered, which had an NDFD almost 10 % points higher than that of the second-ranked hybrid. In the 36 hybrids in 99-110 RM trial in Madrid (no 85-98 RM trial at this site), the top-to-bottom range in NDFD was 7.1 % points but again with the exception of the BMR hybrid, which was about 9 % points higher than the second-ranked one. Predicted DMI and milk yield were highest for the BMR hybrid in both locations.

There was a much larger range in silage yield (tons/acre @ 35% DM): Over the two sites the yield range averaged almost 10 tons of silage per acre! (The yield of the BMR hybrid was lower than the trial average but didn't have the lowest yield in either of the 99-110 RM trials.) Obviously it pays to carefully select corn hybrids for silage, but if you're choosing standard (conventional) hybrids focus primarily on yield.

While BMR digestibility is consistently higher than that of most (perhaps all?) standard hybrids, I think that BMR hybrids continue to have a "yield drag" of 10-15%. BMR yields have increased over time, but so has the yield of standard corn hybrids. And although data is very limited I'm not convinced that the BMR yield drag is decreasing. The BMR yield drag was 19% in Alburgh and 8% in Madrid. Starch content of the BMR silage was similar to the trial average, so it's not that the BMR hybrid had poorly-filled ears; the yield of the whole plant was lower.

I've long been a proponent of BMR corn hybrids, and Miner Institute has used them successfully for at least 25 years as part of its dairy forage program. But the Institute uses standard hybrids as well, which make up a majority of its corn acreage. Each farm has to make hybrid decisions based on quality and yield, and for farmers planting BMR hybrids this would include storing BMR corn silage in a separate silo and feeding it to the cows that would most benefit from it.

— Ev Thomas
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TIME TO REGISTER:
VT DAIRY PRODUCERS CONFERENCE
FEBRUARY 20, 2024
@ Doubletree by Hilton South Burlington, VT

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https://www.eventbrite.com/e/2024-vermont-dairy-producers-conference-tickets-781354862427?aff=oddtdtcreator

or contact Louise Waterman, LWalshWaterman@gmail.com or 802-373-3352

VERMONT DAIRY PRODUCERS CONFERENCE

GREENHOUSE GAS EMISSION TERMINOLOGIES

Happy New Year! It is a privilege and a delight to experience this new beginning with all the prospects it brings, and in the words of Charles Lamb, “New Year's Day is every man's birthday.” Among my impractical new year resolutions of putting my clothes away after doing laundry and avoiding junk food, a more realistic one will be to learn and share more about enteric methane emissions and environmental sustainability of the dairy industry. With the growing interest in reducing greenhouse gases (GHGs) globally, and the evolving strategies aimed at mitigating enteric methane emissions from ruminant animals, I figured that would be a good place to start my Farm Report article this year. This will be the first part in a series, so stay tuned.

Greenhouse gases: GHGs are gases that trap heat in the atmosphere and increase the earth’s temperature. These gases are present in the atmosphere, and their heat-trapping effect (known as the greenhouse effect) helps to maintain a warm temperature (15°C) on the earth’s surface making it habitable. However, an upsurge in the amount of these gases in the atmosphere from human and agricultural sources has led to a continuous rise in the earth’s temperature, triggering the concerns of global warming and climate change. The impact of GHGs on global warming and climate change is dependent on the concentration of the gas in the atmosphere, the lifetime of the gas in the atmosphere, and the effectiveness of the gas at trapping heat in the atmosphere (estimated by the global warming potential of that gas). Examples of GHGs are natural compounds like carbon dioxide (CO_2), methane, (CH_4), nitrous oxide (N_2O), water vapor (H_2O), and synthetic fluorinated gases which include hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF_6), and nitrogen trifluoride (NF_3). (Sources: US Environmental Protection Agency, Natural Resources Defense Council, NASA Global Climate Change).

Methane (CH_4): CH_4 is a colorless odorless gas made up of one carbon atom and four hydrogen atoms. It is also known as marsh gas or methyl hydride. It is a major component of natural gas and is flammable, hence, its use as fuel. The combustion of CH_4 in the presence of oxygen (O_2) gives off CO_2 and H_2O. As a GHG, CH_4 is the second largest source of GHG in the atmosphere after CO_2 but it is more potent in absorbing heat in the atmosphere than CO_2 which makes it a GHG of interest. Sources of CH_4 include wetlands, oceans, landfills, natural gas production, livestock production, and manure management systems. In the US the largest sources of anthropogenic CH_4 emissions (from humans) come from oil and gas systems, livestock enteric fermentation, and landfills. (Sources: US Environmental Protection Agency, National Library of Medicine, University Corporation for Atmospheric Research).

Methanogenesis: this is simply the process of CH_4 formation in an anaerobic environment. In ruminants, methanogenesis occurs primarily in the rumen during the process of fermentation (enteric fermentation) of ingested feed, but this process can also take place in the lower gut. The process of carbohydrate degradation in the rumen involves the hydrolysis of cellulose (and other polysaccharides) to simple sugars which then undergo fermentation to yield volatile fatty acids (VFAs) such as acetate, propionate, and butyrate. Other end products of this fermentation process are formic acid, hydrogen (H_2), and CO_2, and specific microbes in the rumen known as methanogens (prokaryotic organisms that belong to the archaea domain) use H_2 to reduce CO_2 to produce methane ($CO_2 + 4H_2 \rightarrow CH_4 + 2H_2O$). The removal of H_2 from the rumen after fermentation is important to ensure normal metabolism of other rumen microorganisms, but the CH_4 produced as a result is not useful to the animal as it causes a loss of 2-12% of gross energy. CH_4 is released from the rumen via eructation (burping) into the atmosphere. (Danielsson et al., 2017; Hook et al., 2010; Russell & Hespell, 1981).

Metrics for enteric methane: various metrics are used to determine the efficacy of any strategy aimed at reducing enteric CH_4 emissions. They include total/absolute CH_4 production (g of CH_4 produced per day), CH_4 yield (g of CH_4 produced per kg of dry matter intake), and CH_4 intensity (g of CH_4 per kg of milk or animal product). Other methods include CH_4 yield (g of CH_4 produced per kg of digested organic matter), and Ym, which is a variable that assesses CH_4 energy loss as a proportion of gross energy intake. Sometimes, these metrics do not yield the same amount of CH_4 when used simultaneously, hence, the amount determined would vary depending on the method adopted. (Beauchemin et al., 2022; Fouts et al., 2022).

I find it important to know what these different terms mean, so I hope we can use this as a baseline for further discussions on this topic.

— Gift Omoruyi
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CAN AI REPLACE RICK GRANT?

With 20+ years of Farm Report articles written by Rick Grant to draw upon, can we generate more automatically? Our data scientist, Alex Pape, help me answer this question. He used Google Bard, a conversational AI tool. Initial result were bland and generic. Results improved with some stylistic prompts for Bard to use anecdotes and other details to make it more engaging. Here is one of the favorites although the biology is questionable…

In the heart of every successful dairy operation lies an invisible force, a subtle yet powerful factor that underpins milk production, animal health, and overall well-being: cow comfort. While often overlooked, cow comfort stands as a cornerstone of dairy excellence, influencing everything from milk quality to herd longevity. …

Consider the story of Daisy, a Holstein who consistently produced milk with exceptional composition, her udder a symphony of quality and flavor. Daisy's secret? Her stall, a cozy haven adorned with soft bedding, strategically placed lighting, and a gentle breeze that rustled through the barn, creating a sense of tranquility.

Or take Henry, a seasoned Jersey known for his longevity, his productive years extending far beyond the average. Henry's longevity stemmed from his daily routine, a predictable rhythm of feedings, milking, and leisurely strolls in the pasture. This predictability fostered a sense of security, allowing Henry to channel his energy into milk production rather than stress management. …

It looks like Rick is hard to replace and AI is not the answer!

GRANT, Continued from Page 1

was, partially, through his monthly contributions to the Miner Farm Report." said Melissa Carabeau. She continued "Today, as a dairy nutritionist, I continue to be grateful for Rick's role as a resource to farmers and industry professionals to generate new ideas and tackle big farm questions." The good news is Rick will still be involved in the dairy industry during his retirement by writing popular press articles and giving dairy management talks. Mac Campbell said "Reading back through these years' worth of Farm Reports was fascinating and left me inspired. It was truly an experience to watch Rick's ideas develop over these two decades around stocking density, fiber, feeding management, and so many other topics that he explored." Rick's research is definitely having a positive impact on how cows are fed and housed locally as well as across the globe which is contributing to the sustainability of dairy farms.

In addition to the Farm Report articles, Rick wrote over 250 popular press articles and published 96 peer-review articles. An article he co-authored with Luis Ferraretto in 2018 entitled "Silage review: Silage feeding management: Silage characteristics and dairy cow feeding behavior" is among the 100 most highly cited papers published in the Journal of Dairy Science. There is no doubt that silage quality is critical to successfully feeding dairy cows and Rick helped us to better understand that fact.

Training the next generation of dairy farmers and dairy industry professionals was important to Rick as he taught 21 semesters of Advanced Dairy Management at Miner Institute as part of a 2+2 program with University of Vermont and Vermont Technical College. In addition, he was the major professor for 8 graduate students at University of Vermont. Margaret Quaassdorff shared "I am so proud to be a Miner alum! The foundation for my success in the dairy industry began when I was a student in the Advanced Dairy Management program."

Rick demonstrated the importance of service by giving his valuable time to numerous regional and national organizations. This past year, the Northeast Agribusiness and Feed Alliance recognized Rick for his "professional career of outstanding leadership and exceptional commitment to the agriculture industry" and presented him with the Distinguished Service Award. In typical Rick fashion, he suggested the award was not for his contributions, but for the whole Miner team. Most recently, Rick received a citation from the New York State Assembly commending him for his many years of service as President of Miner Institute.

We will miss Rick now that he is "out to pasture." Fortunately, Rick will stay connected to us as a trustee of the William H. Miner Foundation and the Miner Institute Board.

— Heather Dann
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MEASURING AND MAINTAINING CALF FEEDING EQUIPMENT CLEANLINESS

A new year means many people have already made resolutions for improvement. I'm not one for resolutions but often find this time of year as a good time to reflect on what has happened in the last year and where I would like to go in the next. We often get caught up in all the hustle and bustle but sometimes we just need to go back to basics and make sure we're still doing all the "easy stuff" the way it should be done.

A pillar of a successful calf program is maintaining the health of those young animals. Calves are the most susceptible to disease and a contributing factor to increased risk could be the hygiene standards of the farm. If improperly managed, there could be increased pathogen load and exposure. Proper management and good hygiene standards will leave your calves less susceptible to health challenges in the preweaning period.

One area to focus on in hygiene standards is feeding equipment. This includes buckets, nipples, bottles, esophageal tube feeders, and tubes of auto milk feeders. Each calf has direct contact with these multiple times of day, and they could be the perfect source of inoculation to the calf's gastrointestinal tract if not properly cleaned and sanitized regularly.

feeding equipment after every use are as follows (Stewart et al., 2005):

1. Disassembly of the individual parts.
2. Rinse with lukewarm water until visibly clean.
3. Place in hot water with detergent.
4. Scrub all surfaces (inside and outside) with a brush.
5. Rinse with hot water containing acid sanitizer.
6. Drain and air dry completely.

How do you determine cleanliness?

1. **Visual inspection** - This is fast and convenient. It can be done routinely. However, it is very subjective and lacks the sensitivity to detect clean surfaces that are heavily contaminated.
2. **Microbiological analysis** - This is a scientifically-proven method but is time consuming and cannot be completed on farms. However, this would give a definitive answer of contamination on a surface, even when it appears "clean".
3. **ATP luminometry** - This is a method that quantifies the amount of ATP (energy present in every life form) into relative light units (RLU) by a chemical luminescent reaction with an enzyme. This allows for on-site assessment of cleanliness and has been commonly used in hospitals and the food industry.

A paper published in the *Journal of Dairy Science* (106:8885–8896) evaluated 50 commercial farms in Quebec through a questionnaire that included self-reported cleaning practices of feeding equipment. This encompassed the frequency of cleaning and replacing feeding equipment of preweaning calves, products and utensils used for cleaning and disinfecting, and the temperature of the water.

Samples from feeding equipment (buckets, nipples, bottles, esophageal tube feeders, and tubes of auto milk feeders) were evaluated by visual inspection, microbiological analysis, and two methods of ATP luminometry. Microbiological samples were taken to get total bacteria count and total coliform count. Two commercially available products were used to evaluate ATP luminometry: UltraSNAP (surface ATP test) and MicroSnap (coliform test).

In the Quebec herds there was a wide range in reported hygiene procedures of the feeding equipment. Half the farms claimed they unscrewed the nipples before cleaning. The utensils used were brush (68% of farms), washcloth (2%), sponge (2%), or no utensil (28%). Only 4.3% of farms in this survey reported cleaning feeding utensils after every use.

The temperature of water used for cleaning was very hot (20% of farms), hot (56%), lukewarm (16%), and cold (8%), but no temperature was determined. The primary cleaning product used was dishwashing soap for 40% of respondents, but other soaps were used by others.

Only 40% of farms used disinfectant for feeding equipment, the most popular was sodium hypochloride (50%), followed by penta-potassium bis (peroxymonosulphate bis (sulfate), also known as Virkon (46%; Vetoquinol) and a combination of iodine with sodium hypochloride (4%).

In the rinsing process only 10% used a utensil, which was a brush. The temperature of the rinsing water was very hot (18% of farms), hot (12%), lukewarm (32%), and cold (38%).

Most equipment generally looked clean from visual inspection. All feeding equipment showed contamination: Buckets and tubes of automatic milk feeders were more contaminated compared with nipples, bottles, and esophageal tubes. High contamination of one specific piece of feeding equipment on a farm was not automatically correlated with a high contamination of other feeding equipment on that same farm. There were positive correlations between ATP luminometry and visual scores of buckets, nipples, bottles, and esophageal tubes. However, the study showed that contamination can still be present even when the feeding equipment looks OK to the naked eye.

How does your calf feeding equipment cleanliness stack up?

— Sarah Morrison
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Closing Comment

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