



## Dairy Pipeline

Department of Dairy Science

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### Capital Investments: Analysis and Decision- making Process

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Many times, dairy farmers must face major capital investments, such as expanding the herd, building new barns, upgrading a milking parlor, or switching from a conventional milking system to an automatic milking system. Analyzing and making a decision about a major capital investment can generate some anxiety for farmers. However, implementing a meticulous analysis and decision-making process can help alleviate or minimize this anxiety. Following are some recommended tips for making these decisions.

As a first action, set a blueprint of the improvements wanted and needed. In this regard, distinguishing what is wanted from what is needed is paramount. For example, when buying a new tractor, it is tempting to buy more horsepower than needed. In this case, people tend to want more than what is needed. The opposite might occur when switching from a conventional milking system to an automatic milking system. In this scenario, people tend to minimize the investment by retrofitting current facilities without evaluating potential (adverse) consequences on cow comfort and management. In this other case, people tend to want less than what is needed. Sometimes, starting from scratch and building a whole new barn is a better option than retrofitting an old barn when implementing an automatic milking system.

As a second action, evaluate the current financial situation. For this, start by analyzing the balance sheet, which describes the solvency and equity. A poor solvency or low equity situation will indicate that a major proportion of the assets are owned by

others (namely, lenders). Continue the financial assessment by determining the current ratio or liquidity. A poor current ratio will indicate that there are very little current assets relative to the current liabilities. A poor liquidity situation means that there is very little buffer capacity to handle an adverse cash flow situation, such as when milk price decreases, feed prices increase, or their combination occurs.

Lastly, but not least, generate a cash flow projection to determine the feasibility of the project. Of everything said, this might be the most important part of the analysis because investments that do not generate a positive net cash flow are not viable investments. Ideally, a major capital investment will increase the cash flow, either by increasing revenues, reducing operative expenses, or their combination. When preparing a cash flow projection, farmers or managers will need to identify and set several assumptions. For example, the outcome of a farmer switching from a conventional 2X milking system to automatic milking system will likely differ from the outcome of a farmer switching from a conventional 3X milking system to automatic milking system. This occurs because the increase in milk production attributed to the increased milking frequency is more relevant to the former farmer than for the latter farmer. For this one, there are several assumptions that need to be considered and included in the cash flow projection that will help in making the best decision.

Switching from conventional to automatic milking systems is more common nowadays, and such a decision demands a deep analysis of the current and future financial situations. With the support of the ***Southern Extension Risk Management Education*** program, our extension team will be delivering educational workshops to show some critical aspects of a comprehensive analysis to secure, from a financial perspective, a successful transition from conventional to automatic milking systems. These

workshops are scheduled for July 9, 2021, at the Augusta Expo and for August 10, 2021, at a location to be determined (likely Rockingham Extension office or Montezuma Hall, Rockingham County). We hope you can join us!



## “Soft”-ware Disease: The New Foreign Body Syndrome in Dairy Cattle

*Authored by Hailey Galyon, M.S. Student with Dr. Rebecca Cockrum, Virginia Tech Department of Dairy Science; [rcockrum@vt.edu](mailto:rcockrum@vt.edu)*

Foreign body syndrome is generally defined as complications due to the ingestion of indigestible metallic and non-metallic foreign objects. As prey animals, cattle ingest feed quickly with little mastication, often leading to indiscriminate feeding of foreign objects. Foreign body syndrome is a prevalent issue associated with high economic losses due to reductions in milk and meat production, treatment costs, and potential fatalities. With studies of abattoirs noting anywhere from 20% to 75% of cattle containing foreign bodies within the ruminoreticulum, it is imperative that potential effects within the animal and subsequent products are evaluated. The objective of this paper is to provide a review of the shifted focus from hardware disease to plastic disease, potential physiological impacts of plastic disease, and current mitigation strategies.

Hardware disease was a primary focus in early production. However, with the application of rumen magnets as a preventative method, veterinarians have noted a reduction in hardware disease-related cases. The more pressing issue today is “soft”-ware or plastic disease. Upwards of 80% of foreign bodies found within today’s cattle are plastics, and occurrence of plastic disease will likely increase with agricultural plastic production due to management strategies. Producers may unintentionally introduce plastics into the diets of cattle by incorporating hay bales into total mixed

rations with plastic net-wrap or other baling materials still attached either due to fragility of the materials, materials being frozen on in the colder months, or labor efficiencies. Plastics accumulate within the rumen when ingested, forming hard, ball-like masses. Clinically, cattle present with inappetence, indigestion, emaciation, dehydration, and abdominal distension due to impaction that may lead to reduced weight gain and production after long-term ingestion. However, subclinical cases may be of higher impact due to physiological alterations to the animal early on with little indication.

The physiological impacts of plastic disease may influence animal health and production without producer knowledge. Studies find that plastic accumulation within the rumen leads to alterations of the rumen lining. In Dorper sheep, short-term placement of just 129g (~0.5% of mature bodyweight) of plastic bags within the rumen led to reduced size of papillae, degeneration of the outermost layer of the rumen lining, thickening of mucosal layers, and separation of the muscular layers. Severity of changes were proportional to plastic amount within the rumen in this study. As the rumen lining is critical for nutrient absorption, transportation, and metabolism, plastic accumulation within the rumen of cattle can have drastic effects on feed efficiency as it alters papillae structures, though long-term influences are currently unknown.

Plastic presence within the rumen additionally impairs rumen efficiency by leakage of heavy metals. In plastic manufacturing, heavy metals are incorporated as stabilizers. When plastics are ingested by ruminants and other animals, it is hypothesized that these heavy metals leach out and accumulate within tissues. Buffaloes identified as having plastic accumulation within the rumen at slaughter in India were found to have elevated concentrations of heavy metals in ruminal fluid, blood, muscle tissues, liver tissues, and kidney tissues. Mercury, lead, and cadmium levels were associated with impaired microbial function. Further, there was preferential accumulation of mercury, lead, cadmium, and chromium in the kidney and copper in the liver. Further studies are warranted as accumulations within cattle could potentially lead to toxicosis and increase heavy metal presence in meat and milk products influencing human health.

Currently there are no mitigation strategies against plastic accumulation, and surgical removal is the only treatment. Treatment and subsequent antibiotic administration can be a costly investment but has proven effective. Five days post-operatively, cattle that had plastics removed from the rumen via rumenotomy had increased ruminal movement and bacterial metabolism and decreased rumen pH, packed cell volume, and white blood counts. Though values were still significantly different from healthy animals. However, producers reported approximately 82% of animals could return to the herd by six months. With no preventative measures and expensive treatment, close management of feeds and plastic wastes on farm are essential in mitigating its effects.

We successfully control hardware disease with rumen magnets. Yet, foreign body syndrome is still a prevalent issue through plastic disease and is predicted to increase. With no preventative strategies, studies are needed to evaluate long-term exposure of plastics on rumen structures and potential heavy metal toxicities as rumen function and efficiency are largely impaired and there are potential implications on human health. As we move forward, it is recommended producers make every effort to reduce indigestible plastic use and wastes on farm to help control incidences.

## Upcoming Events

**Regular Women in Agriculture Meetings**  
Every 1<sup>st</sup> Tuesday @ 7:30 pm

**Virginia Dairy Expo**  
July 9, 2021

**Southern Extension Risk Management Education Workshop @ VA Dairy Expo**  
July 9, 2021

**Multi-Min Producer Meeting--Dayton**  
July 12, 2021

**Franklin County DHIA Banquet**  
July 15, 2021

**Virginia Colored Breed Show**  
August 5, 2021

Virginia Cooperative Extension

**State 4-H/FFA Dairy Youth Field Day**  
August 6, 2021

**Virginia Summer Holstein Show**  
August 7, 2021

**Southern Extension Risk Management Education Workshop**  
August 10, 2021

**Rockingham County Fair**  
August 17-21, 2021

**Dr. Larry Tranel Farm Visits & Workshop**  
August 30 - September 1, 2021

**Virginia State Fair**  
September 23-26, 2021

**World Dairy Expo**  
September 27 - October 2, 2021

**Hokie Cow Classic**  
October 18, 2021

**Cattle WISE for Dairy & Beef**  
October 22, 2021

If you are a person with a disability and require any auxiliary aids, services or other accommodations for any Extension event, please discuss your accommodation needs with the Extension staff at your local Extension office at least 1 week prior to the event.



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