Utilizing Low-Quality, Rained Damaged Hay in Beef Cattle Feeding

Bob LeValley

Hay producers were certainly challenged this summer in their efforts to put up good quality hay without getting it rained on before baling. Much of the alfalfa and forage sorghum hay that was put up is reduced in feed value due to problems associated with the wet summer weather. Rain damaged hay can lose quality in several ways including mold, loss of protein and carbohydrates and damage due to excessive heating after being put into bales.

The reduction in quality is very dependent upon factors such as how much the cut hay had dried in the windrow when rain was received, how much rain was received, and the drying conditions following the rain. Rained on hay loses value in various ways. While the following information addresses alfalfa specifically, the same conditions should apply to forage sorghums and grass hay.

- Prolonging plant respiration;
  ° Plant respiration will take place until it dries to less than 30% moisture. Re-wetting the hay will re-start the process. The respiration process utilizes carbohydrates, which again, lowers the energy value of the hay.

- Leaf shatter and loss:
  ° Turning the hay to aid in the drying process will result in increased leaf shatter.

- Microbial activity;
  ° Wet hay supports microbial growth which breaks down plant nutrients and promotes mold growth.

- Color bleaching.
  ° Loss of green color often reduces marketability.

- Leaching of soluble carbohydrates and some minerals;
  ° Mild /long-term rainfall events will leach more soluble nutrients than intensive/short-term rain fall. Up to 50% of the dry matter removed might be soluble carbohydrates. Loss of carbohydrates means less TDN, or energy available for cattle consuming the hay.
The loss of quality is certainly variable and dependent upon case by case situations. Research at Iowa State gives a general guide for alfalfa hay, but it should not replace a laboratory analysis. The Iowa State research suggests that newly cut hay receiving a light rain probably loses little quality. Nearly dry hay that receives a light rain may suffer significant quality loss. Dry matter loss can be up to 5% per inch of rain, while digestibility can decrease up to 10%. The most significant loss will be in energy. While protein will also decrease, it may not be as drastically affected. Vitamin A content will also be decreased.

How can a beef cattle producer utilize rain damaged hay? The first recommendation would be to get a laboratory analysis to determine the nutrient content. This can certainly return many times the cost of the lab fee. Remember that hay above 8-10% Crude Protein will meet the cow’s protein requirements until near calving time, providing cows have access to all the hay they want. Many producers successfully use grass or sorghum hay of this quality to provide supplemental protein and energy to cows in their winter feeding program. Lower quality hay can be supplemented with protein to stimulate intake and digestibility. Utilize lower quality hay when the cow’s requirements are the lowest and save the higher quality hay for when the diet demands higher quality ingredients.

A useful tool for evaluating different supplementation scenarios with various feeds is the OSU computer program “CALCULATOR”. Calculator is available through the OSU Extension Center, or on the OSU Animal Science Department website at http://www.ansi.okstate.edu/exten/cowculator/

Moldy hay is certainly an issue this year. The quick and easy recommendation is to avoid feeding moldy hay. Avoiding it altogether may not always be an option. Try to limit the exposure as much as possible. If the mold content is moderate to high, it will probably be objectionable to the animal and they will refuse it as long as there is another feed available. Not all molds are toxic to cattle. Ruminants have the ability to detoxify many mycotoxins due to the microbes in the rumen. Older cattle have a higher tolerance to mycotoxins. Due to the number of types of molds that can be on hay, there is not a practical lab test to screen for potentially toxic types. In addition to other health problems, certain molds can cause reproductive problem in cows and bulls. Limiting the exposure to moldy hay will reduce potential problems.
Oil reached a record high of $89.47 per barrel in the middle of October. Hopefully as you’re reading this, this record is still holding and hasn’t been replaced by a new one! Still at these record breaking oil prices, the U.S. currently depends on other countries for 65% of its total domestic oil consumption. At current trends on decreasing domestic supply and increasing demands for oil, that percentage will continue to increase. While efforts could be done to decrease current levels of demand, by increasing fuel efficiency standards for vehicles for example, additional efforts should be placed to increase domestic supply of oil and/or develop fuel alternatives to increase domestic supply.

“The fuel of the future is going to come from fruit like that sumac out by the road, or from apples, weeds, sawdust -- almost anything. There is fuel in every bit of vegetable matter that can be fermented. There’s enough alcohol in one year’s yield of an acre of potatoes to drive the machinery necessary to cultivate the fields for a hundred years.”

Henry Ford, 1925

This quote by Henry Ford can be seen on many websites that promote biofuels, posters geared toward educating people about biofuels, and presentations given during biofuels meetings and conferences. Mr. Ford first envisioned the idea of using agricultural commodities as feedstock for transportation fuel when he built the Model-T, which ran strictly on ethanol, but low cost and easy processing soon lead oil to become the dominant transportation fuel. We now find ourselves with high cost oil, with supply and demand concerns, and a desire to recapture Henry Ford’s vision.

I recently had the opportunity to attend the GROW Oklahoma Biofuels Conference in Oklahoma City to learn about what is being done in the biofuels arena in the state of Oklahoma. Secretary of Energy, David Fleischaker, started the conference by speaking about the three most important aspects of biofuel production. The first was “National Security.” As it was previously mentioned, Americans are dependent on 65% percent of total oil consumption. In the event that foreign oil was no longer supplied to the U.S., there is no safety net available to keep daily routines in progress, therefore setting grounds for an economic catastrophe. We would soon find ourselves in the mercy of these oil producing countries in order to maintain our own stability. This leading to Fleischaker’s second aspect of biofuel, “Economic Wellbeing.” Biofuels are domestically produced, domestically processed, and domestically consumed. Therefore, all monies are kept within American boundaries, particularly focusing in rural America. “Environmental Protection” was the last aspect of biofuels that was mentioned. Studies have shown evidence of climate change and a heating atmosphere due to increased levels of harmful greenhouse gas emissions. Biofuels allow for increased levels of carbon sequestration from plant feedstocks, the capture of carbon dioxide emissions in processing to be used in oil recovery in depleting oil fields, and lower emissions levels when being used as a transportation fuel as compared to fossil fuels. Biofuels have the opportunity to allow for a further secure America, boost rural communities, and have an overall positive impact on the environment.

With the biofuels industry still being fairly new in most areas of the U.S., there are still many things that must be addressed in order to make it successful. Curt Rich of Van Ness Feldman in Washington, D.C. tried to portray what it would take the U.S. to advance the development and deployment of alternative transportation fuels. He currently represents companies, trade associations and local governments before Congress and federal agencies on issues related to tax policy, energy, the environment, natural resources, and appropriations.

In his keynote speech, Mr. Rich established the top 10 policies that would be helpful, if not required, in creating a successful biofuel industry:
Top 10 Public Policies to Create a Biofuel Industry
from Curt Rich

1. Enact policies that promote diversity of biofuel feedstock in the U.S.
2. Solve biofuel feedstock transportation challenges; including how to harvest, transport, and store feedstock
3. Accelerate governmental funding for research and development into a wide range of conversion processes
4. Develop cellulosic production technology that can be integrated into corn and sugar refineries
5. Fund and administer a workable federal loan guarantee program to build first generation commercial facilities
6. Address fuel transportation challenges
7. Improve retail distribution infrastructure so it can be available for retail sale upon production
8. Make the current and future U.S. automobile fleet renewable fuel compatible
9. Create a demand for renewable fuels
10. Make it cheap!

While these public policies would be beneficial for the industry, they appear vague and are going to require very much attention. In fact, some of these issues have already been noted and have been brought to the eyes of governmental officials. Lloyd Ritter, director of Green Capitol, is very specialized in clean energy and environmental advocacy, strategic planning, and public policy development. He has continued to pay close attention to recommendations concerning the Energy Bill and Farm Bill, especially concerning the areas of biofuels. While at the Oklahoma Biofuels Conference, he reviewed recommendations made by House and Senate regarding the biofuel industry:

Energy Bill Recommendations:
• Produce 36 billion gallons of ethanol per year by 2022 of which 15 billion gallons would come from conventional grain processing and 21 billion gallons would come from cellulosic biomass
• Create a Cellulosic Production Tax Credit ranging from $0.50 and $0.67 (which are the respective proposals set by the House and Senate) in addition to the current $0.51 per gallon ethanol from grain tax credit and $0.10 per gallon small producer tax credit (small being less than 60 million gallons per year)

Increase infrastructure for higher ethanol blended fuels such as E85. There is currently a 30% alternative refueling property credit to businesses that install alternative fuel pumps, it has been proposed to increase this credit to 50% of installation costs

Farm Bill Recommendations:
• Provide Low Carbon Biofuel Loan Guarantees for those wishing to build biorefineries or biofuel production facilities
• Bioenergy Crop Incentives Program for producers interested in energy crop production
• Increase support for conservation programs for sustainable growth and removal of bioenergy crops as well as study soil quality enhancement through energy crop rotations
• Increase funding for the Biomass Research and Development Act
• Provide aggressive funding for cellulosic research
• Study ethanol pipeline transportation

As you can see, there is still much to be done in the biofuels industry. The recommendations of the House and Senate, assuming will be passed, will continue to push for a plentiful and prospering biofuel industry. While it might seem unnecessary for the government to invest billions of dollars into an industry that is only just broken the surface of its capabilities, especially in a time of heightened deficit, the returns of its investment will hopefully soon be immeasurable. With the advancements in technology to use biomass, such as switchgrass, the President’s goal of Twenty in Ten, reducing U.S. gasoline usage by 20 percent in 10 years requiring a projected 35 billion gallons of ethanol be produced in 2017, could be reached if not surpassed. As research and development continues to grow in the areas of cellulosic ethanol production, more producers will begin trying to capture income from outside of their current production markets. We will soon see biofuel provide national security, economic wellbeing, and environmental protection to America.
Vaccine Considerations for Receiving Stocker Calves
 Modified Live vs Killed Vaccines
 Gene Parker, DVM

The viral respiratory diseases of cattle are bovine viral diarrhea (BVD), infectious bovine rhinotracheitis (IBR), parainfluenza 3 (PI3), and bovine respiratory syncitial virus (BRSV). These viruses cause problems not only as respiratory disease in stockers and feeders, but some of them also can cause abortion and other problems in infected cowherds. In some areas, herds are in close proximity, which makes it difficult to isolate cattle enough to prevent transmission of these diseases. Therefore, immunization becomes the method of choice for protecting herds. Once the decision to incorporate a vaccination program is made, the confusion starts. Today there are at least 150 products available for use in cattle that offer protection against these viral diseases. Some use killed viruses, some use modified live viruses (MLV), and some use a combination. What are the differences and how do you make the right choice?

Killed vaccines cannot multiply in the animal, so they cannot cause disease or abortion. The immunity they produce is not as strong or as long lasting as that produced in response to MLV vaccines. Killed vaccines usually require multiple vaccinations to achieve adequate immunity, and they will require multiple revaccinations to maintain immunity over the lifetime of the animals. Killed vaccines usually utilize an adjuvant, which is a chemical additive that increases the immunity by increasing inflammation at the injection site. This leads to increased stress and hypersensitivity reactions.

MLV vaccines produce much stronger and longer lasting protection. Because they don’t depend on adjuvants, they are less stressful. They require much less, if any, revaccinating throughout the life of the animal. On the down side, however, is the fact that because they are live viruses which have been changed (modified) to reduce their disease causing ability, they may produce disease in some immunologically compromised individuals. Some MLV vaccines may cause abortions if they are given to pregnant females or calves nursing non-vaccinated cows. In recent years several modified vaccines have been developed for use in pregnant cows, I have used clients herds and on my own cows with excellent results. Also, it is not a problem to use MLV vaccines on calves nursing cows that have received MLV in the past. A good program is to use a MLV vaccine on replacement heifers at weaning and again at 12 months of age to achieve a long term protection, and to eliminate potential problems when vaccinating their nursing calves. This is less expensive than boostering every year with killed vaccines. A word of caution: give the MLV vaccine at least 30 days prior to the beginning of the breeding season to prevent interference with ovulation.

Recently published research from the U.S. Meat Animal Research Center in Clay Center, NE, characterized the incidence of bovine respiratory disease (BRD) in feedlot calves. Records from 18,112 calves representing 9 pure breeds and three composites breeds fed at the center from 1987 to 2001 were evaluated. Calves were spring-born and placed on feed at an average age of 176 days with an average initial body weight of 451 lb. Calves were fed a starter or backgrounding diet for approximately 5 weeks to become adjusted to the finishing diet. The average feeding period was 200 days.

The incidence of BRD varied across the 15-year span from about 5 to 44% with an average annual incidence of 17%. From 1987 to 1992, the annual incidence generally exceeded 20%. However, after 1992 the incidence did not exceed 14%. The researchers speculated that this occurred because killed vaccines were used from 1987 to 1992 as compared to modified live vaccines being used from 1993 to 2001.

In conclusion, the lower death loss after 1993 was attributed to using the modified live vaccines which produced faster and longer lasting immunity to viral respiratory diseases in feedlot calves.

A visit with your local veterinarian will help you to outline the best program for your herd, and identify the products that meet your requirements. Making the right choices can save money in vaccine cost, as well as minimizing costly health problems and production losses.
This newsletter was developed by your team of Area Specialists in the Southwest District. Our goal is the dissemination of research-based information.

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