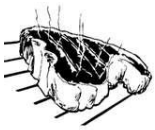

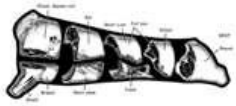

"Riding Point With Animal Science"

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Evaluating a forage analysis report
Steve Paisley

Most ranchers in the in the Mountain West would not classify 2009 as a "normal" summer. Above average rain, cool conditions, and timing of precipitation has resulted in above average grass hay production for much of the West. Forage production occurred late, and there are several operations that are just now finishing up the 2009 haying season. Much of the 2009 alfalfa produced in the region was rained on at least once before baled. All of these factors suggest to me that it will be as important as ever to sample forages and get a good estimate of forage quality this year. In order to make best use of your existing feed supplies, minimize additional feed costs, and most accurately provide adequate nutrition to the beef herd, hay sampling and analysis is critical.

Although it is often difficult to wade through all of the information provided in the laboratory forage analysis, the first, most important job is proper sampling technique. With forages, the first job is to determine how many samples need to be taken, and how many separate lots, or groups, of forage need to be sampled. Generally, any factor that could affect forage quality can be used to separate forages into lots. Certainly, hay from different cuttings should be separately sampled and compiled. Grass samples from pastures on different locations may also need to be sampled and analyzed separately. The number of lots of forage is dependent on how you plan to feed and manage the forage during the winter. Once you've identified your sampling lots, you need to decide how many individual samples to include in your composite sample for analysis. Typical recommendations are to obtain and mix 10-20 'grab' or core samples in the collective lot sample sent off to the lab. More is always better, and it's not a simple task to do a good job with each sample. Always keep in mind that you're trying to obtain a sample that will represent the whole. For hay bales, this means using a forage probe and sample as close to the center of the bale as possible. When taking pasture samples, the best approach is to mimic the locations in the pasture and the parts of the plant that the cows might actually use. Silage samples should come from freshly unloaded material only and should come from several spots throughout the pile. Close attention to representative sampling is so important that some nutritionists suggest that you're better off to throw the sample away and simply use a book value if you're not going to take the time and effort for a good sample.

Components of the forage analysis report:

1. Dry Matter (DM) Forages can vary tremendously in the amount of water (or moisture) in the sample. For this reason, the most important determination on any sample is the dry matter content. Accurately determining the correct amount of moisture in the forage can affect accuracy of balancing rations for livestock, as well

as accurately determining the value, and ultimate price, of the forage. A 5% difference in moisture results in $8.90/ton difference in price paid for actual forage on a DM basis, and the DM content of wet feeds, such as silage, is even more important to accurately estimate. When you look at a forage analysis (Figure 1) you'll have one column reporting "wet" or "As-fed" concentrations, and one column for DM concentrations. When we balance rations for livestock using forage analyses, we ignore the results under the 'as-fed' column and focus our attention on the DM-basis column. This eliminates differences in components that are just due the dilution effect of the water present in the feed.

2. Protein fractions Protein is a critical component in determining the value of a particular forage in cow calf production systems. The simplest and easiest way to determine the protein level in a feed sample is to chemically analyze the feed to determine its level of Nitrogen. Researchers coined the term 'crude protein' (CP) which is based on the total amount of N in a sample multiplied by 6.25 to estimate the amount of amino acids, or protein in a feed. Since the majority of the nitrogen in most feed samples is, in fact, protein, this system has worked pretty well for us over the years. However, we now have techniques that allow us not only to separate out the 'true protein' from the non-protein nitrogen (NPN, such as urea and ammonia), but also to categorize the true protein into fractions that have nutritional relevance for ruminant animals. Ruminant animals can utilize NPN sources, but the efficiency of that utilization depends on a number of additional factors. Therefore, it is important to separately categorize the amount of NPN in diets, particularly if outside sources of NPN have been added. In addition to crude protein and NPN, nutritionists have also recognized that not all protein is created equal. To accurately balance rations, and to correctly estimate forage intake, ruminant nutritionists ultimately need to know what protein is broken down in the rumen, or Rumen Degradable Protein (RDP), and what component bypasses the rumen, and is absorbed in the small intestine (RUP, or Rumen Undegradable Protein). However, we also know that of the protein that escapes ruminal degradation, a portion is indigestible, and thus, cannot be absorbed or utilized by the animal. This fraction is named from the analytical procedure used to measure it - Acid Detergent Insoluble Nitrogen (ADIN) aka Acid Detergent Insoluble Protein (ADIP). Unavailable protein, or ADIN is an important measurement when evaluating heat-damaged forages, such as bales or ground hay piles that have heated due to higher moisture levels. Much of the protein found in these heat damaged forages is unavailable to the animal.

3. Fiber Fractions Fiber is somewhat unique among the forage components routinely measured by laboratories in that it is not a clearly defined chemical entity. There are a number of different chemical compounds that are actually included with the various fiber fractions. For this reason, fiber fractions have generally been named for the procedures used to isolate them. Historically, Crude Fiber (CF) was the first standard fiber fraction to be measured in feedstuffs. As its name implies, this is a crude preparation that presumes to measure the fiber component of diets. From a diet formulation standpoint, the chemical constituents that we isolate from feed samples are only important if they help us predict how the feed will be utilized

by an animal. Techniques were developed in the 1960s to estimate components within the CF fraction, Acid Detergent Fiber (ADF) and Neutral Detergent Fiber (NDF), as they relate more closely to nutritionally important parameters. These two fractions are used to estimate both forage intake (using NDF) as well as digestibility (ADF). In general, as the level of fiber increases, both intake and digestibility tend to decrease. A final fiber component that is inversely related to digestibility is lignin (aka Acid Detergent Lignin or ADL). Lignin is a very rigid structural component of plant cell walls and, as a consequence, is indigestible. Furthermore, lignin can 'protect' other cell wall components from digestion. Thus, as the level of lignin increases, the digestibility of forages decreases.

4. Energy (TDN, or Total Digestible Nutrients) Energy is not a nutrient itself, but rather a function of several of the classes of nutrients. Dietary energy comes from the breaking of some of the chemical bonds that hold molecules together (oxidation). The amount of energy available from a dietary constituent depends on a number of factors. Most important among these is the digestibility of the dietary constituent. If a component is not digestible, the energy contained in the chemical bonds will still be present in the feces, and obviously, not available to the animal. Energy that was made available (didn't show up in the feces) is collectively known as digestible energy (DE). Also, some energy is lost in the urine, some in fermentation gases like methane, and a substantial amount is lost as heat. The amount of energy available to the animal for maintenance and production, after accounting for all of these losses, is known as Net Energy (NE). Because energy availability is more a function of how efficiently its used rather than how much is present in a feedstuff, we don't typically measure energy in feedstuffs. What we do is measure other things that are related to the available energy. Many studies have been conducted that have allowed us to develop regression equations to relate the amount of ADF in a forage with its digestibility (more specifically, with total digestible nutrients, or TDN), or with its NE. A number of different equations exist to do this. One of the more common sets of equations is known as the Penn State Equations. Within this group are equations that have been developed for specific types of feedstuffs to increase their accuracy. For example, there are separate equations for corn grain, corn silage, and grass hay, etc. Often, laboratories will ask you to categorize a submitted feed sample in order for them to apply the correct set of equations to determine energy values. The relationship between ADF and energy estimates are not without fault. We know that factors other than just variation in ADF contribute to variation in available energy. Fat has 2.25 times as much energy as an equivalent weight of carbohydrate. By accounting for the amount of fat in a feedstuff, we can more accurately predict its energy than just by accounting for ADF. Because of this inherent variation, some labs offer, at an additional expense, "wet chemistry" analysis and summative equation, mechanistic approaches to better estimate digestibilities of individual forage components and are therefore are less prone to errors from new sample types. For by-product feedstuffs (especially highly digestible fiber sources) traditional equations appear to under-predict actual energy values. In such cases, it may be advisable to use 'book values' as estimators of the energy content.

5. Index Values For years, the Relative Feed Value (RFV) index has been used as an 'integrated measure' of forage quality. This value is based on both the ADF and NDF values of forages. The idea is that, because NDF is negatively correlated with intake and ADF is negatively correlated with digestibility, an index value can be developed from both components that gives an estimate of the voluntary intake of digestible DM. If accurate, such an estimate would be a very strong indicator of overall forage quality. In practice, the value calculated from ADF and NDF is divided by a value for a theoretical 'standard' alfalfa hay. Thus, the 'standard' value is 100 and hay with estimated digestible DM intake greater than the standard will have RFV values greater than 100. This value has been widely adopted by the industry and has been used as a key value for setting hay prices on the open market. However, as you may have already guessed, such a simplistic approach is bound to be subject to some errors. As with the energy prediction approaches, RFV is based on a very limited set of forage components, namely ADF and NDF. A new index called Relative Forage Quality (RFQ) is rapidly supplanting the use of RFV. This index has been developed using concepts based on the summative equation approach for estimating energy values. Like the RFV, the RFQ is an index value that is based on a standard forage having a value of 100. Generally, RFQ is considered to be a better index of true forage quality than RFV. The developers of the RFQ approach have suggested that it works well for all forages with the notable exception of corn silage (the equation does not account for variation in starch digestibility seen with corn silage).

6. Mineral Levels. Mineral levels in a forage sample are expressed as a percent of the total sample or in parts per million (ppm). Having the correct level of minerals in the diet is important. Minerals needed in relatively large amounts are macrominerals, and minerals needed in relatively small amounts are microminerals or trace minerals. *Macro* or *micro* do not denote importance but rather the amount of the mineral required by livestock. The levels of calcium and phosphorus necessary for maximum growth rate and mineralization of the bones are not always adequate in forages. Having the correct ratios of minerals in the diet is also important. A forage analysis should always provide estimates of calcium and phosphorus to evaluate overall levels, as well as the calcium-phosphorous ratio. Because of the relationship between Ca and P, a proper balance must be maintained. Based on extensive research on these two minerals, optimal performance occurs when the Ca:P ratio in cattle diets is 1.5:1 to 2.0:1. When Ca:P ratios exceed 6:1, or P remains deficient, reduced growth, feed efficiency and reproduction will result. If the ratio approaches 1:1, or P intake exceeds Ca, (as seen in high-concentrate diets), urinary calculi (water belly) can develop in steers and bulls.

Importance of Analysis. Sampling and obtaining forage analyses is only part of the equation. Matching diet quality to stage of production and nutrient requirements of the animal is the second half. Please consider sampling forages this year. All county extension offices are equipped with sampling tools, and there are several resources available to help evaluate the results.

Figure 1: Example basic forage analysis

Account No. : 39637

UW-SAREC
2753 STATE HWY 157
LINGLE WY 82223

Results For : UW-SAREC
Sample ID : 1A
Description : ALFALFA

	Analysis As Received	Analysis Dry Basis
Moisture, %	21.98	0.00
Dry Matter, %	78.02	100.00
Crude Protein, %	17.4	22.3
Acid Detergent Fiber, %	30.0	38.5
Total Digestible Nutrients, %	44.8	57.4
Net Energy Maint, MCal/cwt	43.32	55.53
Net Energy Gain, MCal/cwt	23.29	29.85
Net Energy Lact, MCal/cwt	45.40	58.19
Calcium, % Ca	1.32	1.69
Phosphorus, % P	0.21	0.27

Importance of managing and controlling coccidiosis in this year's calf crop
Steve Paisley

This year's precipitation patterns has left us with an abundance of grass and full reservoirs, but damp soils and full ponds may have also increased the chance for coccidiosis problems, even on range. In the last 2 weeks, I've received a handful of calls where calves, still on range with their mothers, are showing signs of coccidiosis. As discussed later, it is important to address any signs of coccidiosis as soon as possible, as coccidia outbreaks can have longer term impacts, even after the infection is cleared up.

Coccidiosis, caused by a single celled organism called protozoa of the genus *Eimeria*, results in health and economic problems to several classes of livestock. The disease reduces feed consumption, body weight, and feed efficiency and may cause mortality of 24% in some cases if left untreated. Coccidiosis commonly affects young cattle up to 2 years of age. Animals housed in proximity are more likely to contract the disease. Therefore, feedlot and dairy cattle are most susceptible. However, this summer's above average rainfall and damp conditions have even resulted in coccidiosis cases found in grazing herds. Additional contributing factors to coccidiosis outbreaks include exposure to stress caused by shipping, changes in ration and in weather, and overcrowding. Stress caused by weaning makes calves very susceptible to coccidiosis.

Development of Disease

At least 13 different coccidial species are known to infect cattle in the United States, but not all are pathogenic. The two most pathogenic species are *Eimeria bovis* and *Eimeria zuernii*. Cattle ingest the infective oocyst (egg) that then produces an infective form called a sporozoite. This mobile form, or life cycle phase, penetrates the cells of the intestine. They then go through a cycle of rapid growth and reproduction known as the asexual phase. One infective oocyst produces up to 900 asexual forms, each invading a cell in the intestine. The asexual phase is repeated several times during a 21 to 28 day cycle. Eventually the asexual form becomes a precursor of a sex cell that results in an oocyst that is passed in the feces. Thus coccidia harm the host by destroying the cells and tissues in the lower intestines, cecum, and the colon. The loss of intestinal lining may lead to blood and fluid loss and may alter food absorption. Bacterial invasion of the intestine may follow.

Clinical signs of coccidiosis

Clinically apparent coccidiosis in cattle is deceptive. Signs are often not demonstrated until 3 to 8 weeks after initial infection, if at all. Observation of one clinical case in a pen indicates oocyst cycling in other animals in the pen or feedlot, and also means that most of the damage to the intestinal tract has already occurred. If the infection is slight, the most characteristic sign is foul smelling, dark, and watery feces. Usually no blood is seen in these less severe infections. The animal may have a mild fever, but in most cases its temperature is normal or possibly below normal due to dehydration. Severely affected animals may develop a diarrhea that is thin and bloody. Some cattle will pass formed feces that contain streaks or clots of blood and shreds of mucus. The diarrhea usually lasts 3 to 4 days, but may continue for a week or more. The area around the tail is often stained with blood and physical discomfort and straining is common. The animals lose their appetites, become depressed and dehydrated, and lose weight. Cattle can also suffer a central nervous disorder from coccidiosis. Affected animals show muscular tremors, convulsions, and bending of the neck and head. Infected calves may die within 24 hours after the onset of dysentery and nervous signs, or they may live for several days, and are usually unable to rise. Even with intensive treatment, the death rate in these severe cases can be high.

Mortality from coccidiosis is usually associated with severe diarrhea, which causes loss of electrolytes and dehydration. In one study, calves with diarrhea lost 8 and 18 times more sodium and potassium respectively, than normal calves. Denatured proteins cause shifts in osmotic pressure, and alter levels of intra- and extra-cellular ions. Coccidia destroy intestinal cells, which results in loss of blood and other fluids into the small intestine, further affecting intestinal absorption.

Importance of recognizing the impact of subclinical infections in the herd.

While actual diagnosed clinical cases of coccidiosis can have a large economic impact on a herd through reduced intake and decreased performance, as well as health costs and death loss, it is perhaps more even MORE important to consider the impact of subclinical, or undiagnosed coccidial infections within the herd. Studies suggest that with Eimeria infections, only 5% of total infected animals show clinical signs of coccidiosis. Subclinical coccidiosis, in contrast, refers to a period before appearance of typical signs of the disease, or actual infected animals that do not show signs of a clinical infection. Subclinical coccidiosis then refers to the remaining 95% who are likely to have a coccidia infestation, although not showing visible signs. A large majority of the animals could be infected without the cattle producers knowledge, with the subclinical infection causing a decrease in feed intake, an increase in susceptibility to other respiratory diseases, and a reduction in performance of the animal as a result of decreased absorption of nutrients in the small and large intestine due to damage to the intestinal lining.

Cattle producers and veterinarians have problems diagnosing coccidiosis because clinical signs are associated with the late portion of the early sexual phase. Passage of oocysts follows signs of coccidiosis, therefore, if there are large numbers of oocysts in the feces, coccidia probably have already completed their life cycle. If treatment is given at this time, and secondary bacterial infections are controlled, animals will probably recover.

Prevention of Coccidiosis in Cattle

In addition to treatments for coccidia, good management practices are important when establishing parasite control programs. The primary concern in coccidiosis outbreaks is the potential to spread the disease to other susceptible animals in the herd. Some steps to consider include:

1) Evaluate tanks, watering troughs as well as feedbunks, and try to prevent drinking water and feed from becoming contaminated with manure.
2) Especially during wet, cool weather, evaluate available pens, and try to wean calves in dry pens with adequate slope and no mud holes. Keep pens dry and supplied with ample dry bedding.
3) Prior to weaning, or as a part of your fenceline weaning protocol, try to use pastures that are well drained.
4) If outbreaks occur while grazing pastures, prevention steps could include limiting or minimizing access to edges of ponds and streams.
5) Prevent overgrazing. Animals forced to graze down to the roots of plants may eat large numbers of parasites.
6) Heavily parasitized animals should be isolated from the rest of the herd and treated.

Treatment

Although coccidiosis is considered a disease of young animals, older animals are frequently infected with Eimeria. The severity of clinical coccidiosis depends on the

number of sporulated oocysts ingested and the general health of the infected host (Ernst and Benz, 1986). An objective of control could thus be reducing the number of oocysts available for ingestion. However, no minimum infective dose for coccidia has been established. Proper sanitation and good animal husbandry practices are important in preventing coccidiosis.

A major difficulty in treating clinical coccidiosis is that signs of the disease do not appear until the life cycle is almost complete. By this time, the gut may be severely damaged. Most anticoccidial drugs are only effective during early stages of a coccidian life cycle. Thus, the difficulty in treating coccidiosis is that by the time signs appear, parasites have already passed through the stage in which anticoccidial drugs are most effective. Infected animals often recover without treatment due to acquired resistance to the disease. However, the reduced performance, reduced absorption potential due to intestinal damage, and increased susceptibility to disease of infected animals suggest that prevention is the best option. Treatment with anticoccidial drugs should be administered at the earliest clinical signs because it may reduce severity of the disease and decrease mortality. Antibiotics may be administered to reduce secondary infections.

Electrolyte solutions and fluids should be administered to control dehydration. During treatment, animals should be isolated to prevent further contamination.

Treatments for coccidiosis include sulfonamides in the drinking water and amprolium in the feed or water. Polyether antibiotics, such as lasalocid and monensin, originally developed as coccidiostats for poultry, have been effective in preventing coccidiosis in cattle. Decoquinate (Deccox) aids in controlling coccidiosis caused by *E. bovis* and *E. zuernii* in calves and older cattle. Deccox fed at 0.5 mg/kg body weight for at least 28 days during periods of exposure aids in controlling the disease. For decoquinate to be effective for cattle, it must be fed to provide 22.7 mg/100 lb. of body weight/head/day, and it MUST be fed for 28 days to ensure control. Research with decoquinate at North Carolina State University shows that deccox can be effective in increasing feed intake and gain when animals are placed in an environment where coccidia have been found previously. Rumensin (monensin sodium) and Bovatec (lasalocid) are both effective at controlling coccidiosis as well. Studies with early weaned calves suggest that Rumensin provides very good control of coccidiosis at both 22 mg/kg (20 g/ton) and 33 mg/kg (30 g/ton) levels. This equates to approximately 0.70 and 1.0 mg monensin/kg of calf. Bovatec is also is an effective when fed at 1 mg/kg body weight/day, which equates to feed levels of Bovatec at 33 to 44 mg/kg of the diet (30 to 40 g/ton). It is important to work with your veterinarian, and properly diagnose coccidia infections before treating. If the outbreak occurs while the cattle are still out on range, there are treatment options as well, working with your veterinarian, nutritionist, or extension personnel in developing prevention and control methods.

Prevention is key

All evidence suggests that waiting until visible signs of a coccidiosis outbreak is too late. Only 5% of all animals typically show physical signs, and by the time physical symptoms show up, the organism is already in the latter stages of it's life cycle and difficult to control. Subclinical (undiagnosed) effects from coccidia include reduced intake, negative impacts on intestinal absorption due to intestinal lining damage, increased susceptibility to disease, and reduced performance. Good pen management and design, clean water and feed bunks, and a proper nutritional program are all key to eliminating the impacts of coccidiosis on the herd.

Equine News- Preventing Pigeon Fever
Amy McLean

Horse owners can often prevent infectious diseases and outbreaks by taking the correct precautions by practicing good equine management skills. Recent reports of Pigeon Fever in Northern Colorado should make horse owners in Wyoming more concerned with taking proper biosecurity precautions. Pigeon Fever is caused by a bacterium, Corynebacterium pseudotuberculosis, which is found in the soil and transmitted by biting flies or transmission of soil (e.g. bottom of one's shoes). Research has indicated that horn flies maybe a carry of this zoonotic disease. The horn flies can transmit the disease to and from cattle and horses by biting the skin, entering wounds or mucous membranes. Fly prevention can help control horn flies as well as removing excess manure and bedding. Signs of pigeon fever include edema in the pectoral region, lethargy, high fever, and lack of appetite and can lead to death if not treated. If you suspect your horse may have Pigeon Fever consult your veterinarian immediately and isolate your horse from others. Make sure and clean all water, feed buckets and clean your horse's environment daily. This disease will cause an infection in the chest that will eventually come to a head and bust. The drainage may contain the bacteria, so it's very important to isolate the sick individual and sanitize everything after daily treatments prescribed by your veterinarian. When dealing with an equine that may have Pigeon Fever, remember to wash your hands, bleach your shoes and do not wear the same clothing when dealing with other horses on your farm. For more information on Pigeon Fever check out http://www.extension.org/faq/24666.

Points of Interest
Scott Lake

If it produces meat, milk or eggs, and you produce it with the intent of profitability, it will be spotlighted today. USDA's new reports on livestock, meat prices, and the feed outlook are all the focus for livestock producers who have had a tough time lately making ends meet. Is there anything to be encouraged about?
http://www.farmgate.uiuc.edu/archive/2009/09/post_45.html

The three major goals of any breeding season should be to: get the cows settled as early in the breeding season as possible; get them bred to the bulls with the highest possible genetic worth; and achieve both as economically as possible, by getting the cows bred with the fewest possible bulls. Defining the optimum bull to female ratio is important to a successful breeding season.
http://www.ansi.okstate.edu/exten/cc-corner/cowtobullratio.html

Most beef producers routinely pregnancy test cows after breeding season to determine which to keep and which ones to sell. Jeff Hoffman, a veterinarian near Salmon, ID, says the biggest reason to know which cows are open is that it's a major cost to feed them through winter, and this is a waste of money if they're not going to have a calf.
http://www.tsln.com/article/20090917/TSLN01/909179998/1013

Age and source verification for meat and source verification for many more food products are management processes that seem to please consumers.

http://www.ag.ndsu.edu/news/columns/beeftalk/beeftalk-age-and-source-verification/

E. coli O157:H7 – food microorganisms and foodborne pathogens; part I
Warrie Means

Microorganisms are small living single or multi-cellular organisms, which can be classified into several groups including: 1) bacteria, 2) yeasts, 3) molds, 4) viruses, and 5) protozoa.

Bacteria, yeasts and molds are most important in meat systems. Yeasts and molds are sometimes important in flavor/aroma development of selected dried meat products and, contrarily, are sometimes involved in meat spoilage. However, when considering meat fermentations, meat spoilage, or pathogens found in meat products, we are primarily concerned with bacteria. More recent research, however, is pointing to a significant role of viruses in development of food borne illnesses. Microorganisms can be further classified based upon their function in food systems.

A. **Desirable Microorganisms** are useful in food fermentations. They are inoculated into a food and metabolize substrate(s) to produce desirable end products such as acids or alcohols. Fermented meat products include summer sausage, hard salamis, pepperoni, Lebanon bologna, and other acidified meat products.

B. **Undesirable Microorganisms** can be divided into two groups.

1. **Spoilage microorganisms** are those organisms which cause product loss. Spoilage of fresh and ready-to-eat (RTE) meat products is a multi-million dollar concern to the meat industry.
2. **Foodborne pathogens** are those organisms that cause human diseases in which food is the common vector. Enteric pathogens from animals, birds and humans can be present, normally in low levels, on carcasses. These include *Salmonella* spp., *Yersinia enterocolitica, Campylobacter jejuni, Clostridium perfringens* and ***Escherichia coli* O157:H7.**

It is important to note that the muscle of healthy animals, and therefore meat, is essentially sterile until it becomes contaminated during slaughter, fabrication, processing, storage, or preparation. In addition, research indicates that there is a correlation between **coliforms** (mainly species from *Escherichia, Enterobacter, Citrobacter,* and *Klebsiella*), **fecal coliforms** (mainly *Escherichia coli*), or bacteria from the family ***Enterobacteriaceae*** and the presence of pathogens in meat. Therefore, meat samples are often tested for microorganisms of these groups. Currently, USDA also requires testing of meat samples for *Salmonella* spp. Microbial testing, per se, does not necessarily improve the safety of meat and meat products. However, testing for generic coliforms and specific pathogens can be used as a tool to develop and monitor systems that inhibit or decrease pathogens in meat.

Although direct fecal contamination of carcasses can occur, it is not as common as one might think. The primary source of enteric pathogens in meat is due to contamination during opening and removal of the hide. This problem is difficult to solve and many resources are currently being expended to find better ways to reduce contamination.

Prepare your horse for cold weather

Amy K. McLean

The recent snowstorm is a good reminder that winter is not far away but have you thought about winterizing your horse? Just because it snows and gets cold doesn't mean you can forget about your four-legged, equine friend. Some things to prepare for include meeting your horse's energy requirements, checking water, providing shelter and blanketing (maybe).

When the temperatures drop and the wind picks up, your horse will need additional energy to keep warm. Think about supplying your horse with hay and if you already feed hay, consider increasing the amount of hay you are giving to him or feeding a more energy dense source of hay (e.g. legume versus grass). Also, feed more than once a day, such as once in the morning and once in the evening. Think about including a concentrate in his diet to supply additional energy. Ideally, you would like your horse going into winter a little fatter than normal (Body condition score: 6-

7). A horse that is a moderate body condition score (meaning 4.5-5.5), the critical temperature for your horse will depend on his hair coat. A horse with a short hair coat can have a lower critical temperature of 60°F, and a heavy hair coat would be 30°F. So, any temperature below this level, the horse will have to burn energy to make his own heat.

A good rule of thumb is each degree below the critical temperature causes an increase in digestible energy requirements for 1% of the body temperature maintenance. Ideally, a horse should consume about 2% of its body weight in food (forage or concentrate). Some owners prefer to supply 1.5% in forage and supplement the 0.5% with concentrate (grain) and others depending on the activity level of the horse can get by with supplying all 2% with forage (hay or grass). However, when you factor in the drop in temperature and wind-chill factor, additional energy is needed. So, for a horse that weights 1,000 pounds and has a heavy hair coat, and the temperature with the wind-chill is 20°F, he will require an increase in energy of 10 percent (the temperature has dropped 10 degrees below the critical, 30°F, 1% for every dropped degree=10%). Therefore, the owner will need to supply the horse will an additional 2Mcal/day or 2 more pounds of hay per day to avoid loss in body condition (1,000 lb horse should now be consuming 17 pounds of hay).

Remember you can also supplement the horse's diet with concentrates (grain) some horses may not consume a large quantity of hay at one feeding, so feed this amount over several feeding times (e.g. morning and evening). Other things to consider are if your horse has access to shelter and are the conditions wet? If the horse does not have access to shelter and its in wet conditions this can drive up the amount of energy needs even more (1,000 pound horse that's wet and no shelter in 30°F would now need 25lbs of hay).

Also, don't forget to check your horse's water. An increase in forage intake and a decrease in water intake is a recipe for colic! So, try to monitor your horse's water intake, make sure the tanks are thawed out or a heater is in place. Ideally, the water should be maintained around 45-65 degrees. A 1,000 pound horse should consume about 12 gallons of water a day.

So, what about keeping a blanket on your horse to keep him warm? If you do choose to keep your horse blanketed all winter remember to have a waterproof blanket and check your horse regularly. Often times owners place blankets on their horses and forget to monitor their body condition and come spring they are skinny! Also, make sure you purchase a blanket that fits your horse properly and does not rub him. An oversized blanket will do little good and if it rubs your horse's shoulders raw this is bad too!

Winter tips to Remember:

- **Monitor your horse's body condition**
- **Supply extra hay and even grain when the critical temperature drops**
- **Ideally have shelter for your horse (well ventilated shelter)**
- **If you blanket, make sure the blanket fits properly and doesn't rub**
- **Use a water proof blanket**
- **Remove blanket frequently**
- **Check water twice a day.**

For more information on properly winterizing your horse check out these free webinars:

Winterizing your Horse from Purina Mills:

Dr. Katie Young, November 3rd, 7-8:30 PM EST- Winterize your Horse

https://www2.gotomeeting.com/register/579461330

Dr. Karen Davison, November 12th, 7-8:30 PM EST- Winterize your Working Horse

https://www2.gotomeeting.com/register/704389579