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Livestock and Range News

Considerations for storing and feeding rained on hay

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The series of spring storms in the Sacramento Valley was a welcome site to rangelands that haven't had spring moisture in what seems like forever. Although these storms have been welcomed by managers of annual rangelands devastated by drought, it has made appropriate timing of cutting hay nearly impossible. Consequently pasture, small grain and first cutting alfalfa hay all over Northern California has been rained on at some point. Fire and mold that causes feeding avoidance and toxicity are worries that arise from rain damaged hay.

Fire

Rain allows mold spores which are always in dry hay (but largely inactive in a dry state) to grow and reproduce. Without water and oxygen there is no growth. Heat is caused as a by-product of spore growth and, if it cannot dissipate faster than it is created, then there is the risk of spontaneous combustion. Since hay isn't wrapped air tight like silage, all that we can attempt to control is moisture.

Hay moisture probes are available at many farm supply stores and online. Contact your local Farm Advisor if you cannot find one and/or need to borrow one quickly. Moisture readings below 10-15% are usually of minimal concern for spontaneous combustion and/or mold development. However hay with 15-20% moisture is cause for caution, and moisture levels above 20% will very likely mold and pose a fire risk.

If you are suspicious of a stack of hay then monitoring temperature is imperative to assess the risk of imminent fire.



Temperatures that rise to, or even slightly exceed, 120°F are a worry and cause for further monitoring. At 130°F monitoring the stack daily should be a priority, and at 140°F the stack should be dismantled to individually dry the bales. If the stack exceeds 150°F it will likely combust and the fire department should be called immediately, because the risk of combustion once the center of such a stack is exposed to oxygen is very high.

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Feeding molded hay damaged by rain

While horses should never be fed moldy hay, cattle can consume some moldy hay. Generally it is not the mold which are the problem, in the sense of making the cattle ill, but the toxins that are created by some of those molds. So molds that do not create toxins are not particularly dangerous to cattle, although the cattle will naturally avoid consuming most moldy hays due (presumably) to learned behavior that some molds make them sick. So, for example, if moldy hay is spread out in the sun and dried then the molds will stop growing, although there will be lots of dead molds present, but only if toxins were created will there still be a danger from the material. So drying changes little relative to feeding safety.

In general, cattle will avoid moldy hay and, in the case of bales with moldy exteriors, they will avoid those areas in favor of the center of the bales which is much less moldy due to a lack of oxygen and moisture. But when you combine hungry cattle and moldy hays there is potential for disaster. However if hays are going to be placed into a total mixed ration then that creates higher risk (animals can no longer easily avoid moldy hay) but simultaneously reduces risk (by diluting the molds in the diet consumed). Keep in mind that it is the mold count in the whole diet that counts.

It is not difficult to send a sample of hay to a lab for mold/yeast counts (not expensive) and if those values are above thresholds there are guidelines (below) as to how to feed it. These are general guidelines that more-or-less assume that the higher the mold counts the greater the likelihood that some of them will create toxins. While the actual mold types can be speciated (identified) this is expensive and generally only identifies some of the dangerous molds. So speciation can find toxin forming molds, but may not find all of them. In other words a positive finding for some toxin producing molds indicates risk, but a lack of such a finding does not guarantee safety.

Below is a 6 point mold scoring system useful for whole mixed diets (where cattle selectivity is very limited) or hays fed as essentially the whole diet:

- 1 = <500,000 (low mold level)**
- 2 = <1,000,000 (safe to feed)**
- 3 = <2,000,000 (caution is advised)**
- 4 = <3,000,000 (observe cattle closely for abnormal symptoms)**
- 5 = <4,000,000 (dilute prior to feeding with mold free feed)**
- 6 = >5,000,000 (do not feed unless at very low levels and in a really well mixed ration)**

Methods of Selenium Supplementation for beef cattle and Associated Weight Gains

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Selenium (Se) deficiency in California livestock species is widespread, having been estimated to exist in excess of 60% of herds in the state. Selenium is an essential nutrient for all animals including cattle. The importance of correcting Se deficiencies is well documented. Adequate Se levels have been found to booster immunity, thereby reducing mortality, diarrhea, and increasing disease resistance in cattle. We completed two trials to determine how commonly used Se supplement products corrected Se deficiency and monitored the resulting weight gains in yearling cattle.

The first trial included 80 hd with 20 steers in four treatments of:

- 1) 3 cc of a 5 mg/ml injection of sodium selenite (15 mg Se/head, Muse)
- 2) 5 cc injection of a 5 mg/ml sodium selenite in a mixture of zinc oxide, manganese carbonate, and copper carbonate (25 mg Se/head, Multimin)
- 3) Se oral bolus designed to release not more than 3 mg/head/day
- 4) Control

The cattle in the first trial were weighed every 30 days for 90 days and sampled for whole blood Se at day 30 and 90. At sampling 30 days after initiating the treatments (Figure 1) all of the Se treatments had increased Se whole blood levels on a herd average to within an adequate range of 0.08 ppm. However, at 90 days after treatment only the Se bolus managed to maintain levels at or above the adequate level.

The second trial built on the first one by testing the ability of a salt based supplement with 120 ppm of Se to raise whole blood levels of cattle (48 hd treatment 1). A small subset of cattle were separated as a positive control with a bolus (6 hd treatment 2) and a true control with no treatments (6 hd treatment 3) so that we could determine any relationships between Se levels and cattle weight gain. We weighed and collected whole blood Se samples of all 60 hd every 21 days for 85 days.

As seen in the first trial the control cattle started and remained deficient in Se, and the bolus treated cattle reached adequate levels rapidly and remained around adequate. The salt supplement was successful in raising Se levels within the first 21 days, but took 90 days to fully produce herd average adequate levels of Se (Figure 2).



Figure 1. Selenium whole blood levels (ppm) based on treatment and sample date for trial 1. Adequate is considered 0.08 ppm

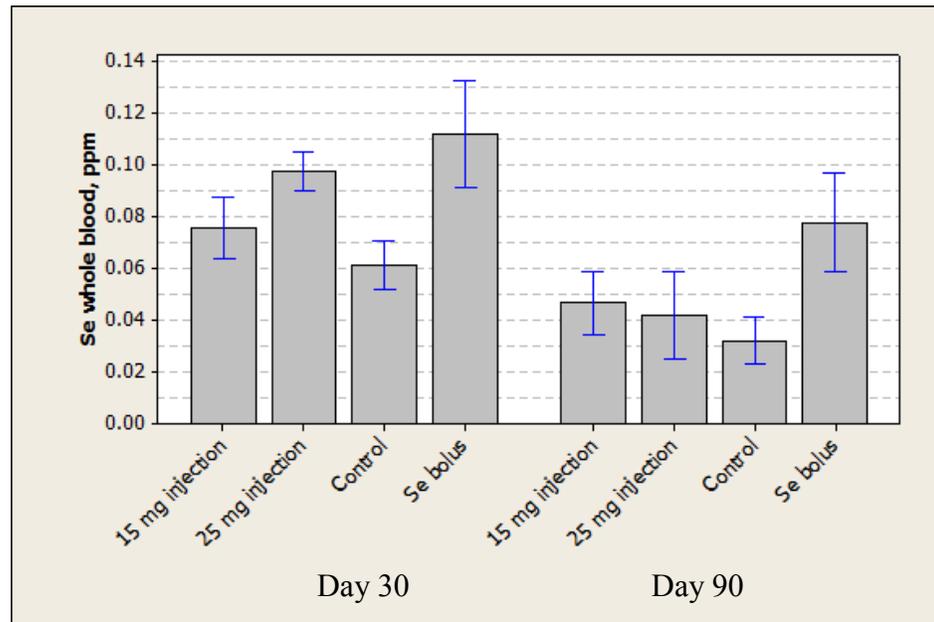
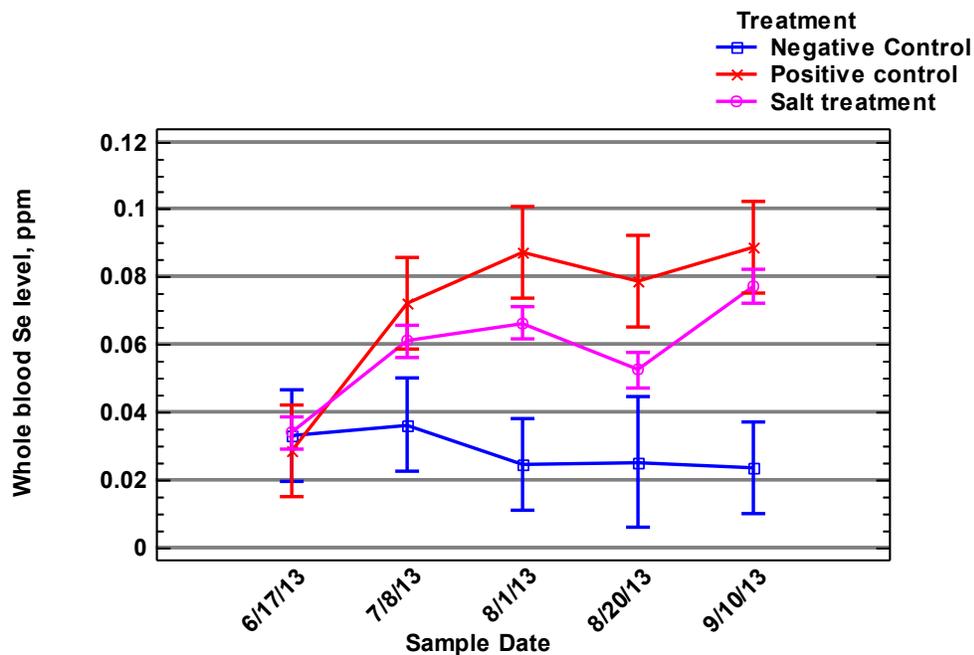


Figure 2. Whole blood selenium response by treatment and date for trial 2. Adequate is considered 0.08 ppm



Correcting Se deficiency

Our data showed the rumen bolus method of supplementation appears to be a very dependable method of supplementation, particularly if Se is the only deficient mineral.

The injections do elevate Se levels. In our trial, the higher injection dose at 25 (Multimin) vs. 15 (Muse) mg Se/hd provided significantly higher whole blood Se levels than the lower dose at 30 days post treatment. In this time frame, the higher dose was equal to the Se bolus treated cattle, however the benefits didn't last as long. Our results suggest that at 90 days, an injection of Se should not be expected to provide any supplemental benefit regardless of dose. However, this method may be a practical consideration when combined with the salt based supplemental method.

The greatest benefit of a salt based supplement is that it allows multiple minerals to be supplemented at the same time. Our second trial found that it was possible for the herd to reach an adequate level of selenium with this supplemental method. The difference between this method and the others is that it takes a longer time period to bring deficient cattle to adequate levels. This treatment did increase whole blood Se levels soon after the supplement was placed into the treatment pasture, but remained at a marginally deficient level until the final sampling.

Whole blood selenium levels corresponded to consumption of the loose mineral supplement. Intake levels were high when the supplement was first placed in the pasture (Table 1). At 5.6 oz/hd/d consumption, the corresponding Se intake was 19 mg/hd/d, which is similar to levels administered through Se injection. With Se intake of 9 and then 8 mg/hd/d average whole blood Se levels remained the same and then declined. Yet again, when the herd average intake increased (15 mg/hd/d) the

Table 1. Period average consumption of the loose salt mineral and associated Se uptake of the whole herd

Sample dates	Loose salt consumed, oz/head/day	Actual Se consumed, mg/head/day	Herd average Se blood level, ppm
7/10/2013	5.63	19	0.06
8/1/2013	2.76	9	0.07
8/20/2013	2.26	8	0.05
9/10/2013	4.43	15	0.08

corresponding Se whole blood levels again increased significantly. This data indicates the importance of continued consumption of the supplement in known deficient areas. Seasonal supplementation, such as only during the breeding season, does not appear to be a method to adequately maintain Se levels.

Though they did very well at a herd average, no supplemental method, including the bolus, brought all animals to adequate levels. Table 2 depicts the percentage of the salt treatment cattle that were still deficient or severely deficient as compared to the herd average Se level at each sampling. Surprisingly all treatments were similar in this effect. Though the salt treatment reduced the percentage of cattle that were severely deficient by four times, there were still 21% of cattle that were severely deficient when the herd average was adequate. Even the bolus, which was considered a reliable long term treatment, left 23% and 17% of animals severely deficient in trials one and two, respectively. Combining supplementation methods may decrease the overall number of deficient cattle. This may include practices such as administering Se injections at the beginning of the supplementation period and then providing salt supplement as a means to maintain Se levels.

Table 2. Average herd whole blood level and corresponding percentage of cattle below adequate and severely deficient in the salt supplemented group of trial 2.

Date	Average Se blood level, ppm	% below 0.08 ppm	% below 0.05 ppm
6/17/13	0.03	100%	88%
7/8/13	0.06	73%	33%
8/1/13	0.07	69%	29%
8/20/13	0.05	88%	58%
9/10/13	0.08	54%	21%

The Influence of Se on weight gain

Weight gain was surprisingly not a function of Se whole blood level. Both trials had significant variance in animal Se levels and neither proved significantly attributed nor correlated with gain differences based on Se. This does not infer that correction of low Se levels is not important. Previous Se supplementation studies have found significantly increases in immune response in calves, antibodies in yearling cattle, and vaccine antibody response. It appears that Se may not directly influence weight gain as do factors such as energy (TDN) in a ration, but rather indirectly with factors such as health. Reductions in weight gain may only be noticed in Se deficient cattle that experience some sort of immune challenge, which secondarily reduces weight gain. The possibilities for this type of challenge could be numerous including parasite and disease infections which are commonly faced by beef cattle. It is likely in our two controlled trials that these challenges were minimal due to many factors such as contained herds with little exposure to outside cattle or off ranch forage sources. However, it could be speculated that at some time an immune challenge would occur resulting in any number of animal health problems of a Se deficient group of cattle.

Medusahead Seed Suppression with Milestone Herbicide

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Medusahead (*Taeniatherum caput-medusae*) is an invasive annual grass that plagues California rangelands. Control of this grass is a challenge, in part due to difficulty in selectively targeting a single grass in a grassland environment, and also because the economic return on investment for control can be questionable. A previous newsletter article reported on research in Northern California that found successful management of medusahead with an application of 14 oz/acre of Milestone (aminopyralid) prior to germination, and suppression with 7 oz/acre. However, this treatment is not effective after germination. Another downside to this treatment is that the high rates necessary for management can be expensive and the highest rate of 14 oz/acre is only registered as a spot spray.

Trials by Dr. Matt Rinella with USDA-ARS may have found an alternative lower cost option for medusahead suppression. In greenhouse studies, Dr. Rinella found a reduction in medusahead's ability to produce seed by applying Milestone during the boot stage of production with much lower rates, making it more cost effective. This is important because most medusahead seeds germinate within a year of production, so any method that prevents seed production can drastically reduce the weed population. Working with Dr. Rinella, we established field trials in Northern California to test the efficacy of this method for medusahead control.

The field trials tested the effects of Milestone on grass seed production at rates of 3, 7, and 14 oz/acre applied during the boot stage. The boot stage occurs just prior to the seedhead emerging. In our local trial in Red Bluff, spring germination tests found all three treatments were equal in drastically reducing medusahead seed production from over 80% viable seeds to less than 10%. It is important to note that the treatments did not kill the plants, but rather inhibited them from producing viable seed.

The following season medusahead cover was monitored (Table 1) and corresponded to the reduction in seed production with the control having 40% medusahead and the three treatments ranging from 2-9%. None of the three treatments were statistically different from each other, but all were statistically less than the untreated control.

Table 1. Medusahead cover in late spring one year after application at two sites (%)

Sites	Untreated	3 oz Milestone	7 oz Milestone	14 oz Milestone
Red Bluff	40	9	5	2
Brown's Valley	9.7	1.4	3.75	0

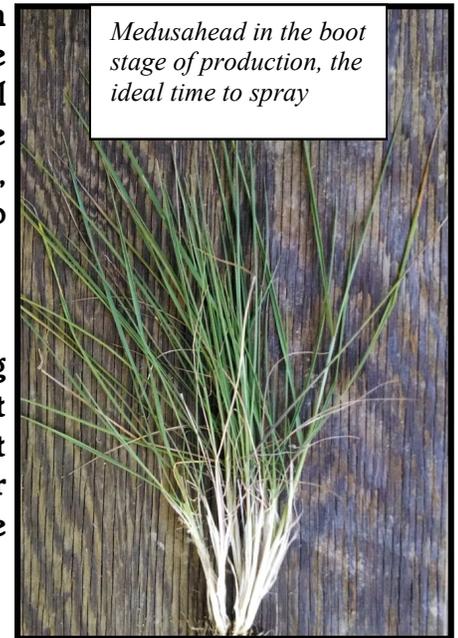
RATE IS CRITICAL

The higher rates of Milestone (7 and 14 oz/acre) impacted medusahead similarly, but had increased negative effects on soft brome (chess) and annual ryegrass. All treatment

rates had some negative impacts on soft brome germination, but the 3 oz/acre treatment had much less. Twice the amount of soft brome was found in the 3 oz/acre treatment group than the 7 and 14 oz/acre treatment groups. Even with some negative impact, all the Milestone treatments were significantly higher in soft brome when compared to the control because of reduced medusahead competition. If the desirable grass seed bank is depleted due to heavy medusahead invasion, It may be beneficial to reseed with desirable annual grasses to avoid large areas of bare ground.

TIMING IS CRITICAL

The timing of Milestone application is critical. Targeting medusahead during the boot stage is key to reducing plant populations for the following year. The boot stage of plant growth occurs just before seedhead emergence. Far lower success in medusahead seed suppression would occur if the application timing occurred at or after heading.



DUAL WEED CONTROL

Another advantage of this type of herbicide application is the possibility for suppressing both medusahead and starthistle at the same time. Although the timing referenced for medusahead control is late for commonly applied starthistle control with Milestone, it would still likely be successful in controlling plants as they would only be entering the bolting phase. The downside of a late application of Milestone for starthistle is that the flush of annual grass growth due to the lack of water competition with starthistle would not be realized in the current growing season compared to what it would be with an earlier application.

Does Feeding Bur Clover Through a Cow Work?

Josh Davy – UC Farm Advisor

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The idea of feeding clover to cattle and having them spread the seed across the field in little piles of fertilizer makes sense and some have reported success. We conducted a small trial at the Elk Flat Ranch to determine what the germination of the clover seed would be after it passes through a cow. A cow was placed in a pen and fed medic (bur clover) seed that was mixed into a molasses grain mix. We collected the seed after it passed through the cow and compared the germination with the same medic seed that hadn't been fed through the cow (control seed). Ten seeds of each treatment were separately placed in a pot with four pots per treatment, totaling 40 seeds per treatment. The control seed germinated eight days earlier than the fed through seed and finished with a 90% germination. All of these plants survived the duration of the test. The seeds fed through the cow had a 7.5% germination (3 out of 40), but two died soon after germination, thus of the 40 seeds planted only 1 survived (2.5% survival). We are not certain why the two seedling medics in the fed through treatment died. The sole surviving fed through plant showed the same nodule formation as the control plants. It is possible that the inoculum did not survive in the two plants that died, but we were unable to evaluate this. Our trial demonstrated a significant loss of germination in medic seed when fed through a cow. We are interested in repeating the trial with other varieties of clover.

Livestock and Range News

TEHAMA, GLENN, COLUSA COUNTIES



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