

Grass Hay Production – The “Down n Dirty” Version

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This is not meant to be an exhaustive approach to grass hay production but rather some rules of thumb of principles that will help many hay producers grow higher quality and possibly more hay. By following these “rules of thumb” which are proper fertilization, irrigation, weed management, and harvest management producers can produce higher quality(for sure) and higher tonnage(quite possibly) grass hay. In my travels around the Tri River Area which includes Mesa, Delta, Montrose, and Ouray counties I can’t help but notice that there are a lot of grass hay producers. The typical grass species that are grown in the area are cool season grasses and typically consist of orchard grasses, bromes(smooth and meadow), tall fescue, and perennial ryegrass, and several wheatgrass species. Most irrigated pastures consist of two or more of these species. Something else I notice is that the majority(probably eighty percent plus) of hay producers only seem to be concentrating on “quantity” of hay produced. For the most part “quality” does not seem to be taken into consideration. Most of the producers harvest their hay when the seed head has fully erupted and on the verge of turning brown or fully brown. They are harvesting the grass in the over mature stage which tends to give the quantity that they want but at the sacrifice of quality. More on quality vs quantity later. First let’s start with fertilization.

FERTILIZATION:

Or should I say “over” fertilization. The majority of people that call me about their hay pastures just take the recommendation of the fertilizer seller. Probably ninety percent of the producers I visit with apply substantially more fertilizer than a lab would recommend from a soil sample. Without a soil test, fertilizer applications are just a shot in the dark. Grass plants are only able to take in and use a certain amount of Nitrogen(N) over a certain time period. Any excess tends to get leached deep into the soil past the root zone of the plants and/or washed off the field through irrigation. So the excess N ends up polluting the groundwater or streams and rivers. At the risk of offending any fertilizer sellers there are a couple of local outfits that have an Agronomist on staff that make good recommendations. On the flip side I have also seen some local places that send in soil samples to a lab for fertilizer recommendations and when they get the results back from the lab they tell the hay producer that they think these recommendations(from the lab mind you) are not enough and that the producer should put down more. I am not kidding! The lab will make a fertilizer recommendation based on the current soil conditions and it is important when sending in your soil test to fill in the box of how many tons/acre you want to produce. Be realistic when you fill in this box. Some very highly productive pastures may produce as much as 4 tn/acre but a more realistic number would be around 3 tn/ac for a good pasture. Also you want to do split applications of fertilizer. So if the recommendation is 110 lbs of actual N/acre you should split the application by about 60/40. Sixty percent in the spring right before you start irrigating and forty percent after your first cutting. So 110lbs actual N/ac or 110 actual N multiplied by .6 or 60% = 66lbs of actual N for your spring application. 110 actual N/ac or 110 multiplied by .4 or 40% = 44 lbs actual N applied after your first cutting. Using this method there will be less fertilizer wasted as you are not putting out more than the plants can use. Note: Put out N when the plant needs it as N is not stockpiled in the root zone and therefore wasted. N is very mobile in the soil and will go

where the water goes. For example, someone went by the fertilizer sales person recommendation and put out 138 lbs of actual N on a fall planted field where the little grass plants were about 6 inches tall. This was not a split application. They probably wasted one hundred pounds of N not to mention their money. Let's do another example and use the recommended 110 lbs / ac vs 138 lbs of N/acre from above. Let's use a small ten acre pasture. As of this writing a local store is selling N(urea) which is 46-0-0 for \$575/ton for the first ton and is discounted some percentage for every ton after the first ton. Without boring you with all the calculations the difference would be about a \$170 cost savings for a ten acre pasture. You would more than likely produce at least as much with the 110 lbs/ac as you would with the 138 lbs/ac by the simple fact of doing a split application. Studies show that with split applications of up to a total of about 200 lbs of actual N you can see an increase in tonnage. However there is that pesky law called the "Law of diminishing returns." You will produce a little more hay with increased amounts of N but at a decreasing rate. So your efficiency starts to go down and each pound of hay starts costing you more to make. Using a soil sample test from a lab will help you hit that efficient "sweet spot." A soil test cost about \$20 and is some of the best money you will ever spend! Be aware that if you send in a soil sample and tell them that you have a cool season grass/alfalfa mixed pasture then the N recommendation will probably be very low. The reason for this is that high N will select for the grass and cause it to out compete the alfalfa. If you have 80 percent grass and 20 percent alfalfa they will only recommend something like 30-40 lbs. of N unless you tell them that you are more interested in the grass and their recommendation for N will be much higher.

I saw one study done in Colorado that stated that for each pound of N fertilizer applied there was an increase in production by about 20 pounds, up to 100 pounds of N. So for each 100 pounds of N applied you may expect up to an extra 2,000 pounds of production per acre over no applied N but only up to a certain amount.

Another important consideration of N fertilization is the volatilization of N(urea form) to ammonia. There is more science in the application of N than I am going to go into here but suffice it to say that urea needs to be watered in asap after being applied to a pasture. Urea is very volatile and if it sits on the field especially in the hot weather and high PH it can/will turn into a gas and you can lose a considerable amount to the atmosphere. Just as an example it is possible to lose over 20% N in just four days in warm temps and high PH. FYI: Most of the soils in western Colorado that I have seen lab tests of soil samples hover around 8 which is quite high. After ten days you may see a loss of N of over 40%. That is wasted money! Irrigate immediately.

Don't forget the other fertilizer constituents such as phosphorus(P) and potassium(K). Most producers mainly apply N but P is also important for plant health, especially root growth. What goes on underground is extremely important. When a plant has a good root system it can gather more nutrients and moisture from the soil which enables it to produce more top growth which is what hay producers want. Phosphorus is typically applied in the fall. P is not very mobile in the soil like N and if applied to the soil surface will typically take a season to become available to plants. The saying is "you apply P this year to help plants next year." By applying P in the fall, the winter moisture and the freezing and thawing action help to get the P into the root zone, therefore becoming available to the plant the following season. When you are planting a new pasture, be it grass or alfalfa it is always recommended to apply P before planting and disking in or by banding it just below the seed at the actual time of planting. Grasses need P but alfalfa has an extreme need for P.

Potassium(K) is another constituent of fertilizer. Colorado soils are generally adequate for potassium(K) but a soil test should be done to know for sure. For more detailed information on fertility management see “Intermountain Grass and Legume Forage Production Manual” chapter 6.

IRRIGATION:

Everyone knows that without water there will be no grass. People sometimes do not realize that over irrigation is detrimental to grass production. It is actually possible to over irrigate. I do see this on occasion and you may not realize it is hurting your production since the grass tends to stay green. When a pasture gets watered and the soil becomes saturated the pore space in the soil is full of water which will displace oxygen. Plants need oxygen to carry on photosynthesis, respiration, etc. After an irrigation event the soil will be quite saturated but as the water is distributed and/or goes below the root zone oxygen will re-enter the soil profile and the plant can “breathe” again. Note: There are some plants that will do very well in saturated conditions such as foxtail barley and it will sometimes find a foothold in over irrigated situations. If you are finding foxtail barley in your hay pastures there is a good chance that you are over irrigating. This does not always hold true but is something to consider. A soil probe is a good tool for checking soil moisture. A soil probe consist of a steel rod that is approximately .5 inch in diameter by approximately 4’ long and has a steel ball that is .75 inch in diameter that is welded onto the end that is inserted into the ground to check for depth of good moisture. It will pass through moist soil rather easily and will abruptly stop when it hits dry soil. You should aim for about two and a half feet of penetration shortly after irrigating since this is the depth of most of our cool season grass roots. Note: This mostly holds true for sprinkler irrigation as gated pipe will tend to irrigate much deeper and is just the nature of the beast. However a good rule of thumb is to still have about two and a half feet of moisture several days after irrigating. Another note: This is just a generalization since there are different types of soils that have different properties thereby affecting the water holding capacity of each type. As a general rule for meadow brome, orchard grass, and tall fescue you should expect approximately 300 lbs of dry forage for each one inch of irrigation(properly applied irrigation, fertility, and low weed load) up to a certain amount of course and not an over irrigated pasture. For more detailed information on irrigation management see “Intermountain Grass and Legume Forage Production Manual” chapter 7.

WEED MANAGEMENT:

Weed management in Western Colorado is an ongoing battle in irrigated pastures. I will say that the best weed deterrent is a strong, vigorous, well managed pasture. An expertly managed pasture will not be weed “proof” but will be weed “resistant.” One of the beauties of growing grass hay is the producer’s ability to deal with broadleaf weeds which is the biggest weed problem in grass hay pastures. There are quite a few good postemergent broadleaf herbicides that are available to producers for weed control. I must stress that you need to know the species of weed(s) that are causing quantity/quality problems before you just use whatever herbicide you have laying around. You want to be sure you match the herbicide with the offending weed(s). Also, timing of spraying can be very important as a certain herbicide may work on young weeds but may not work on mature weeds. For instance: 2, 4 D works well on young kochia but is not effective on mature kochia.

Weed control won’t necessarily increase forage yield but typically increases forage quality by reducing the amount of undesirable weeds. However, in a newly planted grass pasture broadleaf weed mitigation is very

important as broadleaf weeds compete heavily with new seedlings. If weeds are allowed to thrive in a new seeding they will typically out compete the grasses which can lead to weak grass stands and bare spots where only weeds will persist. Lesson: Good fertility management, irrigation management, and harvest management is your best bet against weeds. Also be on the lookout early for weeds before they become a problem. I have looked at clients pastures where there were some weeds present and I warned them that the problem is only going to get worse if they don't do something soon. Many times they have elected to do nothing and then a year later the problem has gotten so bad that they are looking at a season of weed infested hay or possibly a total rehab. Foxtail barley and dandelions come to mind! Always read the herbicide label for restrictions on grazing/haying and weeds controlled. Herbicides are typically most effective when plants are young and actively growing. For more detailed information on weed management see "Intermountain Grass and Legume Forage Production Manual" chapter 5.

HARVEST MANAGEMENT:

From my first paragraph. We can now get into the "quality vs quantity" aspect of hay production. I will keep this fairly simple by sticking to the "down n dirty" title.

By harvesting grass hay in the earlier maturity stage you increase quality at the expense of quantity. On the flip side, by harvesting at a later stage of maturity you increase the quantity of forage produced at the expense of quality. The key to hitting the sweet spot is harvesting at a stage where you get the best of both worlds. If you time your harvest too late you may get the tonnage you are after but the animals you are feeding it to may not get the nutrition they need without having to supplement. I would rather feed good quality hay and not have to supplement except perhaps for some minerals. As hay matures its crude protein and digestibility decreases. Some people are under the impression that an animal can just eat more low quality hay to make up for the low quality. However as it turns out the higher fiber in lower quality forages actually decreases voluntary intake. Higher quality/digestible hay will move through an animals system faster which allows for individual animals to return to feeding quicker which means more high quality forage will be eaten. This leads to better animal performance. For the sweet spot for most of the grasses I mentioned it is preferred to get the first cutting in the mid/late boot stage or just before or shortly after the seed head erupts from the sheath. One of the benefits of harvesting at this stage instead of when the seed head is brown and mature is that the grass can begin to regrow for your second cutting probably two weeks earlier. Also, since the weather tends to be a little cooler with cooler nights at this time of year the plants recover faster than they would if harvested later when it is warmer. Remember that we have been talking about "cool season" grasses, so take advantage of this. If you are harvesting at an earlier stage of maturity for your first cutting then you are moving your entire season back by approximately two to three weeks. This has another advantage. Many folks do their last cutting in October. The problem with this is the grass plants do not have enough time to recover before it turns cold. Grasses should have about 4-5 weeks to recover before going into the winter. If they go into the winter in good shape they will come out better and more productive in the spring which will pay you dividends in the spring. Maturity at cutting can have a difference of three to six percent crude protein depending on stage of growth.

Something else I notice when I travel around looking at hay fields. Most people do a pretty good job as far as cutting height. For those of you who cut below three inches, please do yourself and your grasses a favor and never cut below three inches and four inches is probably better. If you get greedy for tonnage and cut below

three inches you will pay for it by postponing your next cutting. Grasses store around 80% of their carbohydrates/sugars in the bottom three to four inches of stubble. This is where they get the energy to recover quickly. One client I have been working with for several years used to have his field cut at about two inches or lower even though it did not seem right to him. After the first year he started doing all of his own labor/equipment and he cut his first crop at three to four inches and showed me that the orchard grass plants had grown approximately four plus inches in five days! He said that in over fifteen years he had never seen it do that. He also cut the pasture in the boot stage instead of when over mature. And since it was earlier in the season the nights were cooler so he also took advantage of the plants being cool season grasses. He was taking several variables into consideration and it payed off. I was talking to Dr. Steve Fransen at Washington State University who is a forage expert, and he puts it this way, "the bottom three inches of cool season grasses do NOT belong to you or your livestock, it belongs to the PLANT, so leave it alone!"

I strongly suggest sending in a hay sample to a lab for analysis. It will help you to know how you are doing as far as quality goes and if you are keeping your crude protein and digestibility at a high level you should be able to command higher prices for your hay. If you feed your hay to your own cattle you will be able to determine a feeding program for your cattle and possibly save money and/or improve animal performance. A full test will run about \$30 and I think worth every penny.

I also realize that all of this is easier said than done as hay producers have many things that they have to juggle such as: When you are ready to cut and then the weatherperson says that we have a 10-20% chance of rain for the next 7 days and you get some little showers which postpones your cutting and now the quality has gone down due to over maturity or you cut anyway and it gets rained on.

This just touches on some of the basics of grass hay production and there are obviously differences in each producer's operation. Some of these concepts are generalizations as per the title but are good rules of thumb.

For an excellent(not Down n Dirty) detailed guide on growing Grass and Alfalfa hay you can access the "INTERMOUNTAIN GRASS AND LEGUME FORAGE PRODUCTION MANUAL" online. Highly recommended!

For a publication on hay analysis go online and look at "Interpreting Forage and Feed Analysis Reports" from Mississippi State University Extension.

Also please feel free to contact me with any questions concerning livestock/native range/hay pastures.