'Simple Practices for Better Hay'

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Making 'Quality Hay' is anything but simple. Quality hay is nutritious, digestible, palatable, free of contaminates such as toxic weeds, dirt, manure, metal, glass, plastic, mold and rotten material. So concentrate on the things that you can manage, plan ahead and know all your options. What is your goal? Only to make enough hay to cover non-pasture resources, have hay to sell, make only hay to be stored in one type of package. Have round bales for outdoors storage, small bales for in a barn and/or baled silage too.

The Field (s):
Fields can be native grasses to alfalfa, multipurpose (pasture/feedlot/hay field) and rotated with other crops or even waterways. Field location from the farmstead or feeding area, soil type, terrain, shapes limited by - property lines, river banks, woodland boarders, are several things influencing the results that can not be changed so build a system that will get the most from what you have available. Soil sample & lime, indentify any invasive weeds and the method of best control, tile or build waterways to limit wet spots and build terrace to limit erosion. Trim trees within or along the boarders, harvesting the dead trees to minimize limbs plugging and/or damaging machinery. Pick rocks and identify those extra large hazards that can damage a machine during the harvest. Remember that you may know where 'the rock that Grandfather homesteaded is located' but anyone new helping with the harvest may not know. A field that is tilled for seeding should have a smooth & firm seed bed before planting so make an additional tillage pass when necessary because you may be traveling across this surface hundreds of times before it is reseeded. Till in the same direction as normal haying travel since any ridges created will last a long time. Keep fence wire, post & gates out of the cropping area to limit potential 'hardware disease'. Make gateways large enough to move in & out of the field with easy. If livestock is fed in the field make sure to distribute the 'feed waste & manure' to minimize killing seeding and reharvesting. Spread any manure evenly and early enough to allow breakdown before harvesting. Collect any twine or plastic material before regrowth hides this trash. So manage your fields for best results.

The Crop:
The first question should be 'when should I cut the crop'? The only goal is too make the best quality feed possible because it cost just as much to do it less than best. Do not harvest by a calendar but monitor the seasonal growth. All crops have a 'growing cycle' and once the plants reach an internal 'maturity clock' they switch from growing foliage as a priority to making seed for the next generation. When this 'maturity clock' is activated the plants become more 'fibrosis and less nutritious' which may require additional supplements fed to meet the livestock's needs. Many times it is better to cut a portion of the crop 'on time' and risk being rained on so that any additional cutting that year can stay on schedule. Wait for the dew to evaporate before cutting the crop rather than add to the windrow. If you mow the crop with dew still on the plants, you can add at least an additional 2000 lb. of water per acre to the swath which will only extend the dry down time.

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'Sun light' is the most important factor influencing hay dry-down so lay the crop in the widest swath possible without driving on the hay. It is important to create the widest fluffy uniform swath as possible so light will open pores on all plants exposed to sunlight allowing respiration (drying). This is why an over conditioned dense narrow swath can slow dry-down. In some cases when soil moisture are high it may be better to make narrow swath at cutting too allow the exposed soil surface between swaths to dry then use a tedder or rake and move the original swath too the dryer surface. The growing crop is approximately 80 % moisture so for every ton of crop there is 1600 lb. of water. Dry baled hay will need to be 18 % or less if baled into small square bales or heating and molding will occur. Large square or round bales need to be 14-15 % or even dryer.

Machines:

There is nothing mechanically that can be done to 'hay crops' to make it more nutritious but using the 'right machine' correctly at the best time can save much of the original feed value as possible. Do you own all the required pieces or hire some processes? When replacing machines or adding a new type of machine, it should be matched for both the size of the job and to each other. Just replacing the old with a new of equal features may also be a mistake. Most farmers have higher yields today because of better genetics and management so do not expect the same results from any machine as total volume per area increases. Over time new technologies plus improvements to designs can make something that did not previously work well in your environment is the right choice today. Using too small of machines can extend the harvest to the point that the 'crop value decreases by maturing or weather destroys the value'. Many farmers' use their tractors for both row cropping and haying but do not take the time to move the wheels from narrow row settings to best hay tool application width. When wheels are too narrow several problems arise: swaths made at cutting may not be as wide as possible for faster dry-down; filling a round baler correctly without driving on the windrow will be a challenge with 5 ft balers. Today highway and field operations happen at higher speeds so match the tractor's power & weight to control the machines safely under all conditions. Your tractor may work great on flat ground but remember to consider the extra weight a round bale or wagon load can add in hilly areas. Rotary cutting machines perform better at higher rather than slower MPH unlike sickle machines so do not under power. Match the size to the HP to maintain adequate ground speed in heavy crop, down crops & going up hills. Spending a littler more for some special options can also make your haying simpler, more versatile and a better ending product. There are items like hydraulic tongue pivot, header tilt, net wrap attachment, moisture sensor, crop preservative applicators, tandem wheels or just additional lights. Most farmers are prepared to the same process as the last time but a good plan is to know what options are available in your area. Contact your local dealer for 'renting special equipment needs' such as a 'silage bale wrapper' or know a 'custom operator' that can provide a service to limit crop losses.

1) Cutting:

When selecting a mower consider the crop type & field conditions. Rotaries can keep you on schedule vs a sickle type mower. Using a disk type mower or mower-conditioner will allow you to cut up to 3 times more acres in the same amount of time as a sickle type of equal width. Rotary's cut through wet, down, tuff material, including old bales, manure clumps and rodent nest. They also work better in point row cuts and swath overlap cuts, usually without any ground speed reduction. If rotary knives are damaged, they can be replaced easily and quickly at a low cost so slowing or being limited by what you may not see is not a big issue. Replacing the knives on a rotary machine equals sickle & guards w/ hold-downs on a sickle. If possible install knives

with bevel down for first use application will reduce knife damage and bending if rocks are present. This lets the knife lift on contact with a rock releasing pivot point clamping effect allowing it to swing away from the hazard. Any knife that bends up will leave a 'streak or rooster tail' slowing the dry-down. Cutterbars with a 'shear protection system' can keep your harvest on schedule by not only minimumizing down time but encouraging faster operating speeds. Set the float for minimum surface contact but not bounce over any crop. Rule of thumb is 'the faster MPH or rougher the surface the heavier the float - the slower the MPH and the smoother the surface the lighter the float'. Adjusting for field to field changes will save fuel, reduce knife damage and over all wear and tear. Cut your plants with a 2 inches minimum stubble height to suspend the swath above the soil and create an air barrier to reduce moisture transfer to the cut hay. Limit the stubble height to about 4 inches or you can expect the long stubble to wick moisture from its root into the swath also. The sun works like a 'water magnet' pulling soil moisture up into the swath as the swath moisture decreases. Operate cutterbar at the flattest angle that achieves desired cut height to minimumize dirt in the windrow, knife or cutterbar damage. Quick regrowth crop varieties can slow dry-down and not provide any additional yield benefit. Machines with 'impeller tine type conditioners' are very versatile, adjustable for more conditions plus forgiving to foreign material such as rocks, gopher mounds, ant hills and wildlife. Roll conditioners come in different types; rubber & urethane, steel and all will wear over time, more in abrasive conditions so adjusting is required. When adjusting the conditioner for your crop, do not 'over-condition the crop to the point that it shreds the plants and mat together in the windrow'. Remember unless you do everything else correctly conditioning may have little value. '*A **uniform** low-density fluffy windrow should be the goal'*. Using a rotary mower-conditioner with narrower rather than wider cutting width may actually speed up total haying time. Many farmers have added a wider cutting unit to their system thinking that it would shorten the harvest time but ended up adding 1-2 additional days to the dry-down because swath density increased to the point of slowing the drying process. It may be better to purchase a larger/wider capacity rake to merge the smaller swaths into fewer passes for the baler. All mowing equipment requires regular inspection for damaged or worn parts that can slow the cutting and cause bunching or plugging. Uneven travel and crop flow will create uneven dry-down.

2) Tedding:

Tedders are a great investment even if only used occasionally; on heavy first cutting, rainy years, or rained on hay to limit molding before baling. The tedding can save a crop from being a complete loss. If using only a mower less conditioner the crop can be 'conditioned' by using a tedder shortly after cutting. Drive so that the crop enters the rotors and is pulled through rather than moved (counter flow) forward into on-coming crop which will shred the plants increasing field losses. Operate at high RPM and match MPH to separate crop, have unit tilted to lift and allow crop to fall to the ground evenly. If tedding un-windrowed crop the rotor angle must be flat to the surface to stir the entire crop evenly. Do not use a tedder in crop dryer than 40 % or feed value will be reduced by extreme shattering. Avoid purchasing dual-purpose 'tedder-rake' units since they do neither process as good as specialized models.

3) Raking:

Rakes many times are undersized for best results and performance. The raking process needs to be timed to the crops' moisture level to minimumize dry-matter loss but also get the job done in a timely manner. Single side rakes of the 'basket, rotary or wheel type' can move crop to improve drying without merging more material. Powered rakes allow the raking process to start

when the crop is at high moisture but before it has dried to the point of excess leaf loss. Areas with lower yields can use 'double / twin' rakes to speed up the process but will limit total ending volume to the area covered in each pass. When purchasing a v-type rake to cover the minimum crop width requirement at its maximum operating width it may work ok in light and straight travel but if your fields have curves, rake around corners, side hills, you better buy a larger size so that the operating angle is sharp enough to limit any bull-dozing, bunching or plugging. High capacity wheel rakes should always be considered, these rakes have the rake wheels mounted in front of the pivot point that way large volumes of material can pass without bunching on arms. The discharge point of the rake should have an adjustable width to match the round baler width on all round baler applications. The resulting windrow should also be uniform in shape & volume for best bale results. The windrow needs to be formed to equal either the full baler width or ½ or less. If less than full width windrows are fed into the baler but wider than half width, you will end up having barrel shaped bales. These bales will have lower density, will be more difficult to wrap with twine, move and store.

4) Baling:

All three types of balers: small square, large square and round can benefit from using a 'crop preservative' and should be considered as a 'normal practice' by all dry hay makers. Crop preservatives allow you to start baling earlier each day and to keep baling longer each day when dew is present but not have to worry about potential molding, heating or a fire. This can mean getting more bales done each day with one baler while capturing a higher valued crop because baling high moisture hay will contain more leaves. So using a preservative will result in a higher quality, more nitrous feed with less total ending cost.

Small square balers should be driven at a MPH that will create a consistent 1 ½ to 3 inch charge size (slice, flake, slab) to maintain uniform bale shape, weight and density. Small adjustments of RPM can help tweak the result. Purchase a high quality twine; sisal will degrade over time while plastic may seems to last forever even when not holding a bale together. If using wire keep all pieces away from cattle so hardware disease is limited.

Large square balers are very popular and available for hire in most areas. Three common sizes bales are 3x3, 3x4 and 4x4 with weights up to one ton. Their shape will not resist rain, snow or even dew so spoilage will occur unless covered or store indoors. Large square bales do allow easier portion feeding vs round bale usage.

Today round bales are the most common method of feeding beef cattle hay. Round balers come in many different sizes from 4x4 to 5x6 ft. bale, making larger bales means less bales but can also mean more losses during feed out. Balers can be used to make dry hay, high-moisture and silage bales. Some models have 'pre-cutter knife options' that can make a higher density bale, a bale that will break up after wrap removed for easier portioning and reduce livestock feeding waste. The goal should be to make a very dense bale with a straight top/square shoulders and a packing material that will hold the bale together until fed. Avoid using 'soft core/variable core' features to make soft centered bales. Follow bale shape indicators to feed windrows into the baler at correct areas but do not 'weave frequently or excess material will be placed in center of bale. Round balers can be operated at less than rated PTO speed so watch the crop to baler relationship. Adjust the MPH and RPM to have the crop flow into the baler with a slit bulldozing effect but not chase the crop into a pile before picking up. Excess RPMs can trash the crop causing leaves to be loss but also create extra buildup in and around the baler's components. This

can save fuel, wear and tear and create a denser bale. Add a high-moisture kit or silage kit to non-silage balers to minimumize crop wrapping on moving parts or building up on surfaces. Using net wrap for all round baling saves wrapping time, saves feed value, increases baler productivity, reduces baler wear, saves fuel and money. When fuel was over $3/gal it took approximately a dollar just to put the twine on a bale. Silage baling is a great way to simplify your whole haying process, since now you do not have to rely on 'mother nature' to dry your hay. Silage baling can begin once hay has wilted down to 60 % moisture which in many parts of the country can happen in a few hours after mowing. Silage bales also should be made as tight as possible to squeeze as much air out before wrapping in plastic film. Wrap silage bales as soon as possible but within maximum 6 hours to capture the most feed value. Silage bales can reduce or eliminate any additional energy supplement required by your livestock. Many silage bale users report that they have also reduced the number of acres, bales and machines to meet their feed needs by ¼ to 1/3.

5) Moving and Storing:
Small square bales can be loaded directly onto flatbed wagons, thrown in to basket wagons or dropped on to the ground, individually or grouped. Small square bale accumulators are becoming popular as manual labor issues develop in many areas. Match the tractor/loader size to the bale number and weight. Stack square bales with the 'cut side' up, this will help disperse any internal bale moisture that can keep heating & molding from happening. Small bales can reduce feeding losses over round bale use.

Big bales require big equipment to move safely so do not exceed the tractor/loader capacity. Large bale spears, forks, grapples and squeeze can damage bale shape and integrity. Minimize number of moves to reduce damaging bales. When using a grapple on net wrapped bales reduce the tearing or catching of the net by installing a pipe/tube with holes aligned to the grapple teeth attached with a log chain connection to grapple tooth bar frame. CoverEdge net wrap resist wind damage during transport and in some states eliminates the tarp requirement. Net wrap can limit spoilage to less than 1 inch while the national average for twine packaged bales stored outside is more than 6 inches and close to 33% loss. If storing outside place bales on well drained surfaces, clear of weeds, brush and shade. Align the bales in a row like 'life savers in a package' with rows spaced to allow sunlight to dry area between rows. Do not stack bales like a golf ball on a 'T' because the vertical bale (s) will absorb moisture very easily from the ground and any that runs on to the upper end surface even if 'capped with a bale'. Arrange storage area so that you can feed bales to match livestock requirements for 'quality' and to reduce storage losses. Feed the 'at risk' bales first to keep losses low, these are bales that may have been damaged or poor density that will allow moisture to penetrate over time.

Summary
'Good hay' requires planning and flexibility to adjust for the ever changing environment. Maintaining the field for minimum issues goes a long way in making your hay process simple. Keep your field clean and correct those areas that can cause machine damage or create uneven windrows that slow down the harvest. Check and service all machines so that breakdowns do not interrupt the harvest. Operate the (cutting, tedding, raking, baling) equipment at the MPH and RPMs that you intend to do the operation before inspecting for results. Stop, shut off your equipment and the tractor, periodically inspect the results of each machine operation. Adjust each machine to match the changing conditions from field to field and year to year. Hay is like

‘snow flakes, every day, every field is different’ so the setting that may have worked great today could be completely wrong tomorrow.