

HOW TO PRODUCE HAY FOR THE HORSE MARKET

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Abstract: In many ways, producing hay for the horse market is more exacting than furnishing hay to dairies or the beef industry. The horse owner usually only considers color, leafiness, and lack of weeds, and to a lesser extent, bale weight and stem diameter. To produce good horse hay, the grower must contend with a variety of other aspects that the horse owner does not consider. The key to the horse market is to furnish consistently good hay over a long period of time and to develop confidence with the buyer.

Keywords: horses, alfalfa, production practices

INTRODUCTION

This discussion is intended primarily for the alfalfa grower who is considering producing hay for the horse market or for the horse owner desiring to increase his knowledge of alfalfa hay. The grower must realize that the horse market is a difficult and sometimes exacting market to satisfy. Although only 15% of the alfalfa hay produced in California is used by the horse industry (Henry, 1991), the recent weakening of demand for hay by the dairy industry has motivated many growers to look elsewhere for markets. The ultimate purchaser of hay in the horse market usually is unaware of the best criteria for selecting hay.

The horse owner should be assured that if alfalfa hay is properly prepared, such hay is an excellent feed for horses (Roser, 1990). A tendency exists to consider hay a pure commodity, i.e., "All hay is the same." In actual practice, good hay production is a complicated and technical endeavor which is mostly unnoticed and unappreciated by the consumer.

The basic fundamentals of hay production are discussed elsewhere (Marble, 1990). Marble's article is an excellent review of the important factors in alfalfa hay production. This discussion should be considered an extension or supplement to these basic practices.

We have produced alfalfa hay for over 70 years at our ranch in the Antelope Valley. For the last 15 years, most of our production has gone to the horse market in the Los Angeles area. The comments and recommendations given here are based upon our observations and experience during this time. This discussion might change somewhat if we were growing hay in another geographical location and supplying a market in a different area.

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VARIETY SELECTION

For hay intended for horses, the stems should be relatively small in diameter. Horses do not consume coarse-stemmed hay as easily and tend to waste more of this type of hay. Any variety should have an adequate number of leaves so that the resulting hay bale appears to contain a lot of leaves and not appear to be "stemmy".

The geographical location at which the hay is produced also influences the selection of a variety. Dormancy, pest resistance, stand life, etc., vary with each variety. As discussed later, moisture is needed to retain the leaves when the hay is baled. In our locale when only slight moisture is available during baling, some varieties can be baled satisfactorily, whereas others cannot be baled under identical circumstances.

CULTURAL PRACTICES

Irrigation

We flood irrigate by the border-check method. Each check is 40 feet wide by one-quarter mile long and is surrounded on each side by borders. Water enters from valves at one end of the bed and flows down the bed. Flood irrigation is used because our electric utility bill is 60% less than the bill would be if we irrigated by sprinklers. Also, our area is windy, and our alfalfa stands are more uniform in height than if we irrigated by sprinklers.

To improve our irrigation efficiency and also minimize any weed growth sometimes attributed to localized ponding water, our fields have been laser-levelled. In this way, the slope of the check and side fall can be accurately established. The presence of local high and low spots in the field are minimized.

Irrigation timing is determined by calendar schedule, considering numerous factors which include but are not limited to: the evapotranspiration rate of the plants, time between cuttings, storing adequate moisture in the alfalfa plants to resist effects of cold temperatures during the early spring, assuring some plant growth after the last cutting in the fall so that adequate carbohydrates can be stored in the roots to in turn promote rapid growth the following spring, staggered and timed cutting schedule to minimize adverse effects of inclement weather, and overall harvesting schedule with all of its demands for labor and equipment.

Weeds

For purpose of this discussion, weeds can be grouped as poisonous, mechanically injurious, dodder, and non-injurious. In our area, poisonous weeds to consider are groundsel, fiddleneck, Mexican whorled milkweed, and some silver nightshade. We eliminate any of these weeds by hand roguing. In California, the most common toxic weed problems are caused by groundsel

and fiddleneck which may create pyrrolizidine alkaloid (PA poisoning (Craigmill, 1985). PA's can damage the liver of horses and maintain their toxicity even in dried plant material and hay. Horses and cattle are the most sensitive barnyard species to PA's. PA's produce a classical time-dose response, that is, a high dose will produce toxicity within a short time period, and lower doses take longer to produce the same effects (Craigmill, 1989). The no-effect-level for PA-containing plants is considered to be 5% of the total ration for livestock in general. However, since the PA content for PA-containing plants varies due to weather conditions and other factors, a level of less than 2.5% is considered safe for the most sensitive species such as horses and cattle. Nevertheless, most knowledgeable horse owners do not accept any hay with noticeable contamination of these weeds because of the cumulative toxic effect of the PA's (Craigmill, 1989).

Foxtail and sandbur are mechanically injurious weeds to be considered in our area. The main problems with this type of plant is they may penetrate the surfaces of the mouth. The awns of the foxtail can be impacted in various parts of the mouth, eventually causing ulcers and subsequent invasion of deeper tissue (Fowler, 1978). We control foxtails with one winter application of Velpar (hexazinone) and hand rogue any sandbur plants that may appear.

Dodder is a parasitic plant that can grow on alfalfa in our area and is becoming an increasing problem throughout California. Dodder grows extremely fast and if not controlled can choke an alfalfa field with mats of unruly orange "tentacles." Yield reductions and dying alfalfa stands are the result. Some horse owners object to the dried out dodder in hay and refer to it as "that black stuff." Bunches of dodder usually dry out slower than alfalfa hay and can create "slugs" of uncured product in a bale of hay. This damp slug can affect the surrounding portions of a bale to create all the problems associated with baling uncured hay, i.e., discoloration, bacteria growth, molds, dustiness, etc. We treat our fields with Treflan (trifluralin) once in the early spring and spot burn any patches of dodder in our fields throughout the rest of the year which escape this treatment.

Non-injurious weeds in our area can consist of a broad spectrum of weeds often found in alfalfa such as barnyardgrass, Bermuda grass, Johnson grass, etc. Their presence in small quantities in a bale of hay certainly has no detrimental effect on the feedability or nutrition that the bale provides. However, our horse market will not accept the slightest trace of these non-injurious weeds. If a weed is noticed in a bale, regardless of the quantity, the bale will be rejected.

Insecticide and Herbicide Residues

Fortunately for our hay-making operation, the geographical location has allowed us to develop very safe practices for applying pesticides. We apply two herbicides and one insecticide, each one only once per year. These applications are either in the winter, when the hay is dormant, or in the early spring before the first cutting starts to grow rapidly. In this way, we are able to time any treatments to completely avoid the main growing season.

Also, we do not grow any crops except hay. As a result, we need not concern ourselves with the possibility of overspray from adjacent fields. When we do spray, as discussed above, we use our own grown application sprayer so we have absolute control over the spraying process.

Botulism

Botulism in horses refers to muscular weakness and paralysis caused by ingesting food or water containing a toxin of a bacteria, *Cl. botulinum*. This bacteria resides in the soil and metabolizes the particular toxin, designated type C, in dead organic matter of plants or animals. To provide the environment for the development of the toxin, the bacteria must be present, ambient temperatures must not be too low, and some moisture may be available. Plant sources of the toxin include decomposing moist grass, lodged hay or grain in the field, and spoiled stackhay (Jenson & Swift, 1982).

Only two years ago, an outbreak of botulism occurred in Southern California. At least 18 horses died and over 30 became ill. These horses died in Orange County, Chino, Los Angeles County and Ventura County. One of the horses that died was an Arabian valued at over \$200,000. A disease alert was published by Los Angeles County Department of Health Services. Rabbit fur and skin was found in alfalfa hay pellets that were manufactured in Los Angeles from hay brought in from out-of-state. The cause of these deaths was thought to be the botulism toxin which was metabolized in these rabbit parts (Davis, 1989).

Needless to say, keeping dead and decaying plant and animal tissue out of the alfalfa fields is important. We pick up any hay in the field that may be missed by a baler. Burning is done around the edges of every field in the winter to remove any dead plant material.

Q-Fever

Q-fever is caused by the *Rickettsia Coxiella burnetti* and was first described by an Australian in 1937. Sheep, goats, and cattle serve as reservoirs for this organism. It can be spread in the milk, urine, feces and general physical environment. Although the livestock industry has historically ignored the effects of the organism on the animals, the literature discusses effects on fetal growth and abortion (Waldhalm, 1978). People who have not been exposed to the organism can develop a persistent high fever, chills, headache, muscle pains and severe malaise. Eventually, the heart may be affected. The main mode of transmission to man is through inhalation of the infectious aerosol. The most widely publicized outbreak was at a university in San Francisco in which 88 cases of clinical illness were documented and one death occurred (Bernard, et al, 1982). An outbreak in England was traced to transmission of straw hay and other farmstead debris (Salmon and Howells, 1982).

In California, a common practice is to pasture alfalfa fields using sheep, especially in the fall. The rickettsia can be deposited in the hay from urine, feces, and especially birth products. During hay harvesting, the rickettsia can be baled up with the hay. This provides a risk of

contacting Q-fever for the handler of the horse hay. For these reasons, we do not pasture our fields.

HARVESTING

Haymaking Process

The haymaking process consists of swathing the alfalfa, allowing the the hay to dry out or "cure" in the sun and wind, baling, and hauling in the hay.

Swathing

We use a self-propelled swather that cuts the alfalfa, crimps or conditions it, and lays it back down on the ground in long rows or windrows to dry. The purpose of conditioning the hay is to break the stems about every two inches to facilitate moisture release from the interior of the stem. The windrow is made as wide as possible without interfering with the baler's ability to pick up the entire windrow with the aid of a Haysaver wheel. The hay is conditioned and allowed to dry in wide windrows in order to minimize drying times. If this period is kept to a minimum, the resulting hay bale will have a greener color and irrigation water can be applied to the field sooner.

The hay should be sufficiently tall so the length of each stem will allow a bale to be made which is well constituted. Short hay gives rise to soft or "squishy" bales. For horse hay, some bloom is not only tolerated but is often preferred.

Curing or Drying

For proper curing, the hay should be dried to about 8% moisture by solar radiation and wind. The purpose is to dry out the surface moisture and also the water within the stem or "stem moisture." Removing stem moisture requires the most time. Therefore, in checking to determine if the hay is fully cured before baling, we obtain a sample of hay from the bottom of the windrow near the center and try to strip off the outer coating of a stem using a thumbnail. Only if the coating cannot be stripped do we consider the hay fully cured and ready for baling. To minimize the amount of time the hay lays in windrows in the field, growers may often bale with some stem moisture. We do not recommend this practice when making horse hay because it leads to a greater likelihood of baling the hay with too much moisture. As mentioned in the section on marketing, emphasis is placed on the grower producing horse hay to have a consistently good product.

In our area, this curing process takes about 3 days during the hot summer months and as long as a week to 10 days during the cool spring and fall months. In order to minimize leaf loss and keep as good a color in the hay as possible, we seldom need to rake the hay to assist the natural curing process.

Baling

The baler picks the windrows up from the ground, packs the hay into a bale using a plunger-type apparatus, determines the proper length of a bale, and then ties wire or twine around the bale.

After we have patiently waited until the hay is fully dried or cured, we then have to wait to bale to hay on a morning when adequate moisture is present. Moisture allows the hay to be baled without losing or shattering leaves. In a sense, this procedure may seem like a contradiction. However, once the hay is fully cured, the resulting hay will store very well without turning color or molding if baled with a little moisture.

What constitutes too much or too little moisture? Minimum moisture is determined by examining a "flake" of hay in a bale. A flake is created in the baler chamber every time the baler plunger compresses a bunch of hay. Usually, 15 - 17 flakes are present in each bale. We cease baling when the baler operator cannot pick up a flake of hay in a bale and carry it a few yards without the flake coming apart. The horse owner does not want hay so dry that flakes fall apart when the hay is taken to the horse. We feel the maximum safe moisture is 18%. The measurement is determined by inserting the probe of a moisture meter (such as Delmhorst F-5, DHM-1, etc.) into the interior of a bale. Since the moisture can come from the wind, ground, or dew, sometimes the moisture is not distributed evenly throughout the bale. In instances where the moisture is not uniformly distributed, an average is used, with no single reading to exceed 25 percent.

The color of the hay is very important to the horse owner. In fact, it is the first thing the horse owner observes and for some it is the most important characteristic. To optimize the color, the hay should be baled as soon as possible. During certain times of the year, a heavy dew followed by sunlight will bleach the top of the windrow. When the hay is baled, a "streak bleach" will appear in the bale. While this does not have a significant effect on the nutritional quality of the hay, it is noticed by the buyer and should be minimized.

Bale weight is critical for this market. The horse owner does not like heavy bales. Also, feed stores purchase alfalfa hay by the ton and sell it by the bale, so lighter bales increase the profit margins for feed stores. We try to furnish bales between 105 and 110 pounds. However, many feed stores now require bales under 100 pounds in weight. Whatever the requirement, the key is consistently in weight. All our balers have a weighing attachment which indicates the weights of bales as they exit the baler. We also encourage our baler operators to check the bale weights by hand. Every time we bale, we also carry a separate scale by which the bale weights can be periodically checked.

We still use the balers with a 16-inch chamber. Many growers have gone to 15-inch chambers. Our market prefers wire bales, but we anticipate using twine in the future.

Hauling

Hauling hay bales from the field should be done as soon as possible after baling to minimize damage to the alfalfa regrowth, minimize any chance of ground moisture adversely affecting the bale, maintain optimum hay color, and allow irrigation water to be applied quickly. We use a self-propelled bale wagon for this purpose.

In addition to bringing hay in from the field, we use the hauling function to separate any bales containing weeds. Although the best practice to keep weeds out of the product is to now allow them to grow in the fields, some weeds always seem to get established at the edges of the field.

The hay is stacked so the bottom bales are on the edge. In this way, the wires will not become rusty if ground moisture is present. Special stacking patterns are used if the hay is to be loaded by hay squeezes.

STORAGE

All horse market hay is stored on pads elevated 3 - 4 inches off the ground. In case of rain, bales are protected from moisture damage. The hay is placed in barns with roofs and floors consisting of raised pads of decomposed granite for sale during the winter.

Some of our hay is stored in barns for 9 months before sale. Any signs of too much moisture at baling time is reason to reject the bales. Examples are slightly rusted wires, slight surface discoloration of bales which may be wiped off by hand, etc. Normal bleaching of the hay on the outside edges of the barn is readily accepted by our market.

MARKETING

To supply the horse market, the most important criterion is to develop a reputation for supplying consistently good quality hay. The horse owner is very nervous about mediocre hay. We have dealt with the people we now supply for over a decade. In a way, this is "niche" marketing.

Naturally, many people desire the very best hay at the least price. Some are never satisfied with the quality or price. The key is developing a long-term relationship with reasonable people who understand that the haymaking process is a constant wrestle with many variables.

PELLETS OR CUBES

Many advantages and disadvantages can be listed for feeding pellets or cubes instead of hay

(Roser, 1990). The advantages are increase in palatability, minimal mold and dust, additives can be incorporated, less storage space is required, and less wastage.

However, the main disadvantage is determining quality. Quality differences are not recognized and all pellets are usually treated the same by the consumer. As a result, tremendous pressure is placed on the pellet mill to offer a least cost product. As a result, poor quality or damaged hay is often "blended in" to the pellets. As a grower, I know all of my rain-damaged hay goes to a pellet mill.

An additional advantage of pelleted hay is that the concern for mechanically-injurious weeds is eliminated. However, animals cannot select out PA plants from pellets or cubes. Chemical analysis of PA's in plant material is difficult and expensive (Craigmill, 1985). As mentioned earlier, botulism in pellets created a real problem for horse owners in Southern California a few years ago.

The feed tags on commercial feeds do not give the horse owner the information needed to make an intelligent selection. Crude protein is very misleading and can be satisfied by adding protein sources to the feed that may not be digestible or nutritionally useful to the animal. Digestible protein and total digestible nutrients (or some other measure of energy value) would be better.

Feeding pellets and cubes is an excellent concept. However, the horse owner, pellet mill and appropriate regulators need to get together and address the problem of determining quality. Nutritional value, mold, dust, poisonous weeds, and other "natural" toxins need to be measured and quantified. Otherwise, buying these processed feeds, if you do not know the reputation of the grower and pellet mill, represents a disaster ready to happen. Remember the old adage, "You get what you pay for."

CONCLUSION

Producing hay for the horse market can be more lucrative than other markets, but in many regards it can be more demanding as well. It is imperative that the alfalfa hay be well cured with no evidence of mold, the color should be as green as possible, weed-free, and the bale weight should be light (the exact weight depends on the preference of the feed store). Efforts should be made to minimize the chances of transmitting diseases such as botulism and Q-fever. Success in the horse market is predicated on building a reputation and confidence with the buyer which only comes from producing consistently good hay over a long period of time.

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