

Cutting Tobosa Grass for Hay

By FRED N. ARES, Range Superintendent, Jornada Experiment Station

TOBOSA grass (*Hilaria mutica*) is one of the important southwestern range grasses and is found on the plains of Western Texas, New Mexico and Arizona. Given a fair amount of winter or early spring moisture, this grass begins its growth very early in the spring and provides a source of green feed highly relished by stock after a winter diet of dry forage. Unlike the highly prized grama grasses of this area, tobosa can withstand the low night temperatures of early spring, and under favorable moisture conditions will produce a large amount of welcome feed at this critical time of the year.

However, its greatest volume of feed is produced during and after the late summer rains. The grass then grows luxuriantly on the adobe clay soil of the low swales or slight depressions which receive the excess flood water from adjacent higher ground. Sometimes during the heavy summer rains these areas are inundated to a depth of several inches and the water remains for some time. Under such moisture conditions the grass grows rapidly producing a large volume of summer feed which can support a great number of cattle for a short time without any apparent damage to the plants.

Because the grass is palatable only while green and succulent and does not cure well on the stalk it should be used during the season when it is making its growth. Since this period is short, tobosa must be subjected to heavy stocking. The grass becomes dry and harsh very soon after growth ceases and if full use is not obtained at the proper time, a large amount of the current growth is left unused. It is desirable that some of the growth be left to maintain the vigor of the plant for succeeding years, but any surplus over this small requirement should by all means be grazed if possible because the hard and woody character of the left-over

EDITOR'S NOTE.—The Jornada Experiment Station is a branch of the Southwestern Forest and Range Experiment Station, located about 23 miles north of Las Cruces, New Mexico. The Southwestern Forest and Range Experiment Station is maintained at Tucson, Arizona, by the Forest Service, U. S. Department of Agriculture, covering Arizona, New Mexico and the western third of Texas.

growth remaining in the grass tufts actually hampers the use of the next year's fresh green feed by livestock. Because of this, many stockmen advocate and practice burning the accumulated surplus growth at the end of the growing season in order to clear the ground for the next season's forage.

Tobosa grass comprises about one-third of the total feed resources of the Jornada Experimental Range. This Range, a branch station of the Southwestern Forest and Range Experiment Station, is an area of 184,000 acres of semi-desert range land, located in Dona Ana county, 23 miles northeast of Las Cruces, New Mexico. In character it is fairly representative of the millions of acres of semi-desert range found in West Texas, Southern New Mexico and Arizona.

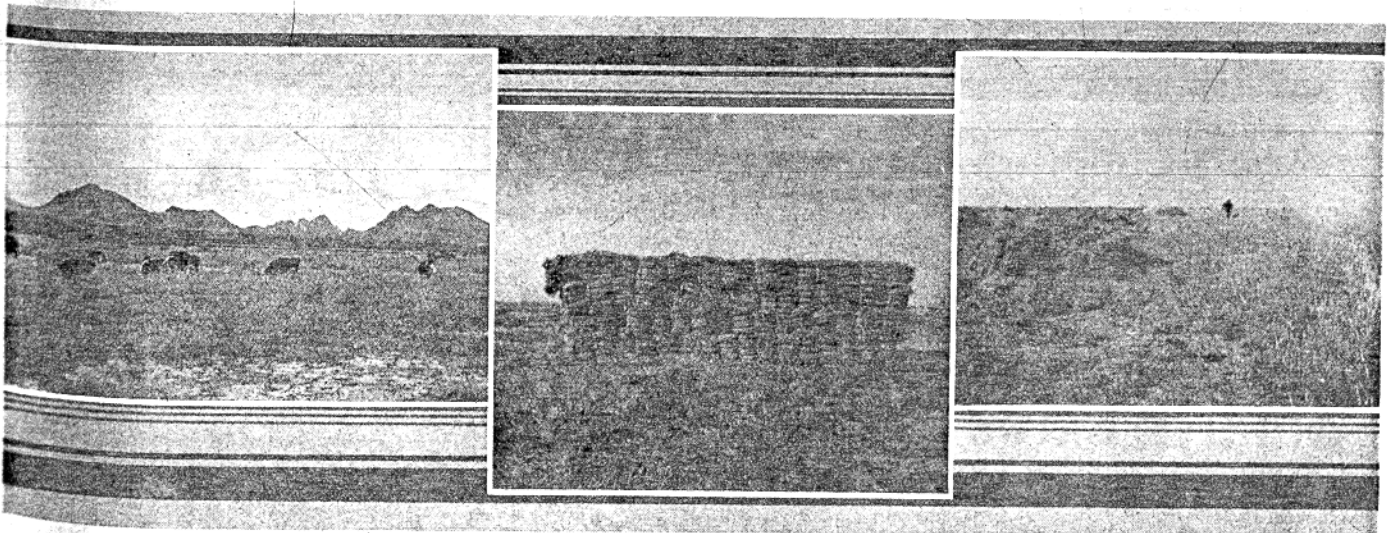
Of particular importance has been the development on the Jornada of a plan of range management and stocking which has been successful in reducing the heavy recurring losses from the severe drouths which are common to the Southwest. On the basis of accurate determination of the capacity of the range through range surveys and records of actual performance of the range through past use by cattle the range has been stocked slightly below capacity during a year of average forage production. This practice has not only provided a reserve supply of forage as a drouth contingency but has prevented over-stocking during years of below average rainfall. If a large amount of feed is produced during an unusually good year, the surplus is utilized by al-

lowing short season stock such as yearlings to graze on the range for a short time and then to be sold before the next grazing year. This increased revenue tends to balance the years when rainfall is scanty and stocking must be held to the minimum.

For economic reasons it is necessary that the fullest possible use of the range handled under such a plan be obtained which is consistent with good management and which secures the improvement and maintenance of the range. Otherwise, the rancher with heavy investments in range improvements cannot show a profit on the enterprise.

Seasonal use of ranges where mixed forage types are found is the only means by which this full use can be made possible. Such use in its simplest term consists of using different types of range during the time when, because of climate and growth conditions, the forage produced by the type is palatable and best suited for use. The Jornada management plan, for instance, provides for full use of the tobosa grass areas during the summer growing season because as explained above, this grass is not usable during the winter and spring periods. The black grama grass which cures well and makes good yearlong forage, is reserved for use during winter and spring grazing periods when no fresh growth of other forage is available.

So fast does the tobosa grass grow under favorable moisture conditions, that unless cattle are actually held by fencing or by herding on the areas where it grows, it is not possible for the grazing animals to keep pace with the production of forage. On the Jornada, salt is placed on the tobosa flats and small temporary water tanks have been constructed so that cattle will be encouraged to remain on these areas and to make use of the grass. While this plan has been well worth while by the utilization of the grass and in protecting the surround-



Left—Cattle grazing on Jornada summer range. Produces a large volume of forage, which should be grazed in the comparatively short growing season while the grass remains palatable. Center—Tobosa hay baled and ready for hauling. Because tobosa hay does not pack down closely, it may be raked and baled very soon after cutting without danger of heating. Right—Tobosa grass cut for hay on the Jornada Experimental Range. Where moisture conditions are favorable, many of these "flats" may be found which will yield nearly a ton to the acre. The same area should be cut year after year if possible, so that the hay will be free from the ungrazed surplus carried over from previous years.

Left—Cattle grazing on Jornada summer range. Produces a large volume of forage, which should be grazed in the comparatively short growing season while the grass remains palatable. Center—Tobosa hay baled and ready for hauling. Because tobosa hay does not pack down closely, it may be raked and baled very soon after cutting without danger of heating. Right—Tobosa grass cut for hay on the Jornada Experimental Range. Where moisture conditions are favorable, many of these "flats" may be found which will yield nearly a ton to the acre. The same area should be cut year after year if possible, so that the hay will be free from the ungrazed surplus carried over from previous years.

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ing unfenced areas of yearlong grama forage, there is still a quantity of the surplus forage left which is of course carried over to the next season with actual detrimental results, as explained above.

Since removal of the leftover growth by burning is often practiced in the tobosa range areas, several such tests were made on the Jornada on selected areas. These tests revealed that there is no doubt that fire is an effective and easy means of removing the old growth, but they also demonstrated that the heat generated in the process, especially when burning is done during a dry period, is likely to be injurious to the plant and if continued year after year may result in loss of density and volume of forage produced during subsequent years. Records for the same plot in the fall of 1937 showed nearly a 6 per cent loss and in 1938 a further loss of 21 per cent of the original 1936 plant density. This translated in terms of volume of forage over a large area means the loss of several tons of feed. Also, in addition to the possibility of permanent damage to the plant there is always the risk of fire getting out of control and destroying a large amount of other forage.

Stands Heavy Grazing

On the other hand, tobosa grass can stand a great deal of grazing and trampling without injury. Clipping studies¹ conducted over a period of ten years show that tobosa may be grazed to within 4 inches of the ground every week and actually gain in volume.

Whenever it is not possible to obtain full use of this grass by grazing, it is thought that harvesting for hay is the next best solution to the problem. The cutting not only removes the objectionable surplus growth but if done at the proper time of the year will also provide a valuable supply of feed which can be used during later critical periods of feed shortage. A number of ranchers fortunate enough to have a quantity of this grass on their range provide themselves in this way with cheap provender which can be used in supplemental feeding during drouth periods and for the few weak cows found in the winter and spring on every ranch, which require feeding regardless of range conditions. The hay is cut by an ordinary mowing machine, stacked on the spot, or if hauled to a distant point it is baled (see figure 2). Then in case of severe drouth which often strikes in the Southwest, the rancher is provided with a large amount of feed which is very satisfactory when fed as roughage along with oil cake or other concentrates and can be cut and put up in prairie stacks for less than \$4.00 per ton by the average rancher. Considering that baled alfalfa hay from nearby irrigated farms will run as high as \$25.00 a ton during drouth times when the demand is great, this fact will challenge the attention of stockmen who are on the alert for ways and means of reducing their overhead.

On the Jornada Range, as in most semi-desert ranges, tobosa grass is found on fairly level areas and the growth is usually so dense that other plants such as yucca and black brush cannot compete with it. As a consequence there are very few obstacles which would interfere with the operation of a mowing machine.

1. How closely Black Grama and Tobosa grass may be grazed year after year. "The Cattleman," December, 1936. R. H. Canfield, Assistant Forest Ecologist, Southwestern Forest and Range Experiment Station.

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Some spots are found which are far from smooth as the grass grows in rather large hummocks, especially where flood waters remain for a considerable time. These can be negotiated by proper adjustments of the mowing machine and of its operating speed.

During 1937 and 1938 experiments in the cutting and feeding of tobosa grass for hay have been conducted on the Jornada. In 1937 three small areas aggregating about 8 acres in extent, were selected for cutting and in August, 1938, a total of 33 acres were cut. Both years an ordinary McCormick-Deering mowing machine and rake were used. Because no satisfactory teams were available, the motive power was furnished by a light truck which proved very satisfactory for the purpose due to better regulation of speed on the rough spots. The grass was cut and allowed to dry about eight hours before raking and hauling.

The eight acres cut in 1937 yielded about 4 tons of hay, while the 33 acres cut in 1938 yielded 21 tons or about two-thirds of a ton per acre. Because the grass had not been cut or closely grazed previously there was some old growth collected along with the fresh current growth. It was not in sufficient quantities to affect the use of the hay by livestock, and by confining cutting operations to the same areas year after year, this objectionable feature will be eliminated.

In 1937 the cost of the hay, including labor, supplies (gas and oil) and hauling the hay several miles to the stackyard was \$5.42 per ton. Since \$1.02 of this figure was for transportation, a considerable saving could have been effected by stacking the hay in lots on the range where cut, which is the method ordinarily used. In 1938 the 21 tons were cut, raked and hauled to stacks about one mile from the cutting site for \$4.71 per ton, or a saving of 71 cents per ton, due to the shorter haul.

In 1937 some of the hay was stacked near the station headquarters where it could be fed during the winter to cattle under observation. As long as the range grass remained fairly fresh in the fall there was very little of the grass hay used by the cows. Later in the fall when the fresh feed was all gone and the cows were given a ration of cottonseed cake, they began to eat the tobosa grass hay readily and while not confined to this diet exclusively, they continued to eat the feed when available throughout the winter, and remained in good condition all winter. Even a good weed crop in the early spring apparently did not affect the relish with which they continued to eat the tobosa hay any time it was offered them.

Objections to the use of tobosa hay, because as some ranchers have said, "cattle had to be starved to it," are probably due to wrong methods of harvesting the grass. It must be cut while still green and succulent, which, of course, is true of all other forage plants cut for hay. If allowed to ripen and become mature the hay is unfit for feed because of the hard and woody texture of the stems.

According to Mr. W. E. Watkins, nu-

trition chemist and associate in Animal Husbandry at the New Mexico State College, the hay obtained from this grass when cut at the right time of the year compares very favorably with some of the best prairie hay of the middle-western states. Mr. Watkins has for several years made analysis of grasses found in this region and here is given a chart furnished through his courtesy which presents the results of analysis made of tobosa grass at varying stages of maturity. Analysis of good quality

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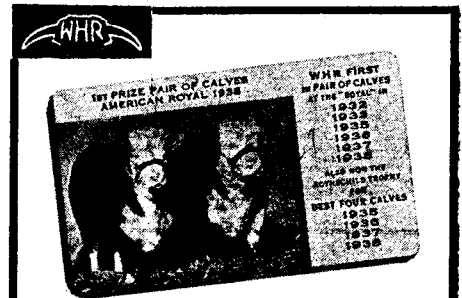
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western prairie hay as taken from Morrison's Feeds and Feeding, is offered for comparative purposes.

From this chart it will be seen that the protein content of the feed is highest when the plant is in the early stages of maturity. However, it is questionable if the hay would be available in sufficient quantities at this time to justify the work of cutting and it is therefore recommended that cutting be done as in sample No. 661 or 535, preferably the former, when the maximum yield may be expected and the grass is not yet too ripe. Of course, the date of cutting will depend altogether on climatic conditions. Rains on the Jornada of general character and sufficient to produce the heavy growth of tobosa desired usually do not come be-

ON AIR-DRY BASIS

Stage	Sample No	Date	Moisture	Ash	Protein	Fat	Fiber	Nitrogen free Extract
Very Immature	683	9-16-37	6.15	8.61	16.30	2.23	23.69	42.82
Early Bloom	533	9-16-36	5.12	8.56	13.73	1.28	25.12	46.19
Late Bloom	661	8-16-37	6.42	9.86	8.48	1.10	27.45	46.69
Late Bloom	535	9-16-36	5.08	11.82	7.81	1.43	27.49	46.88
Nearly Mature	543	10-16-36	5.09	15.73	6.25	3.62	28.72	40.59
Old Growth	613	4-15-37	3.75	9.16	6.91	1.69	31.47	47.02
Old Growth	566	12-14-36	5.88	7.12	5.70	1.06	33.44	46.80
Prairie Hay, western good quality from Morrisons Feeds and Feeding			9.60	7.60	5.70	2.40	30.30	44.40

fore the latter part of August or early September.

It is safe to say that the grass should be cut as quickly as possible after sufficient growth has been obtained to yield the desired volume of feed per acre.

The hay when cut at the proper time

has the characteristic fragrant odor of all fresh cut hay. Because most of the volume is found in the heavy, round stems, the hay does not pack down so closely as to heat or ferment in the stack and may therefore be hauled or baled very soon after cutting.

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