UTILIZING TOBOSA (*HILARIA MUTICA* [BUCKL.] BENTH.) DURING THE WINTER AND SPRING

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Tobosa (*Hilaria mutica* [Buckl.] Benth.) is a coarse, unpalatable grass when it is dormant. It grows on floodplains, which often have a higher production than adjacent upland areas. Therefore, it is an important resource, often underutilized, in the arid, semidesert region of the southwestern United States. The objective of this study was to determine if tobosa could be used by weaned calves during the winter-spring period when it is mostly dormant.

Herbel (1) found that nitrogen (N) fertilization increased tobosa production on floodplains two years during 1957-61. N fertilization increased crude protein of mature tobosa herbage in four of the five years. During 1966-70, Dwyer (2) found that 67 kg/ha of N increased herbage production two years. He recommended burning tobosa to remove old growth in early summer, shortly after initiation of new growth. According to Ares (3), tobosa hay harvested when the plants were green and succulent, was readily consumed by cattle. Paulsen (4) showed that cattle grazed dormant tobosa sprayed with molasses much more readily than untreated tobosa.

MATERIALS AND METHODS

The Study Area

The study was conducted on the Jornada Experimental Range in south-central New Mexico. The average annual precipitation is 22 cm; about 55% of this occurs during the summer growing season. The winters and springs are often rather dry.

A clayey bottomland site, dominated by tobosa but also having some burrograss (*Scleropogon brevifolius* Phil.), was fenced into seven paddocks ranging in size from 14 to 36 ha. The paddocks were fenced into different sizes in an attempt to compensate partially for differences in stand and yield of tobosa. The major soil dominated by tobosa is an Ustollic

Haplargid, fine, mixed, thermic (Stellar series). Another soil on the study area having a mixed stand of tobosa and burrograss is a Typic Calciorthid, fine-silty, mixed, thermic (Reakor series). The paddocks receive runoff water from the adjacent fan-piedmont slopes, but water does not stand on the area, because the topography is gently sloping (less than 1%).

Estimates of herbage production after the growing season were obtained by clipping 40, 30- by 146-cm plots in each paddock. In 1966, production of the perennial grasses ranged from 586 to 1,316 kg/ha among paddocks. Herbage production ranged from 805 to 1,273 kg/ha in 1967.

Procedure

Each paddock was stocked with five to seven weaned calves averaging 155 to 186 kg. The number was varied to adjust for the total amount of forage available in each paddock. The paddocks were stocked from December or January each year to late June or early July, except in 1972, when calves were removed from the paddocks in April. The calves were weighed every 28 days during the study period the first year and every 42 days thereafter. The calves consumed about 11 g per head per day of a mixture of 55% salt, 40% dicalcium phosphate, and 5% cottonseed meal, which was available free-choice in all paddocks. Confidence intervals (0.05 level) were computed for each treatment mean for each year. There was considerably more variation about some treatment means than others.

RESULTS AND DISCUSSION

Treatments and average calf weight changes are shown in Table I. Feeding cottonseed pellets (41% protein) weekly at the rate of 0.45 kg/head/day, except in 1972 when it was increased to 0.68 kg/head/day, was compared to a control all six years. The other treatments used during 1967-69 were: (1) the old growth on tobosa was burned off after the first summer storm; (2) the dense tobosa in one of the paddocks was cut while green and baled, and then fed to the calves at the rate of 1.4 kg/head/day while they were grazing in the same paddock; (3) a paddock was fertilized with 67 kg/ha of N the previous summer; (4) the tobosa on a small area within a paddock was sprayed weekly during the grazing season with a molasses-water mixture at a rate of 0.45 kg/head/day molasses; and (5) similar to (4), except that urea was added to the molasses-water mixture, so that the calves had an opportunity to have about the same N intake as those fed cottonseed pellets. In the 1967 trial, there were no significant differences in weight gains in the dry winter-spring (0.9 cm precipitation), although the calves fed cottonseed

Table I. Average weight changes (kg/head) of weaned calves, 1967-72.

	1967	1968	1969	1970	1971	1972
Length of trial (days)	168	204	212	190	191	129
Av. initial weight (kg)	186	179	160	184	159	155
Treatment[1/]						
Burn	9^{a}	45^{a}	9^{a}			
Control	1^{a}	53^{abc}	11^{a}	37^{a}	6^{a}	29^{a}
Molasses + urea spray	10^{a}	47^{a}	18^{a}			
Hay	6^{a}	47^{abc}	30^{bc}			
Fertilizer	11^{a}	63^{bc}	21^{ab}			
Cottonseed pellets	24^{a}	45^{ab}	42^{c}	44^{a}	26^{abc}	41^{bc}
Molasses spray	15^{a}	81^{c}	19^{a}			
Molasses feed				39^{a}	23^{ab}	
Molasses-urea feed				48^{a}	24^{abc}	
Milo					15^{a}	
41% (5.9% biuret)					37^{bc}	49^{c}
27-1/2% basal					42^{c}	29^{ab}
41% (8.9% biuret)						29^{ab}
20-1/2% basal						48^{c}

1/ All treatment means within a column having the same superscript are not significantly different at the 0.05 level.

pellets gained 23 kg/head more than the control. The winter-spring of 1968 was unusually wet (7.4 cm precipitation); therefore, tobosa was green and made some growth in March and April. The best gains were made by the calves in the paddock where molasses was sprayed on the grass and in the fertilized paddock. Heavy stands of tobosa in both a fertilized and an adjacent unfertilized paddock were sampled each fall, but no significant differences in yields were detected. The advantage of N fertilization is apparently that it increases crude protein in dormant tobosa (1). Tobosa samples, collected in March 1967 from esophageal fistulated calves, had 6.3 and 5.4% crude protein from fertilized and unfertilized paddocks, respectively (5). Hand-plucked samples from the fertilized paddock had 5.1% protein, whereas those from the control paddock had 3.8% protein. Winter-spring precipitation in 1969 was 3.2 cm. Most of this occurred during the winter, but there was a little green-up in mid-March. Best weight gains were made by calves receiving supplements of cottonseed pellets and hay. Calf performance was not improved by burning off old growth. Spraying dormant grass with molasses or supplementing with tobosa hay resulted in higher winter gains. Calves grazing dry grass sprayed with a mixture of molasses and urea had the highest gains during June.

During the winter-spring of 1970, we compared two replications of three supplemental feeds with an unsupplemented control. Supplemental feeds were: (1) 0.91 kg/head/day of a commercial molasses-urea feed (30% protein), (2) 0.91 kg/head/day of molasses, and (3) 0.45 kg/head/day of cottonseed pellets. Precipitation during the winter-spring of 1970 was 1.9 cm, consequently some spring green-up occurred. There were no significant differences in gains among the 1970 treatments (Table I).

During the winter-spring of 1971, we compared an unsupplemented treatment with the following supplemented treatments: (1) 0.73 kg/head/day of a commercial molasses-urea feed (30% protein), (2) 0.73 kg/head/day of molasses, (3) 0.45 kg/head/day of a mixed feed containing cottonseed meal, ground milo, sodium polyphosphate, and dicalcium phosphate (27-1/2% protein), (4) 0.45 kg/head/day of a 41% protein feed with the same ingredients as (3) plus 5.9% biuret, (5) 0.45 kg/head/day of cottonseed pellets, and (6) 0.45 kg/head/day of ground milo. The spring of 1971 was very dry, with only scattered light rains totaling 1.4 cm. The 27-1/2% protein supplement and the same supplement plus biuret resulted in the highest calf gains (Table I).

In an abbreviated trial during the winter and early spring of 1972, we compared weight gains of unsupplemented calves with those of calves fed 0.68 kg/head/day of the following: (1) a 20-1/2% protein feed containing cottonseed meal, ground milo, sodium polyphosphate, and dicalcium phosphate; (2) a 27-1/2% protein feed with the same ingredients as (1); (3) a 41% protein feed using (1) as a base and adding 8.9% biuret; (4) a 41% protein feed using (2) as a base and adding 5.9% biuret; and (5) 41% protein cottonseed pellets. The winter-spring of 1972 was quite dry, but previous fall precipitation was exceptionally high. This, plus warm temperatures in February, resulted in tobosa green-up in March. The 41% protein ration with 5.9% biuret and the 20-1/2% protein ration resulted in the highest calf gains (Table I).

SUMMARY AND CONCLUSIONS

Weight changes during winter-spring grazing trials were highly variable among years, depending on whether tobosa greened up during early spring. Gains for the calves in the control paddocks averaged 6 kg/head during the dry winters and springs of 1967, 1969, and 1971. For 1968, 1970, and 1972, when there was some moisture during the winter-spring, it averaged 40 kg/head. Supplementing with 0.45 kg/head/day of cottonseed pellets resulted in the highest calf gains in 1967 and 1969. The most effective treatment in 1968, the wettest year, was spraying some tobosa weekly with molasses. Molasses-urea spraying was inferior to spraying with molasses. Calves grazed entire grass plants on the sprayed areas. As shown by Willoughby and Axelsen (6), spraying grass with molasses alters the quantity and quality of ingested forage. Thus, spraying molasses on dry grass reduces selectivity for more nutritious plant parts, but this is not serious during a wetter year when forage quality is higher.

Although results are not conclusive, the 1970-72 studies, when a variety of supplemental feeds were tried, would indicate that a mixture of energy and protein may be superior to a high protein-low energy feed. Rittenhouse et al. (7), in studies of low-quality winter range in Nebraska, found that supplemental protein did not increase forage intake, while supplemental energy reduced forage intake and had no influence on digestibility.

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