Alfalfa and Sorghum Silages

experiments indicate no difference between sweet forage-type sorghum and dual purpose-type when fed as silage to steers

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Silage from a sweet forage sorghum with a low grain-to-stalk ratio—variety Rex—was compared to silage from a dual purpose forage sorghum with a higher grain-to-stalk ratio—variety Hegari—and both were compared to alfalfa hay and alfalfa silage in feeding trials with beef steers. Two experiments were conducted; one with a limited concentrate ration, and the second, with a full feed of concentrate.

Two alfalfa fields were harvested in the spring at the same stage of maturity; one half of each field was harvested as hay and half as silage. The hay was baled and fed as long hay. The silage was made without wilting and preserved with 10 pounds of sodium metabisulfite per ton. A trench silo was used for the storage of all silage. Two sorghum—Rex and Hegari—fields also were harvested and the forage placed directly into the trench silos without the addition of any preservative.

Comparative Experiments

In the first experiment four lots of six steers each were fed alfalfa hay, alfalfa silage, Hegari silage and Rex silage free choice. The steers on alfalfa hay and silage were each fed daily two pounds of barley while those on the sorghum silages received two pounds of cottonseed meal. This equalized concentrate intakes and gave the sorghum silage-fed steers protein from cottonseed meal to balance their ration. The steers fed alfalfa had ample protein and consequently were fed barley.

The second experiment utilized the same roughages but allowed the steers a full feed of concentrate. Here again, cottonseed meal was used to supply the additional protein needed by the sorghum silage groups. An additional treatment was to add alfalfa hay to the ration of six steers fed Hegari silage, to see if dry hay added to a silage ration was beneficial.

The animals were fed in pens of three steers each. All steers were weighed every month after an overnight fast without feed or water.

The composition of the alfalfa—when harvested—was similar in protein and lignin for both hay and silage. However, after storage, the composition deviated. Alfalfa hay decreased slightly in protein and increased in lignin after being subjected to harvesting procedures and storage. The alfalfa silage decreased markedly in protein and increased in lignin. This illustrates a great loss of nutrients. Apparently sodium metabisulfite was not effective as a preservative of unwilted alfalfa. The sorghums did not change greatly in composition in the ensiling procedure.

Weight Gains

Equivalent weight gains were made by the steers fed a limited concentrate supplement with alfalfa hay, Hegari or Rex sorghum silage. The sorghum silages were utilized by the test animals more efficiently for weight gains than was alfalfa hay.

With a low concentrate ration alfalfa silage was a very poor roughage and—in fact—the steers lost weight during the entire period. The palatability of the alfalfa silage seemed to be the major factor because the steers refused to consume large amounts of the silage.

No significant difference was found in weight gains between steers fed alfalfa hay or either of the sorghum silages when on a full feed of concentrate. As with the limited fed steers, the sorghum silages were more efficiently used, as evidenced by less feed required per 100 pounds of gain. Alfalfa hay did not improve steer performance when added to the Hegari silage ration.

The steers fed alfalfa silage with a full feed of grain gained relatively faster than did those on alfalfa silage and a limited concentrate intake, but their gains did

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Composition of Roughages

	Dry matter basis	
	Protein %	Lignin %
As harvested:		
Alfalfa for hay	21.9	6.9
Alfalfa for silage	20.0	6.4
Rex sorghum for silage	5.2	4.5
Hegari sorghum for silage	10.4	4.1
As fed:		
Alfalfa hay	20.7	8.0
Alfalfa silage	15.6	10.1
Rex sorghum silage	5.9	7.1
Hegari sorghum silage	11.6	7.1

Comparisons of Roughages Fed with Limited Concentrate

	Alfalfa hay	Alfalfa silage	Hegari silage	Rex silage
No. days fed	95	95	95	95
Steers/lot	6	6	6	6
Av. initial wt., lbs.	636	611	625	638
Av. daily gain, lbs.	1.93	–0.11	1.92	1.98
Av. daily feed:*				
Barley	1.80	1.80	...	...
Cottonseed meal	...	...	1.80	1.80
Oat hay	1.76	...	...	...
Alfalfa hay	12.93	0.15**	0.15**	0.15**
Silage	...	6.20	14.13	11.94
Feed/100 lbs. gain, lbs.*	853	...	735	705

* All feeds presented are on an oven-dry basis.

** Alfalfa hay was fed during the first days of the experiment when the animals were given their new rations.

Comparisons of Roughages with Full-Fed Concentrate

	Alfalfa hay	Alfalfa silage	Hegari silage	Rex silage	Hegari silage plus alfalfa hay
No. of days fed	95	95	95	95	95
Steers per lot	6	6	6	6	6
Av. initial wt., lbs.	635	656	641	624	604
Av. daily gain, lbs.	2.17	1.85	2.34	2.39	2.22
Av. daily feed:*					
Barley	4.58	5.51	3.65	3.65	3.96
Molasses dried beet pulp	2.32	2.79	1.85	1.85	2.01
Cottonseed meal	...	...	1.81	1.81	0.66
Oat hay	1.74	...	...	...	...
Alfalfa hay	7.24	0.15**	0.15**	0.15**	2.79
Silage	...	4.50	7.57	8.61	6.19
Feed per 100 lbs. gain, lbs.*	732	698	642	670	701

* All feeds presented are on an oven-dry basis.

** Alfalfa hay was fed during the first days of the experiment when the animals were given their new rations.

TOMATOES

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ing yields in the hormone treated plots and the absence of seedless fruit were indicators of the dissipation of the hormone effect.

Data were obtained on total and marketable yield, fruit size and numbers of abnormal fruit, but only the information relating to pointed and puffy fruit is presented in this report. The tables on page 5 show that neither hormone applications nor level of nitrogen fertilization have a significant effect on production of puffy or pointed fruit in all seasons or all locations. During the fall 4-CPA failed to increase significantly the percentage of abnormal fruit. In the fall experiments no significant increase in yield was obtained through the use of hormone, which may indicate that natural-set fruit were predominating in these plots. In all other experiments 4-CPA resulted in significant increases in both pointed and puffy fruit, as well as increases in early yield.

Gibrel, in the one experiment where it was used, had no effect on pointed or puffy fruit, but did result in a decrease in early yield, mainly due to a decrease in average fruit size. In addition, fruits from these plots were largely unmarketable due to a brown, corky surface.

The effect of nitrogen on production of abnormal fruit by hormone treated plants is not so clear cut as the effect of hormone itself. In a few cases significant decreases in either pointed or puffy fruit were related to an increase in nitrogen level, particularly where the low rate of nitrogen application was 100 pounds per acre or less. In the remainder of the experiments the differences, if any existed, were too small to be statistically significant.

Storage

In some cases storage experiments were carried out on samples consisting of 50 fruit from each plot. These fruit were picked at the green-mature stage, selected for uniformity of size and color, and placed in storage at Riverside in a refrigerated room maintained at 63°F. After 10 days storage, sorting of the fruit commenced and continued at three- to five-day intervals until all fruit had reached the red, or table-ripe, condition. The fruit were rated as to two qualities, ripeness and condition at maturity. The Ripeness Index was obtained by rating each individual fruit as to color, on a scale ranging *1* for green-mature, to *5* for table-ripe. Means of these values constituted the average condition of ripeness at each sorting date. The Table-ripe Condition Index was obtained by rating each fruit as to its quality, at the time it reached the table-ripe stage, on a scale of *1* for rotted culls, *2* for other culls, *3* for poor quality, *4* for fair quality and *5* for good quality.

The ripening rate of hormone treated fruit as compared with nontreated ones was significantly slower in one experiment. In two other experiments the rate was not significantly different, although in one case the hormoned fruit ripened about one day faster and, in the other case, about one day slower than the untreated fruit.

In one nitrogen level experiment, fruit from low nitrogen plots ripened significantly faster than fruit with higher rates of nitrogen application. In another experiment the difference was reversed, with high nitrogen fruit ripening as much as three days faster than those from low nitrogen plots. In the third experiment nitrogen had no effect on rate of ripening.

No significant differences in the Condition Index, related to either application of hormone or rate of nitrogen fertilization, were found in any of the experiments. Some differences did exist, but they are quite small and fall well within the accuracy of the rating methods used.

The experiments indicate that 4-CPA, used as a fruit-setting spray—under conditions found in the field in San Diego County—is capable of increasing the number of abnormal fruits on tomato plants.

Low levels of nitrogen fertilization, particularly rates lower than 100 pounds per acre, also tend to increase the appearance of pointed and puffy fruit. However, other factors are involved. Some tomato varieties seldom show these abnormalities, regardless of environmental or cultural conditions, while other varieties may show a percentage of pointed and puffy fruit under any condition. Thermograph records taken in the fields, in which the experimental plots used in these studies were located, indicate that an extreme range of day to night temperature may be involved in increasing puffiness and that low night temperatures probably increase both abnormalities. However, because the abnormal fruit can be detected as soon as the petals fall from the very young fruit, the critical period for environmental influences on fruit formation may be a very short one—during and just after flower set—so that appraisal of the influence of temperature is very difficult.

Studies of the influence of temperature under controlled conditions are being conducted and may reveal more accurately its relation to abnormal fruit development.

Ripening Rates and Condition at Maturity of Tomato Fruits Grown With Different Levels of Nitrogen Fertilization and Treated with Fruit-setting Hormone

Treatment	Days from harvest to complete maturity[1]	Condition index of fruit at table-ripe stage[2]
Fruit from South Coastal San Diego County. Harvested Dec. 13, 1956. Variety, Early Pak.		
No hormone applied	23.6	4.22
4-CPA, 50 ppm, applied 3 times	25.0*	4.02
Nitrogen applied at 200 lbs/acre	23.8	4.32
Nitrogen applied at 600 lbs/acre	25.4*	3.93
Fruit from North Coastal San Diego County. Harvested Nov. 16, 1956. Variety, Pearson.		
No hormone applied	17.6	4.64
4-CPA, 50 ppm, applied 3 times	16.9	4.24
Nitrogen applied at 200 lbs/acre	21.3	4.56
Nitrogen applied at 400 lbs/acre	17.5#	4.73
Nitrogen applied at 600 lbs/acre	17.0#	4.47
Fruit from South Coastal San Diego County. Harvested June 25, 1957. Variety, Early Pak		
No hormone applied	22.7	4.32
4-CPA, 50 ppm, applied 3 times	24.5	4.72
Nitrogen applied at 200 lbs/acre	21.4	4.59
Nitrogen applied at 400 lbs/acre	21.2	4.47
Nitrogen applied at 600 lbs/acre	21.6	4.46

[1] Days required for all fruit to reach red-ripe stage determined by sorting fruit at 3–5 day intervals during storage at 50°F.

[2] Condition index is a mean value of the rated condition of the fruit upon reaching red-ripe stage on the basis of rotted culls = 1, good quality fruit = 5.

* Significantly different from no hormone at 5% level.

\# Significantly different from lowest nitrogen application at 5% level.

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SILAGES

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not approach the gains of those fed alfalfa hay.

By using the energy requirements for maintenance and gain, replacement values could be calculated. On a dry matter basis alfalfa silage was worth 97% of alfalfa hay, Hegari silage, 109% and Rex silage was worth 112%.

The results of these experiments indicate no difference between a sweet forage-type sorghum—Rex—and a dual purpose-type—Hegari—when made into silage and fed to beef steers.

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