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**SORGHUM AS A FORAGE AND GRAIN RATION FOR
SHEEP**

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In many localities in southern Arizona there are areas of saline, or for other reasons, unoccupied lands which are available for the growing of sorghum. During the summer months this crop may follow a small grain crop to good advantage; but it must be remembered that sorghum seriously taxes the fertility of the land. The summer rainy season, which usually comes at the time most needed for sorghum, tends to maintain this fertility, for at this time irrigating waters usually carry considerable amounts of fertilizing sediments.

Sorghum, being a drouth-resistant plant, may be grown under southern Arizona conditions with a minimum amount of irrigating water. In some sections of the State, especially in Sulphur Spring Valley, fair crops may be grown in average years on rainfall only. It is commonly fed in combination with alfalfa and small grain pasture, and with alfalfa hay.

In the early summer of 1908 sufficient seed of so-called Japanese sorghum was procured to plant three plots of land. This variety has been grown successfully for a number of years in the Lower Gila valley, near Arlington. The plots, after irrigating, were planted May 21, 1909, and for convenience will be designated Plot 1, Plot 2, and Plot 3. For the sake of uniformity the data for the plots have been corrected to read for one acre.

Plot 1 was planted with a corn lister, in rows 30 inches apart, irrigated June 3, August 1, and September 10, and cultivated with a one-horse cultivator following the first and second irrigations. The crop was harvested October 21, the cost of production and returns being as follows

COST OF GROWING ONE ACRE OF SORGHUM FOR GRAIN

Seed, 3½ pounds at 5 cents.....	\$ 0.17
Three irrigations after planting and one to put the land in condition for planting.....	2.00
Preparing the land, planting and cultivating.....	4.50
Cost of harvesting and threshing.....	9.13

Total cost...\$15.80

Yield: 750 pounds of seed

Plot 2 was thinly sown broadcast for hay and irrigated June 3, August 1, and September 10. The crop was harvested September 15, the cost of production and returns being as follows:

COST OF GROWING ONE ACRE OF SORGHUM FOR HAY—THINLY SEEDED

Seed, 22 pounds at 5 cents.....	\$ 1.10
Three irrigations after planting and one to put the land in condition for planting.....	2.00
Preparing the land and planting.....	3.50
Harvesting.....	5.75

Total cost...\$12.35

Yield: 4,500 pounds of hay.

Plot 3 was thickly sown broadcast for hay and irrigated June 3, August 1, and September 10. The crop was harvested September 15, the cost of production and returns being as follows:

COST OF GROWING ONE ACRE OF SORGHUM FOR HAY—THICKLY SEEDED

Seed, 44 pounds at 5 cents.....	\$ 2.20
Three irrigations after planting and one to put the land in condition for planting.....	2.00
Preparing the land and planting.....	3.50
Harvesting.....	5.75

Total cost...\$13.45

Yield: 10,785 pounds of hay

The hay from Plot 3 was not so coarse as that from Plot 2 and was in much better shape for economical harvesting. Both plots were fully mature when harvested. The hay from these plots was stacked separately. Both cured fairly well but mow-burned in the center of the stacks. The hay from Plot 2 was much the coarser, and kept far better than that from Plot 3. This was also due, in part, to the smaller size of the stack.

The common practice of grazing sorghum in the field when mature, gives the best results, being cheaper and little wasteful. In Salt River Valley, sorghum is commonly pastured with animals that are being fitted for the market, until the best of the feed is pastured off, the remainder being utilized as a maintenance ration for other animals. Care must be taken, however, not to feed young sorghum that is stunted by drouth, inasmuch as in this condition it may contain a cyanogenetic glucoside which, through the action of an enzyme, also contained in the plant, breaks down in the stomach to form, among other products, hydrocyonic acid, which is often quickly fatal to a foraging animal. The cured hay is, however, harmless.

RELATIVE FEEDING VALUE OF SORGHUM HAY, SORGHUM SEED AND ALFALFA IN VARIOUS COMBINATIONS WHEN FED TO LAMBS.

For the past few years alfalfa hay and pasture have been rather expensive rations for sheep or other animals being fitted for the market. They can hardly be fed with profit at the present relative prevailing prices of meat and alfalfa. In order to meet such a condition, various combinations of sorghum in substitution for the more expensive ration, were tested in comparison with alfalfa.

January 18, 1906, four lots of grade Tunis wether lambs, uniform in weight, age, conformation and feeding qualities, were selected, eight to the lot. Each lot was weighed on three successive days just previous to the experiment; after that, once every seven days during the trial, and again on the three successive days at the close of the test. The lambs were fed the following rations: Lot 1, sorghum hay and seed; Lot 2, alfalfa hay; Lot 3, alfalfa hay and sorghum hay; Lot 4, sorghum hay.

Each lot received as much feed as was cleaned up without material waste. The waste was not weighed back and the total amount of feed was charged up to the lot receiving it. The following table shows the total ration for each lot, total loss or gain, pounds of feed for one pound of gain, total cost of sorghum at cost of production and of alfalfa at \$10.00 a ton, and the cost of one pound of gain:

Lot No.	Ration	Gain, pounds	Loss, pounds	Pounds of feed for 1 pound gain	Total cost of feed	Cost of 1 pound gain
1	*Sorghum hay, 717 lb. Sorghum seed, 407 lb.	11	....	102.0	\$1 96 8 54	95.5c.
2	Alfalfa hay, 961 lb.	82	.....	11 7	4.81	5.86c.
3	Alfalfa hay, 541 lb. Sorghum hay, 541 lb.	74	.....	14.6	2.71 1.48	5.65c.
4	Sorghum hay, 1,151 lb.	....	49	.....	3.15	....

*Hay from Plot 2.

The combined ration fed to Lot 3, produced the most economical gain, which was nearly equal to the gain of Lot 2. Sorghum hay and seed when fed alone was little more than a maintenance ration, as shown by the results from Lot 1. Sorghum hay alone showed a material loss when fed to Lot 4. These results are substantiated by those presented in Bulletin 50, of this Station, on Steer Feeding.

SUMMARY

1. Under conditions where alfalfa can not be grown to advantage, as on saline soils, when water for irrigation is scant, or following a crop of grain, sorghum may be grown as a forage plant to supplement the usual alfalfa ration.
2. Alfalfa alone produces the greater gain in weight per unit of feed. However, present prices of alfalfa and meat will not leave a very great margin for the profitable feeding of this ration.
3. Sorghum in combination with alfalfa makes the most economical ration, and the gains made are nearly equal to those with alfalfa.
4. Sorghum alone, both hay and grain, is inferior to alfalfa and at best makes little more than a maintenance ration.

F. W. WILSON.