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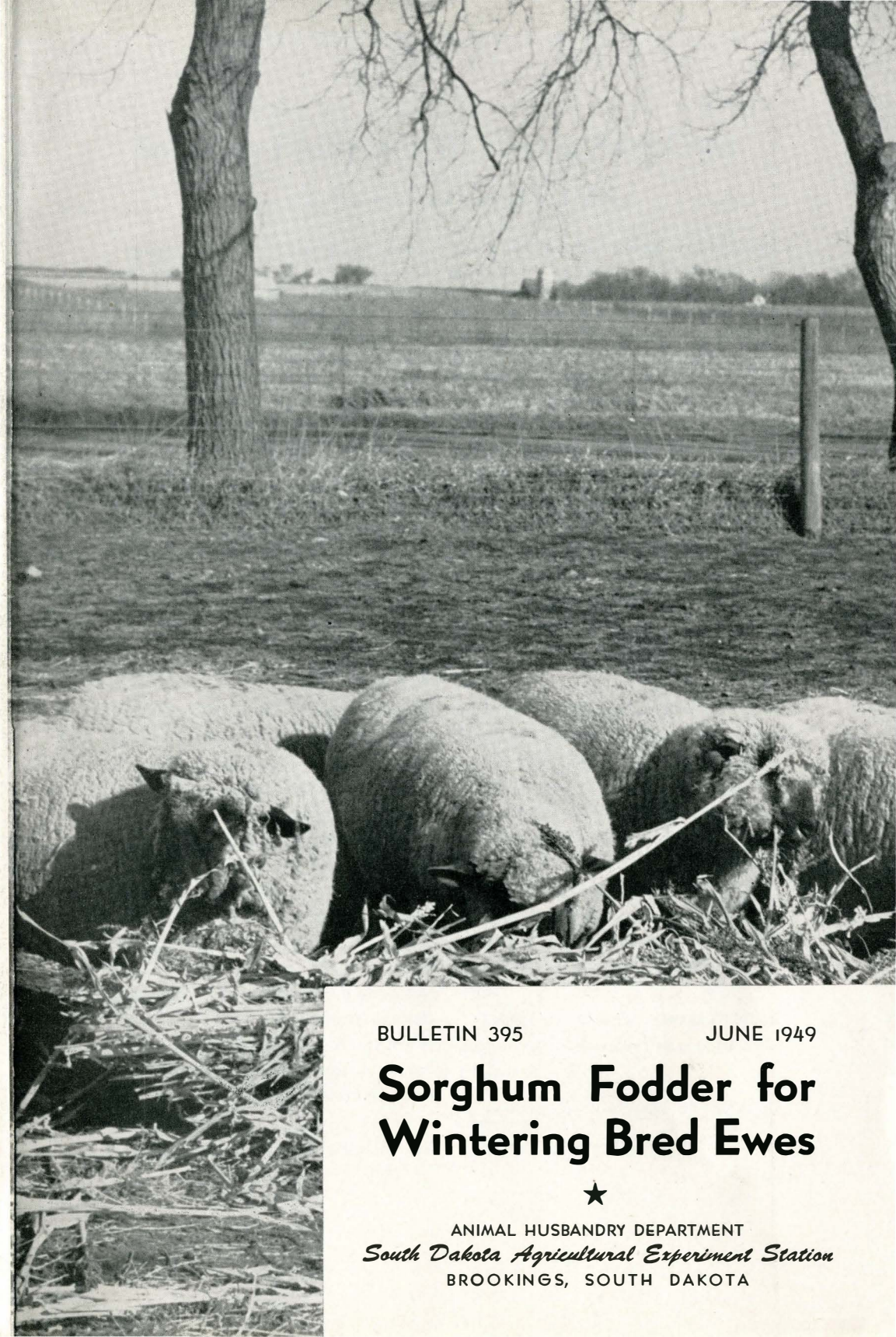
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BULLETIN 395

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# **Sorghum Fodder for Wintering Bred Ewes**



ANIMAL HUSBANDRY DEPARTMENT  
*South Dakota Agricultural Experiment Station*  
BROOKINGS, SOUTH DAKOTA

# Sorghum Fodder for Wintering Bred Ewes

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In the Northern Great Plains ewes must be maintained on winter rations from 4 to 6 months each year. In South Dakota this wintering period largely corresponds to the critical gestation period of bred ewes. An efficient ration for wintering ewes must, therefore, (1) maintain the ewe, (2) produce a good wool crop, (3) develop a strong lamb, and (4) build sufficient reserves to enable proper suckling of the lambs. Furthermore, the feeds in the ration must be consistently available and relatively cheap if sheepmen are to compete successfully with producers in other sections.

Sorghum fodder has long been ranked as one of the most reliable feed crops of

South Dakota. It has produced crops in years of heavy, normal, and sub-normal rainfall, and also has produced fair yields in years of grasshopper infestation. Cost of production with modern equipment has been moderate. Thus, sorghum fodder has many qualities to recommend its use in a livestock production program in South Dakota.

Feeding trials to determine the possibilities of using sorghum fodder in wintering rations for bred ewes were started at the South Dakota Agricultural Experiment Station in 1942. The results of the four trials made are given in this publication.

## The Feeds

The fodder varieties of sorghum yield a roughage that resembles the corn plant in chemical composition. In total digestible nutrients it compares favorably with alfalfa and other high quality hays, containing approximately 50 pounds of total digestible nutrients per 100 pounds of roughage. However, it is deficient in protein and mineral and seldom contains enough to meet the requirements of any class of farm animals. Properly cured sorghum fodder is relatively high in carotene, the food from which animals build Vitamin A. Varieties of forage sorghum selected for low prussic-acid content are safe to feed to farm animals without death loss.

All of the feeds used in this experi-

ment were locally grown. The variety of sorghum was 39-30-S, a strain developed by the South Dakota Agricultural Experiment Station. In general the sorghum fodder fed was leafy, medium green and well cured. The alfalfa hay fed was of No. 2 grade. The shelled corn (yellow) graded No. 2 and No. 3. The mineral mixture was made of 2 parts ground limestone, 2 parts bonemeal, and 1 part salt. Ordinary granulated stock salt was used.

Table 1 contains the average chemical analyses of the feeds fed during the four trials.

<sup>1</sup>Animal Husbandmen, South Dakota Agricultural Experiment Station.

W. H. Burkitt, J. W. Wilson and Turner Wright assisted in directing part of this work.



Table 1. Chemical Analyses of Feeds Used\*

	Moisture	Ash	Percent			Phosphorus	Milligram Carotene Per lb.
			Ether extract	Crude protein	Crude fiber		
Sorghum Fodder .....	22.60	5.12	1.88	6.12	23.85	.30	11.42
Alfalfa Hay .....	9.16	7.70	1.63	17.62	29.82	.38	10.91
Shelled Corn .....	12.75	1.59	3.02	9.38	2.54	.38	3.95
Linseed Meal .....	8.68	6.26	3.61	36.02	8.94	.87	-----

\*These analyses were made by Station Chemistry.

### The Rations, Animals, and Management

Five lots of bred ewes were fed each year. The rations were: Lot 1, shelled yellow corn, alfalfa hay and salt; Lot 2, sorghum fodder and salt; Lot 3, sorghum fodder, linseed meal and salt; Lot 4, sorghum fodder, mineral mixture and salt; and Lot 5, sorghum fodder, alfalfa hay, mineral mixture and salt.

A ration of shelled yellow corn, alfalfa and salt was fed as a check because it had given excellent results in former ewe wintering experiments conducted at the South Dakota Agricultural Experiment Station (Bulletin 388). The other rations all contained sorghum fodder with or without supplemental feeds. The sorghum fodder plus salt ration was fed, even though it was very deficient in protein and minerals as judged by all existing feeding standards, because many sheepmen were using it in sorghum-producing areas of the state.

All lots were fed as much sorghum fodder as they would clean up with a minimum of refusal. The amount of shelled corn in Lot 1 was limited to approximately  $\frac{1}{2}$  pound daily. The alfalfa hay in Lot 5 was limited to approximately 1 pound daily. In Lot 1, the ewes were given all the alfalfa they would eat. Salt and minerals were self-fed when included in a ration. This method of feeding varied the total digestible nutrient intake per lot, but produced conditions similar

to those which producers usually have in their sheep production enterprise.

The trials were started with 3-year old, high grade Hampshire ewes, which remained in the experiment throughout the investigation. Each fall the individual ewes were re-allotted at random into different lots, death losses being replaced with animals of similar age and breeding at the start of the succeeding year's work. These ewes were bred in December for May first lambing to two purebred Hampshire rams, one-half in each lot being bred to each ram.

The feeding trials were started at the beginning of the breeding period and finished prior to the start of lambing. During the lambing period, the ewes were fed a small amount of corn and a mixture of alfalfa hay and sorghum fodder roughage. This period usually lasted four weeks. Following lambing, all ewes and lambs were grazed together on small grain or brome-alfalfa pasture.

The ewes were kept in a semi-open sheep barn and small dry lot. The grain and roughages were fed in the barn twice daily in combination grain and roughage racks. Salt and minerals were self-fed in open boxes in the barn, and water was kept before the sheep in automatic waterers at all times.

Feed records were kept of all feeds offered and refused. All of the corn and linseed meal was consumed. The amount

of alfalfa hay refused was slight. The sorghum fodder offered and refused is reported in Table 2. In some instances some of the sorghum was pulled out of the racks and tramped in the droppings.

No attempt was made to weigh this amount. Thus, the amount not eaten was, in general, slightly larger than the refusal figures.

### The Effect of Rations on Ewes' Production

Each of the rations was palatable as judged by the total consumption of feed, but the corn-alfalfa-hay ration appeared to be consumed a little more readily than any of the others. The use of approximately 1 pound of alfalfa hay per ewe per day with sorghum fodder (Lot 5) appeared to improve the palatability of

sorghum fodder ration and increase the total digestible nutrient intake per ewe. None of the ewes showed signs of sickness or general malnutrition, although there were rather large weight differences between the lots of ewes each year. A summary of the four winter feeding trials is given in Table 2.

Table 2. Feed Consumption, Ewe and Lamb Production Data—4-Year Average

	Lot I Corn, Alfalfa and Salt	Lot II Sorghum, Salt	Lot III Sorghum Linseed Meal Salt	Lot IV Sorghum Mineral, Salt	Lot V Sorghum Alfalfa Mineral, Salt
<b>FEED CONSUMED</b>					
Daily Ration per Ewe					
Corn .....	.47				
Alfalfa .....	2.37				.86
Sorghum—offered .....		4.92	4.89	4.93	4.67
refused .....		.72	.54	.62	.62
Linseed Meal .....			.22		
Mineral .....				.004	.004
Salt .....	.01	.01	.01	.01	.01
Feed per Ewes for 131 Days					
Corn .....	61.6				
Alfalfa .....	310.5				112.7
Sorghum—offered .....		644.5	640.6	645.8	611.8
refused .....		94.3	70.8	81.2	81.2
Linseed Meal .....			28.8		
Mineral .....				.52	.52
Salt .....	1.31	1.31	1.31	1.31	1.80
<b>PRODUCTION DATA</b>					
Ewes fed (total no. during 4 years) ..	53	53	54	54	52
Initial weight .....	118.1	118.9	116.8	118.8	117.6
Final weight .....	138.9	124.6	134.5	125.3	135.5
Gain .....	20.8	5.9	17.7	6.5	17.9
Ewe condition at lambing .....	High+	Thin—	Av.—	Thin—	Av.—
Ewe death loss (No.) .....	0	1	0	1	0
Fleece weights (sheared) .....	7.5	6.8	7.4	7.1	7.2
Ewes bred .....	53	53	54	54	52
Ewes lambing					
Birth weight lambs					
Singles .....	10.45	8.87	9.28	8.96	9.56
Twins or triplets .....	7.48	6.78	7.18	7.85	7.76
*Lamb crop born (%) .....	117.0	113.2	103.7	103.7	123.1
*Lamb crop alive at 2 weeks (%) ..	101.9	88.7	90.7	88.9	101.9

\*Based on number of ewes bred.

The check lot ewes, those fed the yellow corn, alfalfa hay and salt, excelled all others in gain, fleece weight, condition of lambs at birth, and in birth weight of single lambs. The percentage of lambs alive at 2 weeks in Lot 1 excelled Lots 2, 3 and 4, and tied with Lot 5.

Lots fed sorghum fodder supplemented with linseed meal and alfalfa hay (Lots 3 and 5) gave very satisfactory production, approaching closely the results of Lot 1. Feeding 1 pound of alfalfa hay daily with sorghum fodder gave slightly better results than using about 1/4 pound of linseed meal. This latter ration, however, may have been slightly deficient in minerals, especially calcium.

The rations of sorghum fodder and salt, and sorghum fodder, salt and minerals were definitely deficient for wintering bred ewes. The addition of the mineral appeared to help the ewes slightly, but it did not give them an adequate ration. The total gain for these ewes during the feeding period was only about 6 pounds. Since ewes lose from 15 to 20 pounds at lambing, these ewes actually lost body weight while developing their lambs. This was undoubtedly a factor in the relatively small lamb crop alive at 2 weeks of age in Lots 2 and 4.

The significance of the differences between lots, Table 2 was tested statistically to determine their reliability as shown in the footnote.\* Differences checked highly significant, significant, and approaching significance are those that we can reasonably expect to occur when sorghum fodder is fed under conditions similar to those in the experiment. Non-significant differences might or might not be repeated.

The analyses also showed differences in gains, fleece weights, birth weight of lambs, and condition of lambs at birth from year to year. That is, the ewes made greater gains, sheared heavier fleeces, etc., some years than they did other years. These differences were large enough so that they can be expected to occur in future years. The cause of such variation was not clearly shown. Parasite tests were made regularly on the ewes and the infestation varied some from year to year. During one year when the infestation was medium heavy, the ewes on the straight sorghum fodder rations did very poorly. It appeared that ewes fed sorghum fodder and minerals only, lacked resistance to withstand parasites.

\*Significance of Differences Found Between Lots of Ewes

	Gain of Ewes	Fleece Weight	Birth Weight Single Lambs	Birth Weight Twins & Triplets	Condition of Ewes
Highly significant .....	*				
Significant .....		*	*		
Approaching significance .....					*
Non-significant .....				*	





Sorghum fodder properly cut and shocked makes a readily available winter feed.

## Discussion

The results of these trials show very clearly that sorghum fodder is a good feed for wintering bred ewes if it is supplemented with linseed meal or alfalfa hay. It was a highly unsatisfactory feed, however, when fed with only salt, or salt and minerals. Thus, it appears that sorghum fodder is a highly nutritious feed for sheep, but does not contain enough protein and minerals to meet the needs of

pregnant ewes. Probably addition of a simple mineral mixture to a sorghum fodder, linseed meal, and salt ration would improve the production of breeding ewes.

In order to present a clearer view of the needs of bred ewes and the theoretical possibility of obtaining the nutrients from the rations studied, the following table has been prepared.

Table 3. Theoretical nutrient requirements of bred ewes and nutrients contained in rations studied.\*

	Minimum for 120 lb. ewe	Alfalfa Hay 3 lbs., Corn ½ lb., Salt	Sorghum Fodder 4 lbs., Salt	Sorghum Fodder 4 lbs., Linseed Meal .22 lbs., Salt	Sorghum Fodder 4 lbs., Mineral, Salt	Sorghum Fodder 3 lbs., Alfalfa Hay 1 lb., Mineral, Salt
Total Digestible Nutrients (lbs.)	1.8 —2.6	1.77	1.84	2.01	1.84	1.91
Digestible Protein (lbs.)	.18 —.26	.42	.11	.19	.11	.21
Phosphorus (grams)	3.4 —3.7	6.04	7.08	7.95	7.18	7.03
Calcium (grams)	4.3 —4.6	20.52	5.45	5.84	5.96	10.76
Carotene (milligrams)	6.5	37.06	45.68	45.68	45.68	45.16

\*Calculated from Station Chemistry analysis of feeds fed using Morrison's digestive coefficients.

The total digestible nutrient intake can be met by any of the proposed rations as long as good quality sorghum is fed. No trouble was experienced in any of the trials in getting the ewes to consume the quantities of feed suggested in Table 3. For meeting protein requirements, however, the rations, sorghum fodder and salt, or sorghum fodder, salt and mineral, were definitely deficient, scarcely furnishing one-half of the required amount. The analyses also indicate a need for feeding slightly more than .22 pounds of linseed meal per day as a supplement to a sorghum fodder ration. The ewes getting the linseed meal probably were on the borderline of deficiency for the protein requirements. In all the major requirements other than protein, however, the sorghum fodder rations appeared to carry the minimum nutrients required by bred ewes as now known from scientific research.

From the data presented it appears that the best way to use sorghum for wintering bred ewes is by feeding the ewes about 1 pound of alfalfa hay in addition to the sorghum fodder they will

clean up. If the ewes are in poor or fair condition, the use of  $\frac{1}{2}$  pound of grain during the last 40 to 50 days of gestation period would undoubtedly increase the productivity of the ewes. If alfalfa hay is not available, the use of a protein concentrate such as linseed meal or soybean oil meal is desirable. Salt and mineral should probably be included in such a ration.

Exercise is usually considered necessary for a good lamb crop. In this experiment each lot of ewes was penned in a 10x60 foot lot with 10x26 feet of shed space. There were usually 14 ewes per lot. There was no apparent trouble in any lots from lack of exercise. Only two ewes died during the four feeding trials, and there was only one case of pregnancy disease. Probably much of the advantage often attributed to exercise is the result of the ewes having the opportunity of balancing their ration. It seems reasonable, however, that all ewes should have access to some kind of shelter and to open lots at all times. Also, they should not be forced to crowd through narrow doors or at feed troughs or bunks.

## Summary

1. Sorghum fodder is a good feed for wintering bred ewes if it is properly supplemented.

2. The feeding of one pound of alfalfa hay daily per ewe or  $\frac{1}{4}$  pound linseed meal, plus salt and minerals with sorghum fodder, fed free choice, gave excellent production performance with bred ewes.

3. Minerals and salt are not sufficient to balance a sorghum fodder ration for bred ewes.

4. The reliability of sorghum fodder as a crop in South Dakota and the ease of including it in a balanced ration for bred ewes, indicate that it should be considered by many sheep producers as a regular feed crop for wintering bred ewes.