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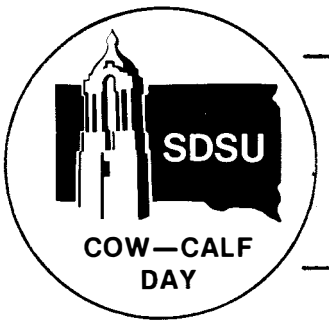

WINTER FEEDING OF PREGNANT STOCK COWS UTILIZING ASPEN TREE FIBER

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Summary

The entire aspen tree (except roots) fiber was used successfully as a major component of wintering rations for pregnant stock cows. It was necessary to correct aspen for deficiencies in protein, phosphorus and vitamin A. The stock cows were only in fair to good condition going into the winter feeding period, and their condition remained fairly constant for all feeding groups with normal or below normal animal death losses. Normal, healthy calves were produced in all feeding groups as indicated by birth and weaning weights. Conception was not affected by feed type, although more open cows were present in the hay-fed group.

Introduction

Hay was high priced and in short supply in South Dakota during the drought years of 1975-76. Range grasses also suffered from drought and would not support summer or winter grazing of livestock. The plight of ranchers having difficulty obtaining traditional roughages to maintain their breeding herds prompted an "on ranch" demonstration on the use of aspen as an alternate roughage. The aspen tree, when suitably processed and corrected for nutrient deficiencies, could potentially supply almost unlimited amounts of roughage for ruminants. The most critical deficiencies of aspen material are protein, phosphorus and vitamin A.

The objectives of this demonstration were (1) to evaluate the potential of aspen as a drought emergency feed in wintering rations of pregnant stock cows and (2) to determine the effect on subsequent breeding performance of the cows and birth and weaning weights of calves.

Animal Allotment and Feed Preparation

The Robert Healy Ranch located approximately 6 miles (11.4 kilometers) northwest of Pukwana, South Dakota, was selected as the site for the feeding demonstration. Two hundred one commercial, bred stock cows varying in age from 2 to 13 years were separated by breed and age into four replications, stratified and randomly allotted to three ration treatments with 67 animals each. Four age-breed groups were, therefore, represented in each ration treatment. Each of the three lots was provided with an area of 10 acres (4 hectares) with limited access to protected loafing areas.

Total Tree, Inc., Burnsville, Minnesota, transported 400 tons (363 metric tons) of freshly chipped, whole tree aspen material from Brainerd, Minnesota, to the Healy Ranch for silage making. The chipped aspen material

was mixed with corn grain, limestone and urea before tub grinding. Since the moisture level of the chips upon arrival at the ranch was less than 50%, an additional 10% water was applied to the silage mixture in the silage pit prior to packing and covering. An additional 400 tons (363 metric tons) of wet chips were transported to the Peavey alfalfa drying plant located at DeSmet, South Dakota, for preparation of the pelleted aspen-alfalfa ration (60:40). Approximately 200 tons (181 metric tons) of the pelleted feed were transported to the Pukwana elevator for storage and subsequently transported as needed to the feeding site. Mixed-grass hay purchased for the control animal group was obtained from several sources because of the scarcity of forage throughout the drought area. The quality of forage was estimated to be good to excellent. The ingredient composition of the rations is given in table 1.

Animal Feeding

Each group of animals was fed its respective ration continuously for 25 weeks beginning November 16, 1976. The chemical composition of these rations is shown in table 2. All animals were provided free access to water and trace mineral salt, salt and dicalcium phosphate supplements. Animals on pelleted aspen-alfalfa initially consumed 26 lb (11.3 kg) of feed per head daily but were restricted to 20 lb (9.1 kg) early in December to prevent overconsumption of feed and any possibility of bloat from the alfalfa portion of the ration.

The silage on a wet basis contained 2.8% crude protein and was not being consumed in sufficient amounts at the beginning of the trial to meet animal dry matter requirements. A top dressing of 2.6 lb (1.2 kg) of protein supplement per head per day was offered after 1 month of feeding as well as 2% dried molasses for 4 weeks to increase silage intake and to provide approximately 7% protein. Corn supplementation at 3.3 lb (1.5 kg) per head daily was initiated in February. Animals in the silage-fed group were having some difficulty with larger aspen particles and were sorting the feed. A few cases of suspected hardware disease were noted later in the trial but not confirmed.

All animals selected from the alfalfa-aspen pellet-fed group had gained weight, averaging 67.4 lb (30.6 kg) per animal or approxiamtely 1.5 lb (.68 kg) per day over the first 45 days of feeding. These animals appeared to be in excellent winter condition. Since it was feared that any additional increase in condition might cause calving difficulty in April, the feed was restricted further from 20 lb (9.1 kg) to 18 lb (8.2 kg) until March 26. On March 26, the pellet-fed animals were again allowed to consume 25 lb (11.3 kg) of pellets plus 1.6 lb (.72 kg) of protein supplement. During the month of May, 6 lb (2.7 kg) of corn per head per day were provided to the hay- and pellet-fed animals and the corn supplement to the silage-fed group was raised from 3.3 lb (1.5 kg) to 4.4 lb (2.0 kg). The additional supplements were intended to maintain animals in good health during calving with maximum milk production.

Termination of Experimental Feeding

At the termination of the experiment, all cows were weighed and condition scored before being turned out as one group to open range. Birth weights of all calves were recorded for each treatment group. The cows in all groups had remained in average winter condition with the final condition score favoring the hay-fed group (table 3). The greatest weight loss was recorded for the silage-fed cattle, 112 lb (50.8 kg) compared to 76.3 lb (34.6 kg) for the hay-fed animals. Normal, healthy calves were born in all groups. No statistically significant difference was noted for birth weights among the feeding groups, although birth weights were 16 lb heavier for the hay-fed animals (table 5). No abnormal loss of calves or cows had occurred during the winter period. All rations were readily consumed except for silage at the beginning of the feeding period. Although normal fermentation of silage had occurred as measured by pH, temperature and odor, it was obvious that the chips should have been ground to pass a 3/8 inch (.95 cm) screen rather than the 3/4 to 1 inch (1.9 to 2.5 cm) screen combination as used in the tub grinder.

Follow-Up

The cows were pregnancy tested in October, 1977, following summer breeding. The number of open cows following the breeding period was 6% higher for the hay-fed control cattle as compared to the aspen wood-fed animals. However, the difference was not statistically significant (table 4). No significant difference was noted in weaning weights, although weaning weights appeared to favor the pellet-fed group.

Recommendations

The most convenient and well-accepted feed as recommended by the cooperating rancher was the pelleted aspen-alfalfa (60:40) ration. It was also the most economical feed, since less protein supplementation was required. It would not be economically feasible to transport wet aspen material very far from the source in preparation of silage. It is recommended that aspen be ground fine enough to pass a 3/8 to 1/2 inch (.95 to 1.3 cm) screen for best silage fermentation and consumption by animals. The method used in this experiment to increase the nitrogen level of silage could be improved. It is sometimes recommended to separate younger animals from older animals during winter feeding so that younger animals can be fed a better ration. No difference in final condition score was noted, however, between young and older animals fed together in this experiment. No immediate harmful or residual effects were noted from feeding high aspen levels to wintering bred stock cows. It would, therefore, appear that aspen could constitute a major portion of the rations of wintering stock cows, if properly supplemented for its known deficiencies.

References

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Table 1. Ration Composition

	Fresh basis		
Ingredients	Mixed-grass hay Control	Alfalfa aspen pellet	Aspen silage
	%	%	%
Prairie mixed-grass	100.0	--	--
Aspen material	--	60.0	88.5
Alfalfa	--	40.0	--
Corn	--	--	10.0
Limestone	--	--	1.0
Urea	--	--	.5

Table 2. Chemical Composition of Rations

	Dry matter basis						
Ration	Crude protein	Ether extract	Crude fiber	Nitrogen free extract	Ash	Ca	P
	%	%	%	%	%	%	%
Hay	6.05	2.50	31.46	51.65	8.34	.47	.16
Pellet	5.39	1.11	46.75	42.17	4.58	.89	.07
Silage[a]	3.11	.61	49.82	43.08	3.38	.54	.06

[a] 2.6 lb (1.2 kg) soybean meal per head per day was added to increase crude protein content to approximately 7%.

Table 3. Least Squares Means for Change in Weight and Condition Score of Cows

Item	Treatment		
	Control	Pellet	Silage
Number of animals	65	64	58
Avg initial wt., lb	1028 (466.4 kg)	1030 (467.4 kg)	1022 (463.4 kg)
Change in wt., lb	-76.3 (34.6 kg)	-90.6 (-41.1 kg)	-112.0 (-50.8 kg)*
Avg initial condition score[a]	5.2	5.3	5.2
Change in condition score	-.2	-.7*	-.7*

[a] Scored on a scale of 1 to 10 with higher values indicating cows in better condition.

* Significant ($P<.05$) within row.

Table 4. Estimated Dry Matter Intake and Breeding Performance of Cows Following Aspen Feeding

Item	Treatment[a]		
	Control	Pellet	Silage
Number of animals	65	64	58
Dry matter intake per head per day, lb	21.4 (9.7 kg)	20.5 (9.3 kg)	20.3 (9.2 kg)
Number of bred cows	51	54	49
Number of open cows	14	10	9
Percent of open cows	21.5	15.6	15.5

[a] No significant difference among treatments.

Table 5. Least Squares Means for Birth Weights and Weaning Weights of Calves

Item	Treatment[a]		
	Control	Pellet	Silage
Calf number	62	61	58
Birth wt., lb	91.7 (41.6 kg)	76.1 (34.5 kg)	76.1 (34.5 kg)
Calf number	62	57	57
Weaning wt., lb	370.6 (168.1 kg)	385.6 (174.9 kg)	363.3 (164.8 kg)
Increase in wt., lb	278.9 (126.5 kg)	390.5 (140.4 kg)	287.3 (130.3 kg)
Percent calf crop weaned	100.0	93.4	98.3

[a] No significant difference among treatments.