1977

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A.S. Series 77-12

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Oats are a major grain and forage crop in South Dakota and acres planted to oats exceed those planted to feed grains (barley, rye, sorghum) other than corn.

Oats are popular in many crop rotations and as a nurse crop in establishing grasses and legumes. The early planting and harvesting dates for oats may offer important advantages regarding use of labor and machinery in some farming operations. Moisture and temperature conditions may frequently be more favorable for oats in many areas of the state than for crops with later planting and harvesting dates.

Questions are frequently raised as to the relative feeding value of the oat crop harvested as grain, hay or silage. More information is needed on the potential returns when oats are fed to cattle as grain, hay or silage. Frequently oats are grown for a forage crop, or weather conditions result in greatly reduced grain yield and the crop is harvested for forage. The objective of the experiment reported herein was to determine the comparative value of an oat crop harvested as hay vs silage.

Procedure

Twenty-eight steers (20 Shorthorn and 8 Herefords) were allotted to four pens of seven each on basis of weight and breed. Oat hay was fed to two pens of the cattle and oat haylage to the other two pens. In all instances, the steers were given free access to trace mineral salt and dicalcium phosphate.

Fifty-five acres of oats were harvested for the experiment. The oats were seeded as a nurse crop for alfalfa. Seeding was at a light rate of approximately 1 bushel per acre, which is about one-third the normal rate of seeding for a grain or forage crop of oats. The light rate of seeding along with dry weather resulted in a low yield of forage. However, there appeared to be a good yield of grain in relation to forage. Forage dry matter yield was 1777 lb. per acre, and the estimated grain yield was 25 bushels per acre. This estimated grain yield would result in about 40% of the forage dry matter as grain.

The oat crop was very uneven as to stand, height and grain maturity. Stage of maturity of the grain varied from the milk stage for low areas with more adequate soil moisture to late dough stage for the drier areas with short forage. The forage was harvested with a windrower and two windrows raked together prior to chopping for haylage or baling as hay using standard size bales. There was no significant precipitation between cutting and chopping or baling. An equal number of windrows were chopped for haylage or baled for hay by alternating in units of two windrows.

The haylage was stored in an 18 foot x 50 foot upright concrete stave silo. The baled hay was stacked under cover in a hay shed. Moisture content at harvest was 12.75% for the hay and 51.60% for the haylage. Protein content (dry basis) was 16.64% for hay and 16.30% for haylage. Nitrate content was below levels considered to present problems from toxicity.

The cattle were fed hay or haylage in amounts so feed would be available at all times. Haylage was fed once daily, but hay was fed twice daily in about equal amounts to reduce waste from the feed bunks. The only other feeds were free-choice trace mineral salt and dicalcium phosphate. The hay was fed from the bale without further processing, but much of the forage was relatively short in length. The cattle received a vitamin A injection of 3 million units and Synovex-S implants at the beginning of the experiment. The experiment was terminated for each group of cattle when the supply of hay or haylage was depleted.

Results

Results of the experiment are presented in table 1.

Feedlot Performance

When fed each forage so feed would be available at all times, daily dry matter intake was about the same for cattle fed oat hay or oat haylage. There was some waste from the hay. However, the practice of feeding hay twice daily helped to reduce the wastage problem to levels considered to cause no appreciable error in feed consumption values.

Average daily gain was greater for cattle fed the haylage (2.27 vs 1.78 lb.). The higher rate of gain (0.49 lb. daily or 27.5%) with similar dry matter intake resulted in a substantial improvement in feed efficiency for haylage over hay (21.8%, dry basis).

Haylage and Hay Comparisons

Procedures described for designating the portions of the area harvested for hay or haylage were considered to have resulted in uniform areas. Weather conditions were very favorable for harvesting and drying the forage for hay. Protein content (dry basis) was similar for the two forages. Dry matter yield as haylage exceeded that for hay by 6.7% at harvest. Harvesting forages at higher moisture contents reduces drying time in the field and thus lessens the chance of weather damage as well as field losses during harvesting.

Moisture contents of samples taken at feeding indicate a dry matter storage loss for hay of 2.3% and 11.7% for haylage. There was only a small change in moisture content of the hay in storage. Haylage as fed was drier than at harvest (4.61 percentage units). Moisture was determined by oven drying at about 85° C. There may have been some loss of the more volatile compounds from the fermented forage by this method of dry matter determination. However, some reduction in moisture is to be expected when feeding small daily amounts from top-unloading silos during summer months. Since a greater amount of dry matter was recovered at harvest from haylage, amount of haylage dry matter harvested available for feeding was 3.6% less than for hay.

Cattle gains per ton of dry matter stored were 141 lb. for oat hay and 163 lb. for oat haylage. These results give a 16% greater value per unit of dry matter stored. However, dry matter yield at harvest from haylage was greater than for hay, resulting in an overall 24% greater net return as cattle gains from oats harvested and fed as haylage compared to that harvested as hay from comparable land areas.

Summary

Oat forage harvested as hay or haylage was compared when fed to steers as the only feed along with free-access to mineral. The cattle were injected with vitamin A and received a Synovex-S implant. Forage yields were low because of a low seeding rate and drought conditions. The amount of grain in the forage dry matter was estimated to be about 40%. The hay was baled into standard size bales at 88.2% dry matter and the haylage chopped at 48.4% dry matter and stored in a concrete stave silo.

Dry matter yield at harvest was 6.7% more for the haylage, but there was an 11.7% dry matter loss for haylage when stored for about 5 months in comparison to only 2.3% for the hay. Net dry matter stored available for feeding was 3.6% less for the haylage.

Cattle gains were higher for haylage (2.28 lb. daily) than for hay (1.78 lb.). The higher weight gain was obtained on about the same dry matter intake for haylage as for hay. This resulted in a 21.8% better feed efficiency for haylage dry matter over hay. Taking into account differences in harvesting and storage losses, net cattle gains were 24% more from haylage than from hay harvested from essentially equal land areas.

Table 1. Oat Hay and Oat Haylage for Growing Cattle
(July 13 to Nov. 19 or 24, 1976)

Item	Oat hay	Oat haylage
No. animals	14	14
Days fed	134	129
Avg. init. shrunk wt., lb.	673	681
Avg. final shrunk wt., lb.	911	975
Avg. daily gain, lb.	1.78	2.28
Avg. daily feed, lb.		
As fed	27.92	46.53
Dry basis	24.63	24.67
Feed/100 lb. gain, lb.		
As fed	1571	2044
Dry basis	1386	1084
Composition of forage, %		
Dry matter		
At harvest	87.25	48.40
As fed	88.21	53.01
Total protein, dry basis	16.64	16.30
Dry matter stored		
Pounds	47,281	50,452
Percent of hay[a]	100	106.7
Dry matter fed		
Pounds	46,200	44,544
Percent of stored	97.7	88.3
Storage loss, %	2.3	11.7
Percent of hay	100	96.4
Cattle gain from forage		
Per ton feed, lb.	144	185
Percent of hay	100	128
Per ton stored, lb.	141	163
Percent of hay	100	116
Total cattle gain, lb.	3,332	4,116
Percent of hay	100	124

[a] Hay used as base and assumed to be 100.