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Corn Silage, Alfalfa Hay, and the Dairyman

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Dairymen must depend on their abilities as crops and soils men to produce the necessary quantities of high-quality feed required to maintain a productive, profitable herd. In this capacity, they have adopted the use of corn silage to such a degree that it has truly become "King of Forages" in Virginia.

Table 1 indicates the steady increase in corn silage since 1955. Note the relationship of corn silage yields per acre and acreage harvested each year. If moisture is not greatly limiting, yields per acre go up. If the farmer does not need to cut as much of his corn acreage to fill his silo, he allows more of it to mature for grain. In a dry year the reverse occurs. The most accurate picture of the forage situation in this case is the tonnage produced.

Production of alfalfa, the favorite partner for corn silage, was really swinging into high gear in 1960 and 1961. Its acreage reached a new high and improved management pushed the average yield for the state to 2.8 tons in 1961, shown in Table 1. Then the alfalfa weevil invaded.

When previously effective weevil control practices failed, farmers had to rely upon costlier, more difficult measures that gave only partial control under farm practice. It was fortunate that farmers began to realize and take fuller advantage of the tremendous energy-producing potential of corn silage.

On some soils, the shift from alfalfa to corn should have occurred and was encouraged. Soils differ in their ability to support high production of a particular crop.

TABLE 1. Acreage, Yields Per Acre, and Total Annual Production of Corn Silage and Alfalfa Hay in Virginia

Year	CORN SILAGE			ALFALFA HAY		
	Acres (000)	Yield/A (tons)	Total Prod. (1000 tons)	Acres (000)	Yield/A (tons)	Total Prod. (1000 tons)
1955	86	10.0	860	226	2.4	531
1957	95	7.5	712	258	2.2	555
1959	96	11.0	1056	263	2.5	644
1961	94	13.0	1222	260	2.8	728
1963	252	8.5	2142	225	1.3	292
1965	173	13.0	2249	171	2.3	385
1966	228	10.0	2280	125	1.9	238

For maximum economic yield, we must match the productivity of soil and crop as closely as possible. Corn is the highest yielding forage available and, for greatest economic return, it must be grown on the best corn soils. On these soils where erosion is not a problem, corn is often being grown continuously.

The practices of sod planting and minimum tillage are becoming more widely used and encourage continuous corn by reducing erosion and conserving moisture.

In many instances, corn and alfalfa make an ideal team. Good corn soils with too much slope for continuous corn will produce more forage when used in a corn-alfalfa rotation than in any other cropping sequence. Many additional soils in the state are marginal for corn production but are well adapted to alfalfa.

If properly fertilized and managed, alfalfa produces more high-quality feed than any other perennial forage grown in the state. For meeting protein requirements, alfalfa is highly competitive with corn silage. Livestock feeders still need to take advantage of its high digestible protein content (10.5% for hay) in relation to corn silage (1.5% as fed). The total cost of purchased supplements can be drastically reduced by including alfalfa with corn silage in the forage program.

Energy is the prime requirement of livestock and dairy rations. Energy production on a limited acreage suited for cropping is a prime limiting factor in the efficiency and expansion of many dairy operations. Alfalfa is generally not able to compete successfully with corn for our top corn soils on the basis of potential energy production per acre. Most good farmers in the state can average 15 to 18 tons of corn silage per acre. Producing the 6 to 7 tons per acre of alfalfa needed to equal the amount of energy produced by this corn silage level has been more difficult.

Table 2 points out the cost advantage corn silage enjoys over other Virginia forages in TDN production. At 21 tons per acre, which progressive farmers can average, energy from corn silage is much cheaper than energy from alfalfa hay yielding 5.8 tons per acre.

But when both protein and energy in each forage are considered in terms of their dollar replacement value in the ration, alfalfa can compete as long as it is used to meet protein requirements in the ration. On this basis, it takes about 20 tons of corn silage to equal 4.8 tons of alfalfa.

These data also show that high yields must be maintained to ensure low costs per 100 lbs. TDN and greater profits per acre. This is generally true for all crops, but the Virginia farmer today is able to achieve this desirable profit-making situation better with corn silage than any other forage. The position of alfalfa will be strengthened as break-throughs in production and alfalfa weevil control are applied.

TABLE 2. Cost of Each 100 lbs. of TDN Produced by Several Forages at Various Yield Levels

	Yield (T/A)	Utilized TDN/A (lbs.)	Cost/100# TDN as fed
Corn silage.....	15	5940	1.90
	21	9450	1.44
Sorghum-sudan silage.....	12	2868	2.93
	17	4162	2.42
Alfalfa hay.....	3.8	3275	2.60
	4.8	4350	2.36
	5.8	5298	2.18
Red clover hay.....	2.3	1935	2.94
	3.5	3010	2.27
16% dairy concentrate @ \$3.50.....		1400/T	5.36

Increase in acreage and use of corn silage has been accompanied by a corresponding improvement in quality as measured by the increased dry matter and TDN percentages, shown in Table 3. In the early years of corn silage feeding, around 27% dry matter was the goal for high quality silage. Research and practical experience soon indicated that higher yields, improved palatability, greater animal consumption, and lower storage losses could be expected if the crop was not harvested until it reached the 36 to 42% dry matter present at the hard dough stage of maturity.

TABLE 3. Changes in Virginia Corn Silage As-Fed Quality*

	1963	1964	1965	1966
% Dry matter.....	29.2	29.6	33.6	34.6
% Total digestible nutrients...	19.6	19.7	22.8	23.2

*Based on annual V.P.I. forage test averages.

Convincing farmers to wait longer before harvesting has been the major factor in improving corn silage quality. Improved harvesting and storage procedures have also played significant roles.

Farmers have become more aware of maintaining sharp cutting edges on their field chopper knives and shear bars, adjusting clearance on cutter knives to chop silage into 1/4 to 3/8" lengths, and packing properly to maintain desirable conditions for fermentation processes.

Early thinking believed best silage corn varieties were those with large, tall stalks. The ear-to-stalk ratio of these is usually low, giving a silage relatively low in TDN. Recommended silage varieties are now also our highest grain yielders.

Another factor involved in improved silage quality is the V.P.I. Forage Testing Service, initiated in 1962. This service has shown forage producers how their management drastically affects quality as well as amounts of forage they produce. By measuring the quality of their forage, it also helps them determine the amounts of feed needed to balance their feeding rations.

Table 4 shows how the trends in alfalfa and corn silage production changed the feeding patterns in the state. Each year, corn silage has made up a greater portion of rations at the expense of hay.

TABLE 4. Changes in Average Amounts of Feed Annually per Cow in Virginia D.H.I.A. Herds*

	1955	1959	1963	1965	1966
Corn silage (tons).....	3.1	3.9	6.2	7.0	7.6
Hay (tons).....	1.6	1.8	1.5	0.9	0.9
Grain (tons).....	1.4	1.6	2.1	2.3	2.3

*Approximately 55,000 cows each year.

As weevil problems have caused alfalfa to decline, dairymen have depended more on grain to supply the additional protein in the ration rather than switch to alternate hay crops such as red clover.

In summary, dairymen are realizing that top production from their animals is associated with increased net energy and properly adjusted protein levels.

The requirement for high energy production has made corn silage the "King" of their forage programs. At present, "Queen Alfalfa" is declining because of no acceptable control methods for the alfalfa weevil.

The use of urea as a low-cost source of protein supplement may also temporarily slow the come-back of alfalfa. But alfalfa makes an ideal partner for corn silage from the agronomic, economic, and feeding viewpoints. Surely it will regain a more prominent role in the Virginia forage program when research produces a more satisfactory control for the alfalfa weevil.