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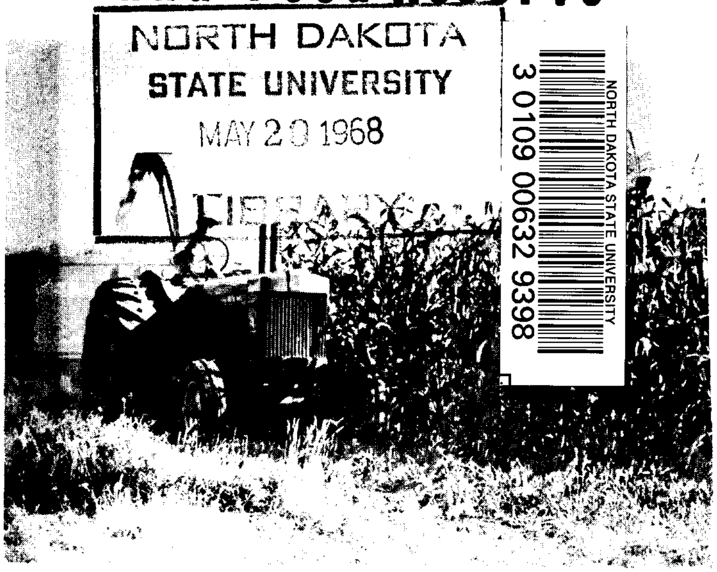
Corn...
for Silage and Feed Reserve



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CORN FOR SILAGE AND FEED RESERVE

EVERY LIVESTOCK FARMER should include corn in his regular crop rotation.

Corn produces a high yield of livestock feed per acre. It makes excellent silage for winter feeding and corn silage stores for several years as reserve feed. A weed free corn field provides clean corn stubble which is an excellent seedbed for grain or for legumes and grasses.

Corn is Dependable

Most of North Dakota can produce a good yield of corn for silage when adapted varieties are grown and good cultural practices are used.

Compared with small grain and hay crops, corn needs less moisture per pound of dry matter produced and usually suffers less from drouth. In 46 years of crop rotation trials at the Dickinson Experiment Station, corn produced an average yield of 3½ tons of silage per acre. Corn failed in only 2 of these years, in 1912 due to hail and in 1936 because of drouth.

In 33 years of rotation trials at Fargo, corn has averaged 7.3 tons of silage per acre.

The USDA Crop Reporting Service estimates the 20 year 1948 to 1967 state average corn silage yield in North Dakota at 4.2 tons per acre.

Per Cent Corn Used For Silage is Increasing

In 1949 only 13 per cent of the corn in the state was used as silage; in 1950 it was 20 per cent, in 1960, 62 per cent and in 1967, 65 per cent.

This increase has come because (1) the field chopper enables small crews to handle silage making, (2) inexpensive trench and temporary covered silos require less machinery for filling, and (3) feeding trials have proved corn silage, when properly supplemented, to be a valuable feed for many classes of livestock.

Corn Silage is an Excellent Feed

Corn silage is a succulent, appetizing and nutritious feed relished by livestock. Compared with common feed grains at Dickinson and Fargo Experiment Stations, corn silage or fodder has produced about twice as much total digestible nutrients (feed) per acre. It is, however, low in digestible protein. The feed value per acre of corn fodder is compared with grain for a 22-year period at Dickinson and for 24 years at Fargo in table 1.

The 10-year (1958-67) average yield of corn silage in North Dakota is estimated at 4.3 tons per acre by the USDA Crop Reporting Service. This yield is compared with other crops in table 2 as to total digestible nutrients and total protein on a per-acre basis. The only crop that exceeds corn is alfalfa hay.

Table 2 can be used to calculate feed production potentials on your farm by substituting your own farm yield figures and using the nutrient percentages in the table.

TABLE 1. POUNDS TOTAL DIGESTIBLE NUTRIENTS AND TOTAL PROTEIN PER ACRE AT FARGO AND DICKINSON.

Dickinson Station – 22 Yr. Ave.			Fargo Station – 24 Yr. Ave.		
Yield per acre	Total digestible nutrients	Total protein	Yield per acre	Total digestible nutrients	Total protein
Wheat					
grain 967 lbs.	812	145	1,638 lbs.	1,376	245
Oats					
grain 1,186 lbs.	848	142	1,933 lbs.	1,382	232
Barley					
grain 1,123 lbs.	883	135	1,680 lbs.	1,322	202
Corn					
grain 1,168 lbs.	941	105	1,731 lbs.	1,395	156
fodder 3,754 lbs.	2,100	225	4,429 lbs.	2,578	266

Source: North Dakota Expt. Sta. Bimonthly Bulletin--March-April, 1954.

TABLE 2. COMPARATIVE YIELD OF TOTAL DIGESTIBLE PROTEIN OF NORTH DAKOTA CROPS

Crop	10 year (1958/67) average yld/A	Total digestible nutrients				Total protein	
		Per cent	lb/A	To equal corn silage		Per cent	lbs/A
				yld/A	acres needed		
Silage-Tons/A							
Corn	4.3	17	1,462	4.30	1.00	2.0	172
Sorghum	4.3	16	1,376	4.56	1.08	1.7	146
Hay-Tons/A							
Tame hay	1.28	50	1,280	1.48	1.16	10.0	256
Prairie hay	.89	45	801	1.63	1.83	6.0	107
Oats hay	.96	48	922	1.52	1.58	8.0	154
Alfalfa hay	1.40	50	1,400	1.46	1.04	15.0	420
Grain-Bu/A							
Oats	39.0	72	899	63.4	1.62	12.0	150
Barley	29.4	78	1,101	39.1	1.33	12.0	169
Corn	32.4	80	1,452	32.6	1.01	9.0	163

10 yr. Av. Yields from - Crops Reporting Service

How to Figure Your Silage Needs

The following guide is for average North Dakota conditions; adjust it to your local needs. Divide your total need by your estimated per-acre yield, to give the acres needed for one season. This does not allow for below average yield or for building a feed reserve.

Beef cows - - - - 6 tons each
Spring calves - 4 tons each

Milk cows - - - - 9 tons each
Breeding ewes-¾ ton each

Plan Silage Feed Reserves

Corn silage can be stored for several years in a good trench or upright silo. If silage is undisturbed, there will be little loss in quality. Feed shortages have occurred in the past and can be expected in the future. Protect your farm business by storing feed reserves.

Choose a Safe Corn Maturity for Your Area

Silage corn should produce well glazed or dented kernels, as the ears make up a high proportion of the feed value in silage. Late maturing hybrids may produce more total tons of silage per acre than early hybrids but the percentage of ears will be lower and the feed value per ton as much as 25 to 40 per cent less. Since corn for silage is cut green the tendency of some hybrids or varieties to lodge is not as objectionable as when the corn is to be harvested for grain. When corn for silage is planted late, use earlier maturing varieties.

Hybrids or varieties that produce a high yield of grain usually will also produce a high yield of silage. Corn for silage when planted early can be about 5 days later in maturity than is shown on the corn maturity zone map (Fig. 1.) Hybrid performance is shown in table 3.

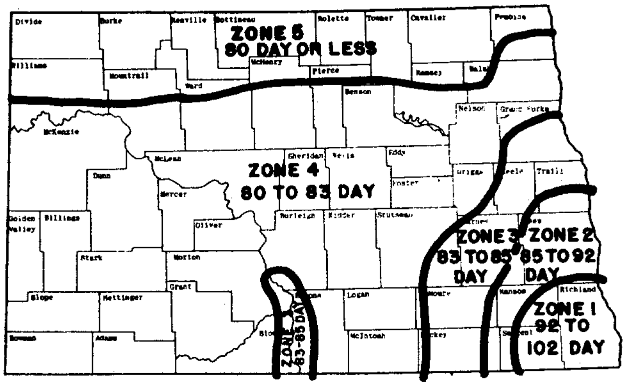

Fig. 1 - - CORN MATURITY ZONES OF NORTH DAKOTA

TABLE 3. SILAGE DRY MATTER AT HARVEST, PERCENTAGE OF EARS AND TONS OF SILAGE PER ACRE AT 30 PER CENT DRY MATTER FOR HYBRIDS GROWN AT SHELDON AND LARIMORE, N. DAK. - 1967

Hybrid	Sheldon1/			Larimore2/		
	DM	Ears	Yield	DM	Ears	Yield
	%	%	Tons/A	%	%	Tons/A
Nodakhybrid 307	-	-	-	40	55	15
N. Dak. Exp. N45	33	43	21	34	45	14
Nodakhybrid 502	30	46	19	33	54	15
N. Dak. Exp. N95	30	47	21	30	44	14
Kingscrost PX480	30	36	22	30	40	18
Weathermaster Prairie Blend #1	-	-	-	31	42	14
Pioneer 3872	-	-	-	31	49	15
Peterson Silo #1	-	-	-	31	45	14
Pioneer 3862	-	-	-	30	45	14
Pioneer 3854	30	39	20	28	38	14
Kingscrost PX527	29	34	19	-	-	-
Kingscrost KE477	29	40	21	27	39	14
Kingscrost PX446	-	-	-	29	42	14
Minhybrid 608	28	34	20	27	37	14
Weathermaster EP40	27	33	20	-	-	-
Kingscrost KE497	27	32	19	-	-	-
Pioneer Silage 90	27	35	20	25	26	14
Pioneer 3658	27	30	22	-	-	-
Pioneer Silage 100	26	33	21	-	-	-
Pioneer 368-A	26	32	22	-	-	-
Pioneer 3773	26	33	21	-	-	-
Pioneer 3775	25	27	21	-	-	-
Pioneer 3926	-	-	-	26	34	15
Taylor-Evans Gromaster	25	26	21	22	14	13

1/ 20,000 plants per acre irrigation.
2/ 17,500 plants per acre.

Seedbed Preparation and Planting

Corn grows best in fertile, well drained and well aired soil. In heavy, compact clay soil, corn does best after manure, alfalfa or sweet clover has been included recently in the rotation. Fall plowing is urged in heavy clay soil while, on most other soils, spring plowing is advised. Corn does not respond to summer fallow as well as other crops. The seedbed should be well prepared and early weed growth eliminated.

When temperatures are cool and the soil is cold, corn seedlings make slow growth. However, corn needs a long growing season, and planting as early as the season permits is necessary. Plant corn when the soil has warmed to about 50 degrees at seed depth. In a normal season this usually is about May 10 to the latter part of May.

Rate of planting depends upon the available moisture and fertility of the soil. For silage, a stand with plants about 10 inches apart in 40-inch rows, or 4 plants per hill, is recommended. Thicker planting may be used when early maturing hybrids are planted or in areas of favorable moisture.

Keep Cornfield Clean

Weeds may reduce corn yields 30 to 50 per cent and also reduce yields of the following crop.

At Dickinson, wheat yields following clean corn in the rotation and tillage trials were only 2½ bushels per acre less than after fallow over a 45-year period. At Fargo for a 24-year period wheat after clean corn averaged only seven-tenths bushel less than after fallow. Such yields following corn are not possible unless the corn field is kept clean. When possible a crop or two of weeds should be killed after planting. A harrow or rod weeder can be used to kill weeds before the corn is up.

Corn can be harrowed 2 or 3 times, on warm sunny afternoons, after it is up, especially to kill weeds in the row. A rotary hoe or weeder is also good if weeds are very small and the soil is crusted. Blind cultivation (before the corn is up) followed later by the harrow is excellent for weed control. Later cultivations should be shallow to avoid root pruning. Hilling the soil around the plants to smother small, late germinating weeds may be necessary.

On land that can be kept reasonably free of weeds drilling the corn is advised. Where weeds are expected to be a problem, check row planted corn allows cross cultivation for better weed control.

Chemical Weed Control

Broadleaf weeds can be controlled with ¼ to ½ pound per acre of 2,4-D amine applied over the corn plants when they are 3 to 8 inches tall, and by drop nozzles after the corn is 8 inches tall until the tasseling stage. An early postemergence application of Atrazine at one pound per acre (active ingredient) plus one gallon per acre of nonphytotoxic oil controls both broadleaf and grassy weeds. Atrazine plus oil must be applied early, usually within the first 3 weeks after planting, while the grassy weeds are not over 1½ inches tall or poor control may result. Even at this low rate of application soil residue may occur that will affect crop the following year.

Preemergence chemicals sometimes give erratic weed control. Effectiveness of such chemicals depends on surface moisture. At least ½ inch of rainfall is required within 2 weeks after application to insure success. Ramrod at 4 to 5 pounds per acre controls grasses and some broadleaf weeds but is ineffective against wild mustard. There is no soil residue with this chemical. Atrazine at 2 to 4 pounds per acre controls grasses and broadleaf weeds but there is a good possibility of carryover that will affect the next year's small grain or soybean crops. Many chemical mixtures are cleared for use and give good preemergence weed control with a reduced chance of Atrazine residue. Atrazine plus Ramrod and Atrazine plus Lorox are two of the new mixtures. Londax (Lorox plus Ramrod) is a promising new mixture that can be used where Atrazine residue must be avoided. Preemergence chemicals can be applied as band treatments to reduce the cost of treatment.

Fertilizing Corn

Corn will respond to commercial fertilizer but when moisture becomes limiting, especially during the tasseling and silking stage, or later, increases in yield may not occur even though early vegetative responses have been noted. Rates of application should be based on soil test or on farm trials.

FERTILIZING SILAGE CORN ON NONFALLOW POUNDS PER ACRE

PLANTER ATTACHMENT*

N	P_2O_5	K_2O**
10-20	20-30	0-20

*Avoid fertilizer contact with seed if N exceeds 10 lbs. per acre in dry soil or 20 lbs. in moist soil.

**On sandy soils, add up to 20 lbs. per acre K_2O.

BROADCAST

N*	P_2O_5**	K_2O
10-40	0	0

*Nitrogen can be broadcast either fall or spring or sidedressed before corn is one-foot high.

**If broadcast instead of applied by planter attachment, apply 40 to 60 lbs. per acre.

TOTAL FERTILIZER applied by planter attachment, broadcast and sidedressed

N*	P_2O_5**	K_2O
10-40	20-60	0-20

*The higher N rates are suggested for favorable moisture areas.

**P_2O_5 rates should be based on soil tests or known field response.

More detailed information on fertilizer recommendations is contained in Extension Circular A-350 available from your county extension agent.

Silage Quality

Top quality silage contains a relatively large percentage of grain or dry matter, which indicates that it was cut late enough for near maximum yield. Silage must be palatable. This comes from proper ensiling technique and storage. Top quality silage has good keeping characteristics with no mold. The growth of mold and other organisms depends upon the presence of air. Poor packing or distribution of cut material within the silo does not eliminate air. Corn which is too mature packs poorly.

The best time to harvest corn for high yield and high silage quality is when the kernels are well dented and the top leaves are still green. See table 4. In varieties which do not produce kernels the hand squeeze test is easily used. Squeeze a handful of chopped material into a ball on the palm of the hand. Slowly open the fingers, if the ball leaves your hand moist and expands slowly, then the proper dry matter percentage is present. Approximately 28 to 35 per cent dry matter material will produce high quality silage in any silo which is in good condition.

For a high quality silage with good storing qualities: (1) Put corn into the silo at about 65 to 70 per cent moisture. If too dry, add water to bring it up to this level. (2) Pack firmly to shut out most of the air to prevent spoilage. (3) Keep the knives on the forage chopper sharp, as bruised and ragged silage is hard to pack. (4) Fine-cut silage (3/8 to 3/4 inch pieces) packs best. (5) For the greatest feeding value, cut your corn for silage when the kernels are well dented.

TABLE 4. ESTIMATING THE PER CENT DRY MATTER IN SILAGE FROM STAGE OF EAR DEVELOPMENT

Ear Development Stage	Approx. dry matter percentage %
Ears beginning to form	15
Kernels forming	17
Early milk	20
Late milk	23
Early dent	25
Kernels well dented	28
Kernels hard, top leaves green	30
Kernels hard, husks turning	35

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