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AGRICULTURAL EXTENSION DIVISION
UNIVERSITY OF MINNESOTA

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MINNESOTA FARM BUSINESS NOTES

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Prepared by the Division of Agricultural Economics
University Farm, St. Paul, Minnesota

SELECTING CROPS FOR ECONOMICAL FEED PRODUCTION

Prepared by S. E. Cleland and Geo. A. Pond

Various crops produce feed at a wide range of cost. First of all, there is great variation in pounds of feed produced per acre by different crops, some regularly yielding more than others. There is also a variation in the composition of different crops, some containing a higher proportion of digestible nutrients than others. It is only when the yield per acre is converted to pounds of digestible nutrients that the true production of feed per acre is obtained.

There is also a variation in the production costs per acre among the various crops. By dividing this acre cost of a given crop by the number of pounds of total digestible nutrients produced on an acre, the cost of producing a pound of those nutrients may be computed. A comparison of the various crops is then possible in terms of the cost of producing 100 pounds of total digestible nutrients.

Table 1. Amount and Cost of Total Digestible Nutrients in Crops,
S. E. Minnesota (Steele Co., 1921-1930)

Crop	Yield per acre	T.D.N. per acre Lbs.	% Protein of T.D.N.	Protein in 100 lbs. Lbs.	Cost per 100 lbs. T.D.N.
Grains:					
Corn	39.5 bu.	1807	8.7	7.1	\$1.16
Barley	35.0 "	1334	11.3	9.0	1.22
Oats & barley	40.0 "	1213	12.2	9.35	1.34
Winter wheat	19.5 "	926	11.1	8.8	1.81
Oats	39.5 "	890	13.8	9.7	1.83
Spring wheat	17.5 "	831	11.1	8.8	2.01
Roughages:					
Alfalfa	2.75 tons	2806	20.8	10.6	.61
Red clover	2.00 "	1984	14.9	7.4	.77
Clover & timothy	1.67 "	1642	10.3	5.1	.83
Wild hay	1.20 "	1156	6.2	3.0	.83
Corn fodder	2.50 "	2404	7.7	3.7	.86
Timothy	1.25 "	1224	5.7	2.8	.87
Corn silage	7.50 "	2580	7.1	1.2	1.14

In tables 1 to 4 is shown the yield per acre, the total digestible nutrients per acre, the per cent of protein, and the cost of producing 100 pounds of total digestible nutrients for the leading feed crops in four representative

agricultural areas of Minnesota. The cost figures were obtained from detailed farm accounting studies; the proportions of total digestible nutrients and of digestible crude protein in the various feeds were taken from Minnesota Agricultural Experiment Station Bulletin 218, by Eckles and Schaefer; and the acre yields are the county averages for the years 1921-1930 as published by the Minnesota State Department of Agriculture in "Minnesota Annual Crop and Livestock Statistics", with data from the farm accounting studies for crops not given in these publications.

In studying these figures, one important qualification must always be made: the higher the percentage of digestible crude protein is of the total digestible nutrients, the more valuable the feed becomes, because protein is usually the most costly element in purchased feeds and the element most likely to be deficient in a ration. Protein when purchased, usually costs about five times as much as carbohydrates. The cost of 100 pounds of total digestible nutrients, and the percentage of protein, must both be taken into consideration in determining the comparative advantage of a given crop for feed purposes.

Table 2. Amount and Cost of Total Digestible Nutrients in Crops, S. W. Minnesota (Rock and Nobles Counties, 1921-1930)

Crop	Yield per acre	T.D.N. per acre	% Protein of T.D.N.	Protein in 100 lbs.	Cost per 100 lbs. T.D.N.
		Lbs.		Lbs.	
Grains:					
Corn	32.4 bu.	1482	8.7	7.1	\$1.11
Barley	30.2 "	1151	11.3	9.0	1.17
Oats	36.2 "	815	13.8	9.7	1.71
Roughages:					
Alfalfa	2.0 tons	2040	20.8	10.6	.71
Corn fodder	2.4 "	2309	7.7	3.7	.78
Wild hay	1.0 "	964	6.2	3.0	.84
Corn silage	6.4 "	2150	7.1	1.2	1.09

Costs are Relative

The cost of nutrients from the various crops should be considered as relative rather than absolute. Labor, land rent, and other items of cost have been charged at the same rate for all crops in that area. These costs may not apply to any particular farm, but if the crop yields on that farm are in approximate proportion to the average yields given, the costs of 100 pounds of nutrients from the various crops will in most cases be approximately in the same relative ranking as those shown in these tables.

Some Crops Supply Nutrients More Cheaply than Do Others

Corn and alfalfa are low cost feeds. It is noticeable, wherever these two crops are adapted, that corn leads among the grains and alfalfa among the roughages, both in total quantity of digestible nutrients produced per acre, and in low cost of 100 pounds of nutrients. In the southeast and southwest areas, alfalfa is easily the leader among other roughages in low cost of nutrients and in per cent of protein, although in the southwest area the corn plant furnishes more total nutrients per acre.

Table 3. Amount and Cost of Total Digestible Nutrients in Crops,
N. W. Minnesota (Polk County, 1921-1930)

Crop	Yield	T.D.N.	% Protein	Protein in	Cost per 100
	per acre	per acre	of T.D.N.	100 lbs.	lbs. T.D.N.
		Lbs.		Lbs.	
Grains:					
Barley	26.0 bu.	991	11.3	9.0	\$1.23
Corn	25.0 "	1144	8.7	7.1	1.48
Durum wheat	16.0 "	749	13.6	10.6	1.73
Rye	15.5 "	711	11.1	9.1	1.73
Oats	29.0 "	653	13.8	9.7	1.87
Spring wheat (other)	13.5 "	642	11.1	8.8	1.99
Roughages:					
Alfalfa	2.00 tons	2040	20.8	10.6	.59
Wild hay	1.00 "	964	6.2	3.0	.74
Sweet clover hay	1.25 "	1268	21.5	10.9	.77
Corn fodder	1.75 "	1684	7.7	3.7	1.03
Corn silage	5.00 "	1680	7.1	1.2	1.38

Certain crops are consistently less profitable than others. Among the grains, oats stands out for its low yield of nutrients per acre and its high cost of nutrients, though the nutrients produced are relatively high in protein content. Timothy and wild hay yield a small amount of nutrients per acre and are low in protein, but wild hay, which is raised to some extent in all parts of the state, yields its nutrients at a comparatively low cost per acre.

Table 4. Amount and Cost of Total Digestible Nutrients in Crops,
N. E. Minnesota (Pine County, 1921-1930)

Crop	Yield	T.D.N.	% Protein	Protein in	Cost per 100
	per acre	per acre	of T.D.N.	100 lbs.	lbs. T.D.N.
		Lbs.		Lbs.	
Grains:					
Oats & barley	34.0 bu.	1101	12.2	9.35	\$1.53
Barley	27.5 "	1048	11.3	9.00	1.62
Oats	36.5 "	822	13.8	9.70	2.01
Roughages:					
Wild hay	1.25 tons	1205	6.2	3.0	.65
Alsike	1.75 "	1656	16.7	7.9	.79
Alsike & timothy	1.60 "	1539	11.1	5.4	.83
Corn fodder	1.80 "	1732	7.7	3.7	1.63
Corn silage	5.50 "	1848	7.1	1.2	1.97
Rutabagas	8.00 "	1520	10.5	1.0	2.88

High Yields Lower the Cost of Nutrients

Farmers who secure high crop yields produce their nutrients at a lower cost per 100 pounds of nutrients than do farmers securing low crop yields. Table 5 shows the influence of yield on the cost of nutrients, using oats and barley from the Steele County area as typical illustrations. Similar comparisons could be made for other crops or in other localities. The acre costs of a high yield are only slightly more than those of a low yield, the increased yield being due more to such things as proper choice of adapted varieties, prevention of diseases, control of weeds, maintenance of fertility, doing work at the right time, and

similar managerial practices, rather than to an increase in physical items of cost. The distribution of the acre cost, over a larger yield results in a lower cost per 100 pounds of nutrients.

Table 5. Influence of Yield on Cost of Feed
(Steele County, 1921-1930)

Yield	Oats		Barley	
	Bu. per acre	Cost per 100 lbs. T.D.N.	Bu. per acre	Cost per 100 lbs. T.D.N.
High	60.0	\$1.29	50.0	\$.90
Average	39.5	1.83	35.0	1.22
Low	30.0	2.29	25.0	1.63

Application

The farmer who aims to produce his feed economically should set up a rotation that will include each year a large proportion of those crops that supply nutrients at low cost. Table 6 presents an example of a farm in Rice County that adopted such a rotation several years ago. The crops raised the year before the change was made, and the crops raised regularly now, are analyzed in this table. Average crop yields were applied in both cases, though as a matter of fact the systematic rotation, coupled with the larger amount of livestock now kept to consume the additional feed raised, have built up the fertility so that better than average yields are now obtained.

Table 6. Comparison of Two Crop Combinations on Same Farm

	Before Reorganization				After Reorganization			
	Acres	T.D.N. Lbs.	Protein Lbs.	Cost	Acres	T.D.N. Lbs.	Protein Lbs.	Cost
Corn for grain	37	66859	5809	\$1075.22	40	72280	6280	\$1162.40
Corn silage	6	15120	942	172.14	10	25200	1570	286.90
Oats	-	-	-	-	5	4450	615	81.40
Barley	8	10672	1208	130.40	-	-	-	-
Oats & barley	-	-	-	-	40	48520	5920	651.60
Winter wheat	17	15722	1751	284.92	5	4630	515	83.80
Oats & wheat	43	36980	4644	709.50	-	-	-	-
Timothy & clover	14	22988	2580	190.54	-	-	-	-
Alfalfa	-	-	-	-	25	70150	14550	425.75
	125	168341	16734	2562.72	125	225230	29450	2691.85
Average per acre		1347				1802		
Average cost of 100 lbs. T.D.N.				\$1.52				\$1.20
Per cent of T.D.N. which is protein			10%				13%	

As shown in Table 6, the same land is producing 34% more digestible nutrients under the present system than it did under the former plan and the total cost has been increased only 5%. In fact, the cost of producing 100 lbs. of digestible nutrients has been reduced 21% and the relative protein content has been increased one-third. If to these advantages are added the increased yields resulting from the better rotation, the importance of a careful planning of the cropping system is apparent. Not every farm will show as striking an improvement from a revised cropping system as did this one, but the data presented in the tables should serve as a guide to farmers in selecting those crops which will produce feed most economically in their locality.

MINNESOTA FARM PRICES FOR MARCH 1932
Prepared by A. E. Erickson

The index number of Minnesota farm prices for the month of March 1932 was 47.5. When the average of farm prices of the three Marches of 1924-25-26 is represented by 100, the indexes for March of each year from 1924 to date are as follows:

March 1924 -	84.0
" 1925 -	105.0
" 1926 -	111.4
" 1927 -	108.9
" 1928 -	101.2
" 1929 -	107.6
" 1930 -	97.4*
" 1931 -	67.7*
" 1932 -	47.5*

*Preliminary

The price index of 47.5 for the past month is the net result of increases and decreases in the prices of farm products in March 1932 over the average of March 1924-25-26 weighted according to their relative importance.

Average Farm Prices Used in Computing the Minnesota Farm Price Index,
March 15, 1932 with Comparisons*

	Mar. 15, 1932	Feb. 15, 1932	Mar. 15, 1931	Av. Mar. 1924-25- 26	% Mar. 15, 1932 is of Feb. 15, 1932	% Mar. 15 1932 is of Mar. 15, 1931	% Mar. 15, 1932 is of Mar. 15, 1924-25-26
Wheat	\$.55	\$.56	\$.59	\$1.38	98	93	40
Corn	.34	.34	.43	.65	100	79	52
Oats	.21	.21	.22	.36	100	95	58
Barley	.38	.35	.29	.60	109	131	63
Rye	.35	.33	.25	.84	106	140	42
Flax	1.21	1.19	1.36	2.44	102	89	50
Potatoes	.33	.31	.55	.83	106	60	40
Hogs	3.80	3.20	6.70	9.97	119	57	38
Cattle	4.00	3.80	5.80	5.90	105	69	68
Calves	5.10	5.50	7.00	9.16	93	73	56
Lambs-Sheep	5.33	4.58	6.66	11.53	116	80	46
Chickens	.108	.106	.139	.173	102	78	62
Eggs	.10	.11	.16	.20	91	63	50
Butterfat	.21	.21	.29	.46	100	74	46
Hay	9.70	8.30	8.38	11.08	117	116	88
Milk	1.17	1.23	1.60	2.13	95	73	55

*Except for milk, these are the average prices for Minnesota as reported by the United States Department of Agriculture.