Protein Survey of the 1979 Six-Rowed Barley Crop

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For the past three crop years (1977-1979), the Department of Cereal Chemistry at North Dakota State University, in cooperation with and with the financial assistance of the Malting Barley Improvement Association, has undertaken a survey of the six-rowed malting barley crop grown in North Dakota, South Dakota and Minnesota.

The third annual survey was conducted on the crop grown in 1979. This report summarizes the data obtained on over 700 samples collected in the three-state area from August 7 to September 12, 1979.

Determination of protein levels for the 1977 and 1978 surveys was carried out by the classical Kjeldahl method. Protein assays this year were carried out using a Technician Infralyzer. The accuracy of this unit was checked by taking every tenth sample for Kjeldahl analysis. The average protein content for some 70 samples was 13.0 by both methods.

The 1979 Crop Year

The 1979 crop year proved to be a difficult one for barley producers in the three-state area and some of these difficulties have affected the survey.

The year began with a very late and very wet spring which delayed general planting until late May. By the end of May, only slightly more than half of the barley crop had been planted but almost all was in the ground by June 10. The crop lagged well behind normal with the condition of the crop in most areas being described as fair to good. Harvest of early planted fields began early in August but the general harvest was considerably delayed in many areas by frequent precipitation. Only about half of the crop had been combined by the end of August compared with the normal average of over 70 per cent.

In addition to the late crop, producers faced reluctance on the part of elevators to accept barley due to poor rail transportation and the Duluth strike.

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The survey was affected by these factors and also by the declining acreage planted to barley. The fewer number of samples collected for the 1979 survey reflect all of these factors.

Results

Table 1 presents the North Dakota county averages for protein, moisture and kernel brightness, the ranges for these parameters encountered in 1979 and the change in the county average from the 1978 crop. The protein content of the 1979 crop was equal to that of the 1978 crop at 13 per cent, with individual counties showing differences of from 1.4 per cent higher in 1979 to 3.2 per cent lower. Ten counties showed higher protein levels than in 1978, 13 showed lower levels and two remained the same.

The average moisture level for the 1979 North Dakota crop dropped by 0.3 per cent from that in 1978 and kernel brightness suffered in 1979. This decline in kernel brightness was probably due to staining which occurred after swathing because of the frequent showers.

Tables 2 and 3 give corresponding data for Minnesota and South Dakota samples, respectively. Minnesota showed a decline of 0.2 per cent in protein levels. The average moisture level increased by 1.4 per cent and kernel brightness was very poor, declining by two units to an average score of 8. The South Dakota samples showed a 1.5 per cent decline in protein content to an average of 12.0 per cent. Moisture levels increased slightly and kernel brightness was equal to that of 1978.

The authors would like to acknowledge the help of Terry Howe and Truman Olson who aided in sample collection and Debbie Turnow and Tom Wiesner who performed the quality analyses.

This survey would not have been possible without the financial support of the Malting Barley Improvement Association and the continued excellent cooperation of the barley producers and county elevators in the three-state area.

Table 1. North Dakota County Averages, Ranges and Changes from 1978 for Protein Content, Moisture and Color for the 1979 Crop

County	PROTEIN			MOISTURE			COLOR		
	1979	Range	Change*	1979	Range	Change*	1979	Range	Change*
Barnes	12.8	10.9-15.8	-0.1	12.7	11.4-16.0	+0.8	7	5-9	+3
Benson	12.7	10.9-14.9	+0.3	12.0	10.5-13.4	+0.7	5	3-7	+1
Bottineau	14.0	11.8-16.7	+1.4	11.1	10.4-12.1	-0.4	5	3-10	+1
Cass	13.0	11.1-14.7	-------	12.7	11.9-14.1	+1.3	7	5-9	+2
Cavalier	13.0	11.7-14.1	+0.4	12.4	11.1-14.0	-3.5	6	3-8	+1
Dickey	12.8	11.1-14.1	-0.6	12.8	11.8-13.8	+1.4	8	6-9	+3
Eddy-Foster	11.9	10.2-13.4	-3.2	11.9	10.9-13.0	-0.3	6	4-7	+1
Grand Forks	12.6	11.0-14.3	-0.5	12.2	11.3-12.9	+0.7	7	4-9	+2
Griggs	12.9	11.5-14.1	-0.2	12.8	11.6-15.6	+1.5	7	5-9	+5
LaMoure	12.7	11.3-15.0	+0.8	13.0	11.9-15.0	+2.0	8	7-9	+3
McHenry	12.3	11.6-13.0	-0.1	11.2	10.4-12.2	-0.1	4	3-6	+1
Nelson	12.5	10.3-13.5	-0.7	11.9	10.8-13.3	+0.4	6	3-9	+2
Pembina	13.5	11.7-15.2	-0.4	11.9	11.3-12.4	-1.5	6	4-8	+1
Pierce	13.4	12.7-14.3	+0.2	12.6	11.7-13.4	-1.9	7	4-9	+2
Ramsey	12.7	11.1-14.2	+0.5	11.8	10.7-14.1	+0.8	6	3-9	+2
Ransom	13.1	12.5-13.8	+0.5	11.6	10.1-12.4	-------	8	7-9	+2
Renville	12.9	12.1-13.8	+0.7	11.2	10.5-12.0	-0.1	5	4-6	+2
Richland	12.6	10.5-14.2	-0.9	12.6	11.5-14.4	+1.4	8	6-9	+2
Rolette	13.9	12.4-15.4	+0.9	11.6	11.1-12.3	-2.3	4	3-7	----
Sargent	13.1	12.2-13.6	-0.2	11.7	9.8-12.8	+0.6	7	4-9	+1
Steele	13.0	11.7-14.3	-0.4	11.8	10.8-14.3	+0.1	7	3-8	+3
Stutsman	13.5	12.0-15.0	+1.0	12.4	11.3-15.8	+1.5	7	5-8	+3
Towner	13.0	11.6-14.2	-------	12.6	11.5-15.9	+1.5	6	3-8	+2
Traill	12.9	11.4-13.9	-0.1	11.8	11.2-12.2	-------	7	5-9	+3
Walsh	13.2	11.2-14.9	-0.4	12.0	11.3-12.8	+0.2	6	4-9	+1
Ward	12.7	11.6-14.7	+0.7	11.0	9.9-12.2	-0.1	5	3-7	+2
Wells	12.1	11.3-12.6	-0.6	12.0	11.1-13.7	+0.4	6	5-7	+2
Average	13.0		-------	11.5		-0.3	6		+1

*From 1978 Averages.

Table 2. Minnesota County Averages, Ranges and Changes from 1978 for Protein Content, Moisture and Color for the 1979 Crop

County	Protein (%)			Moisture (%)			Color		
	1979	Range	Change*	1979	Range	Change*	1979	Range	Change*
Becker	12.2	9.5-13.5	-1.0	12.8	11.8-13.2	+1.8	8	7- 9	+2
Clay	13.3	11.7-15.1	-------	12.4	11.1-14.1	+1.1	7	6- 9	+1
Grant	11.5	10.8-12.9	-0.6	12.5	11.8-13.1	+1.3	8	5- 9	+1
Mahnomen	13.6	12.3-14.5	+0.4	12.8	11.9-13.8	+0.8	8	7-10	+1
Marshall	13.1	10.9-14.7	-0.6	12.3	11.4-13.1	+1.6	7	5-10	+2
Norman	13.4	11.5-15.3	+0.1	11.8	10.9-13.1	+1.1	8	5-10	+2
Ottertail	12.7	10.4-14.6	+0.3	13.3	11.3-14.6	+2.8	8	7-10	+2
Polk	13.3	11.6-14.9	+0.8	12.5	11.3-13.8	+1.5	8	5-10	+2
Traverse	12.3	10.6-15.1	-------	13.2	12.3-14.3	+1.8	7	6- 8	+1
Wilkin	11.9	9.9-13.2	-0.7	13.3	12.2-17.7	+2.2	8	6- 9	+2
Average	12.8		-0.2	12.6		+1.4	8		+2

*From 1978 Averages.

Table 3. South Dakota County Averages, Ranges and Changes from 1978 for Protein Content, Moisture and Color for the 1979 Crop

County	Protein (%)			Moisture (%)			Color		
	1979	Range	Change*	1979	Range	Change*	1979	Range	Change*
Brown	12.3	10.6-13.5	-1.6	12.7	11.9-13.8	+0.9	7	7- 8	---
Marshall-Roberts	11.5	10.6-12.8	-1.5	12.8	11.8-13.6	+0.5	8	7- 9	+2
Average	12.0		-1.5	12.7		+0.6	7		---

*From 1978 Averages.

Table 4 shows the protein distribution for the 1979 barley crop from the three states. Seventy-six per cent of the North Dakota crop samples, 74 per cent of the Minnesota samples and all of the South Dakota samples fell below 13.5 per cent protein. Of the 731 samples collected during the survey, 76.9 per cent were below this level and should be suitable for malting on this basis. Cumulative per cent data for the 1977 and 1978 crops show that 46.7 and 65.1 per cent, respectively, were below 13.5 per cent protein.

The levels of plump kernels and test weights for the three states is given in Table 5. All three states showed small declines in test weight and all three were virtually equal in this respect. Samples from North Dakota and South Dakota showed improved kernel plumpness over 1978 while Minnesota samples were less plump.

Table 6 summarizes the data obtained from the three crop years for the three states. The total protein content has declined in each of the last two years as has test weight. Moisture levels have remained fairly constant and kernel brightness has varied only between scores of 5 and 7. Kernel plumpness, which showed a significant decline in 1978, is slightly higher in 1979.

Table 5. Test Weight and Plumpness of 1979 Barley Samples

State	Test Weight (lbs/bu)		Plumpness*	
	1979	Change**	1979	Change**
North Dakota	43.8	-1.1	72.4	+3.4
South Dakota	43.5	-0.5	68.7	+7.7
Minnesota	43.0	-0.6	61.8	-5.2

* Per cent retained on 6/64 inch screen.
** From 1978 average.

Table 4. Protein Distribution of 1979 Barley Samples

State		Less Than 11.5	11.6-12.5	12.6-13.5	13.6-14.5	14.5-15.5	More Than 15.5
North Dakota		26	137	232	95	25	2
South Dakota		10	9	11	0	0	0
Minnesota		35	44	58	38	9	0
Per cent in class		9.7	26.0	41.2	18.2	4.6	0.3
Cumulative Per cent	(1979)	9.7	35.7	76.9	95.1	99.7	100.0
	(1978)	13.7	36.0	65.1	86.2	97.0	100.0
	(1977)	9.8	26.4	46.7	72.6	92.3	100.0

Summary

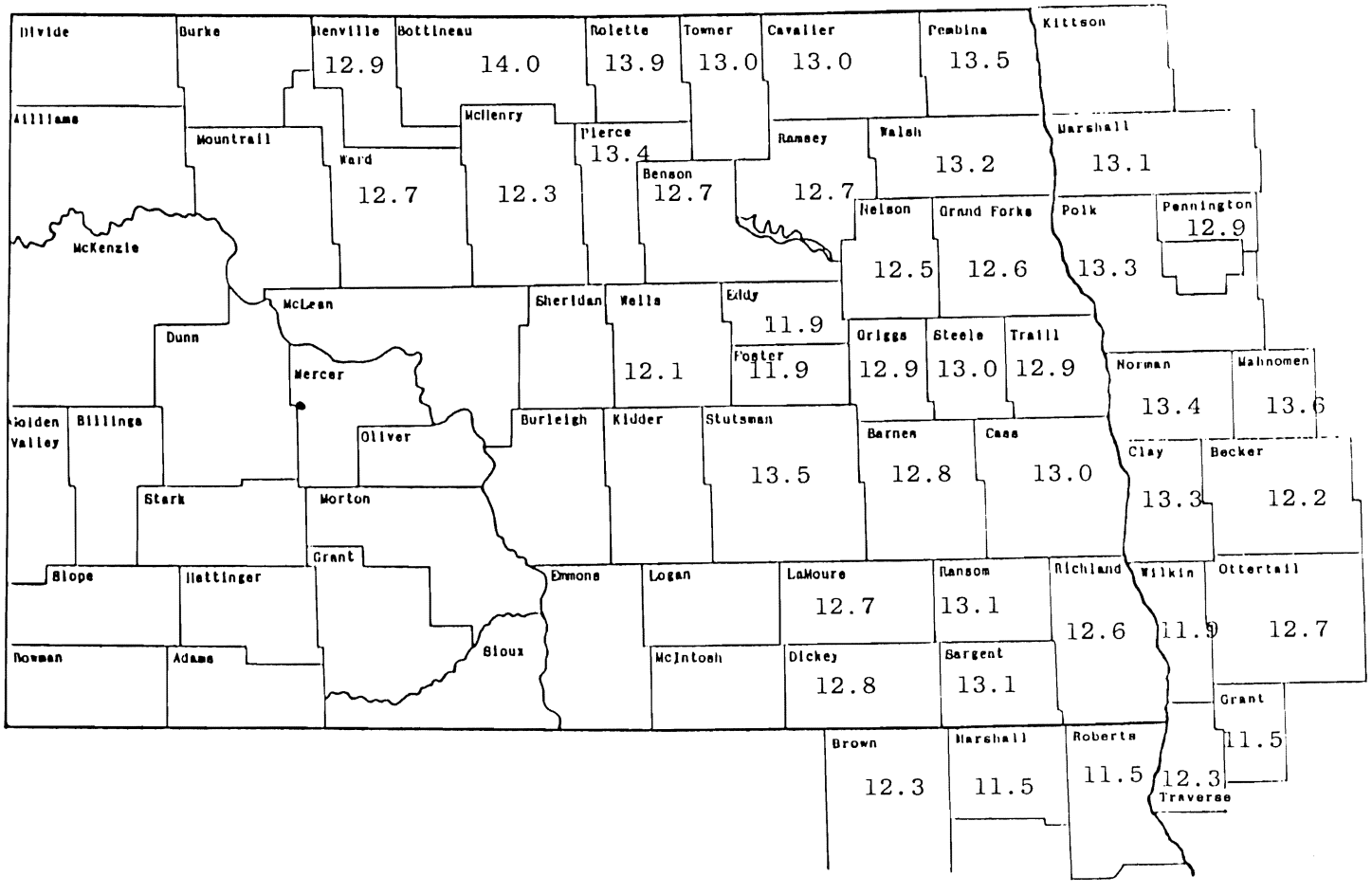
The 1979 six-rowed malting barley crop grown in North Dakota, South Dakota and Minnesota has an average protein content of 12.9 per cent, a decline of 0.1 per cent from the 1978 average. Moisture levels average 11.8 per cent. The test weight is slightly lower than the 1977 and 1978 averages but the level of plump kernels has risen this year. The 1979 crop suffers from poor kernel brightness and this may be a factor in its suitability for malting purposes.

Figure 1 shows the average protein levels for the 42 counties sampled in the 1978 barley crop survey.

Table 6. Summary of Data for 1977, 1978, and 1979 Crops*

	Number of Samples	Protein (%)	Moisture (%)	Color	Test Weight (lbs/bu)	Plumpness (%)
1977	803	13.6	11.8	6	46.5	74.4
1978	871	13.0	11.6	5	44.5	68.1
1979	731	12.9	11.8	7	43.6	69.6

Figure 1: Average protein content for all counties sampled in 1979 barley survey.



ANNUAL REPORT, 1979

Financial Statement
North Dakota Agricultural Experiment Station
July 1, 1978 to June 30, 1979

OPERATIONS

Main Station	Balance 7-1-78	Receipts	Expenditures	Transfers	Balance 6-30-79	Salaries	Fees & Services	Supplies & Materials	Equipment
State Appropriations	$ 767,744.39	$ 5,758,454.11	$ 5,228,081.65	$ —0—	$1,298,116.85	$3,590,810.19	$611,198.27	$ 565,200.05	$460,873.14
Federal Appropriations CR, USDA	(326,722.14)	1,584,657.00	1,619,644.40	(21,885.00)	(383,594.54)	1,559,112.59	30,853.26	15,259.21	14,419.34
Sales & Services	660,718.89	432,642.66	421,108.63	21,885.00	694,137.92	120,052.33	69,612.82	170,711.37	60,732.11
Gifts & Grants	266,949.20	1,222,160.69	1,227,026.06	21,984.66	284,068.49	916,138.98	131,198.83	114,450.49	65,237.76
TOTAL Main Station	$1,368,690.34	$ 8,997,914.46	$ 8,495,860.74	$21,984.66	$1,892,728.72	$6,186,114.09	$842,863.18	$ 865,621.12	$601,262.35
Branch Stations	820,630.07	1,276,913.49	1,283,759.63	3,786.48	817,570.41	703,892.03	153,319.43	290,861.25	135,686.92
TOTAL OPERATIONS	$2,189,320.41	$10,274,827.95	$ 9,779,620.37	$25,771.14	$2,710,299.13	$6,890,006.12	$996,182.61	$1,156,482.37	$736,949.27
LAND & STRUCTURES									
Main Station									
State Appropriations	$ 10,028.95	$ —0—	$ 10,028.95	$ —0—	$ —0—				
Branch Stations									
State Appropriations	508,266.04	—0—	508,266.04	—0—	—0—				
TOTAL LAND & STRUCTURES	$ 518,294.99	$ —0—	$ 518,294.99	$ —0—	$ —0—				
GRAND TOTAL Operations, Land & Structures	$2,707,615.40	$10,274,827.95	$10,297,915.36	$25,771.14	$2,710,299.13				

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VETERINARY SCIENCE Myron F. Andrews, D.V.M., Professor and Chairman[50]; Arnold D. Alstad, D.V.M., Associate Professor[100]; Ivan E. Berg, D.V.M., Associate Professor[100]; Howard H. Casper, Ph.D., Associate Professor[100]; Allan Peterson, D.V.M., Assistant Professor[100]; Dennis Saari, D.V.M., Associate Professor[100]; Ithel A. Schipper, D.V.M., Professor[60]; George E. Staples, D.V.M., Associate Professor[90]; Donald K. Christian, D.V.M., Adjunct Professor, (Private Practice)[0]; Gary R. Christian, D.V.M., Adjunct Professor, (Private Practice)[0]; Robert A. Moen, D.V.M., Adjunct Professor, (Private Practice)[0]; Meril J. Reinhiller, D.V.M., Adjunct Professor, (Private Practice)[0]; Clarence W. Samual, D.V.M., Adjunct Professor, (Private Practice)[0]; Daniel P. Treat, D.V.M., Adjunct Professor, (Private Practice)[0].

BRANCH STATIONS

DICKINSON: Thomas J. Conlon, M.S., Superintendent[100]; Douglas G. Landblom, M.S., Assistant Animal Husbandman[100]; James Lee Nelson, B.S., Animal Husbandman[100].

HETTINGER: Timothy C. Faller, M.S., Superintendent[100].

LANGDON: Robert E. Nowatzki, B.S., Superintendent[100].

NORTH CENTRAL: Ben K. Hoag, M.S., Superintendent[100]; John Lukach, B.S., Assistant Agronomist[100].

WILLISTON: Ernest W. French, M.S., Superintendent[100]; Neil Riveland, M.S., Associate Agronomist[100].

CARRINGTON: Howard Olson, M.S., Superintendent and Agricultural Engineer[100]; Joseph J. Caroline, B.S., Assistant Agronomist[100]; Robert Hoffman, B.S., Assistant Agricultural Engineer[100].

AGRONOMY SEED FARM: LeRoy A. Spilde, Ph.D., Superintendent[100].

The small superscript figure after each title indicates the per cent of the salary paid by the Agricultural Experiment Station. The superscript zero indicates the entire salary is paid by some state or federal agency, usually the United States Department of Agriculture.

PROFESSIONAL STAFF CHANGES
(to June 30, 1979)

ADDITIONS TO STAFF

Hugo O. Carvallo, Ph.D.
Research Associate ..... July 1, 1978
Duane E. Gronhovd, M.S.
Research Assistant ..... July 1, 1978
Steven C. Hvinden, M.S.
Research Assistant ..... July 1, 1978
Timothy W. Martens, B.S.
Instructor ..... July 1, 1978
Gary L. Williams, Ph.D.
Assistant Professor ..... July 1, 1978
Kenneth D. Kofoid, Ph.D.
Assistant Professor ..... August 1, 1978
Michael W. Lund, B.S.
Instructor ..... August 1, 1978
Fredric S. Carter, B.S.
Research Assistant ..... September 6, 1978
Jerome D. Franckowiak, Ph.D.
Associate Professor ..... September 15, 1978
Chung S. Park, Ph.D.
Assistant Professor ..... November 1, 1978
Lyle D. Prunty, Ph.D.
Assistant Professor ..... November 1, 1978
Lawrence E. Mack, Ph.D.
Assistant Professor ..... January 1, 1979
Dennis A. Saari, D.V.M.
Associate Professor ..... March 1, 1979
Joseph F. Giles, Ph.D.
Assistant Professor ..... April 1, 1979
Rollin G. Sears, Ph.D.
Assistant Professor ..... April 1, 1979
Kent A. Belland, B.S.
Research Assistant ..... April 11, 1979
Gary A. Halvorson, Ph.D.
Research Associate ..... April 23, 1979
H. Allan Mann, M.S.
Instructor ..... June 1, 1979
Jay K. Larsen, B.S.
Research Assistant ..... June 4, 1979
Dan E. Parfitt, M.S.
Research Associate ..... June 18, 1979

DELETIONS TO STAFF

Norman E. Toman, M.S.
Research Associate ..... July 31, 1978
David C. Ebeltoft, Ph.D.
Professor ..... August 31, 1978
Robert E. Sojka, Ph.D.
Assistant Professor ..... August 31, 1978
Jay A. Leitch, M.S.
Research Associate ..... September 5, 1978
James W. Bauder, Ph.D.
Assistant Professor ..... September 15, 1978
Gary M. Bedker, M.S.
Research Associate ..... October 6, 1978
Arlon G. Hazen, M.S.
Director ..... October 31, 1978
Damian A. Runge, B.S.
Research Assistant ..... October 31, 1978
Raul Weiss, D.V.M.
Associate Professor ..... November 3, 1978
John R. Erickson, Ph.D.
Associate Professor ..... November 24, 1978
Fred E. Rhoton, Ph.D.
Research Associate ..... January 31, 1979
Franklin B. Arnold, M.S.
Research Assistant ..... February 23, 1979
Fred W. Schroer, M.S.
Associate Professor ..... February 28, 1979

James S. Wieland, M.S.
Research Assistant ..... March 31, 1979
Randal C. Coon, M.S.
Research Assistant ..... April 30, 1979
Gary M. Banowetz, Ph.D.
Assistant Professor ..... May 25, 1979
Barry H. Dunn, M.S.
Assistant Animal Husbandman ..... May 31, 1979
Hugo O. Carvallo, Ph.D.
Research Associate ..... June 26, 1979
Leonard D. Sibbitt.
Professor ..... June 30, 1979

GIFTS AND GRANTS

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North Dakota Lamb and Wool Producers Association
North Dakota Parks and Recreation Department
North Dakota Post Secondary Education Commission
North Dakota Power Use Council
North Dakota Regional And Environmental Assessment Program (REAP)
North Dakota Soils Conservation Commission
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