1974

ANNUAL REPORT

DICKINSON EXPERIMENT STATION

DICKINSON, NORTH DAKOTA

REPORT OF

AGRONOMIC INVESTIGATIONS

AT THE

DICKINSON EXPERIMENT STATION

DICKINSON, NORTH DAKOTA

1974

by

Thomas J. Conlon

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GROWING CONDITIONS-1974

Principal climatic factors responsible for limiting small grain yields in this area in 1974 were below normal precipitation and above average temperature in June and July. Above average precipitation during the last four months of 1973 and in April and May of 1974 helped to compensate for the below average moisture received during the rest of the growing season. Without this favorable fall moisture, the precipitation deficit during the growing season would have been much more serious.

Precipitation summary: Dickinson

	1973-1974	80 yr. Avg.
Sept., Oct., Nov., and Dec., 1973	3.69	3.04
Jan., Feb., and March, 1974	.51	1.58
April	2.82	1.38
May	4.15	2.36
June	2.00	3.59
July	1.50	2.23
August	.90	1.78
Total	15.57	15.96

Precipitation summary: Mandan

	1973-1974	80 yr. Avg.
Sept., Oct., Nov., and Dec., 1973	4.32	3.18
Jan., Feb., and March, 1974	.35	1.49
April	2.87	1.50
May	3.31	2.14
June	2.00	3.48
July	2.24	2.39
August	1.51	1.69
Total	16.60	15.87

Precipitation summary: Hettinger

	1973-1974
Sept., Oct., Nov., and Dec., 1973	7.21
Jan., Feb., and March, 1974	.74
April	1.93
May	3.27
June	.96
July	1.71
August	.18
Total	16.00

SEEDING DATES AND PROCEDURE

Seeding of variety trials at Dickinson began with rye seedlings on September 17, 1973. Wheat was planted on April 23, 1974 and durum, oats and barley on April 24.

Variety trials at off station sites were seeded, beginning with winter wheat, at Bowman and Hettinger on September 10, 1973 and at Beach on September 11. Spring seedings on off station sites began at Hettinger on April 25, followed by Bowman April 25, Beach April 30, Killdeer May 1, Glen Ullin May 7, and Mandan May 8.

All trials were seeded on summerfallow. Fertilizer application was uniform for all varieties at a given location, based on soil tests. Rates of application recommended by the North Dakota State University Soils Testing Laboratory were used for all trials.

Trials with spring grain were seeded with a double disk press at the rate of 1 bushel per acre for spring wheat and durum 1¼ bushel per acre for barley and 1½ bushel per acre for oats.

Winter grains were seeded with a feep furrow drill equipped with 4 inch spear point shovels spaced 10 inches apart. Seeding rates were 1 bushel per acre for winter rye and 50 pounds per acre for winter wheat.

Table 1. Hard red spring wheat variety trial, 1974-Dickinson.

	Yield in bushels per acre								
Variety	Rep 1	Rep 2	Rep 3	Rep 4	Avg.		Test weight	Heading date	Height inches
Chris	31.9	35.2	37.4	27.5	33.0		60.5	7-4	32
Waldron	39.0	34.1	33.0	29.7	34.0		60.0	7-1	33
Bonanza	39.6	41.8	31.9	31.9	36.3		62.0	7-2	23
Era	45.1	42.9	44.0	35.2	41.8		57.0	7-6	24
World Seeds 1809	36.3	39.6	25.3	20.9	30.5		62.0	7-1	24
Bounty 208	40.7	35.2	31.9	29.7	34.4		62.5	6-30	22
Lark	40.7	30.8	40.7	25.3	34.4		61.5	6-30	22
Napayo	31.9	35.2	35.2	29.7	33.0		61.0	6-30	30
Glenlea	31.9	44.0	38.5	24.2	34.7		57.0	7-3	32
Nowesta	39.6	34.1	29.7	27.5	32.7		61.5	7-1	32
Olaf	39.6	46.2	34.1	31.9	38.0		60.5	7-1	28
Ellar	37.4	29.7	24.2	38.5	32.5		61.5	6-30	33
Fortuna	36.3	34.1	38.5	25.3	33.6		60.0	7-1	31
Tioga	31.9	31.3	28.6	25.3	29.3		58.5	7-2	30
Norana	35.2	28.6	33.0	25.3	30.5		59.5	7-5	26
II-64-33	41.8	30.8	39.6	33.0	36.3		57.5	7-6	24
S 6916	41.8	33.0	39.0	29.1	35.7		63.0	6-30	29
ND 510	43.4	40.7	33.0	33.0	37.5		61.0	7-1	32

Table 1. Hard red spring wheat variety trial, 1974-Dickinson continued.

	Yield in bushels per acre								
Variety	Rep 1	Rep 2	Rep 3	Rep 4	Avg.		Test weight	Heading date	Height inches
ND 519	45.1	26.4	26.4	34.6	33.1		62.0	6-30	28
ND521	33.0	17.6	27.5	27.5	26.4		56.0	7-3	27
ND 522	44.5	45.1	41.8	38.5	42.5		61.0	7-1	30
ND 523	37.4	35.2	29.1	31.3	33.3		62.0	7-2	26
W.S. 6	39.6	44.0	39.6	28.6	38.0		60.0	7-1	24
Proctor	40.7	35.2	37.4	32.4	36.4		61.0	6-30	22
Prodax	46.2	34.1	34.6	33.5	37.1		56.0	7-2	22
Wared	47.3	38.5	38.5	40.1	41.1		61.5	7-5	22
S 7003	40.7	27.5	30.8	33.0	33.0		59.0	7-2	30
ND 496-153	44.0	35.2	42.9	30.8	38.2		62.5	7-2	30
ND 496-158	46.2	34.1	41.8	36.3	39.6		61.0	7-2	28
VD 526	42.9	36.3	40.7	36.8	39.2		62.0	7-1	26
ND 527	40.1	25.3	32.4	33.0	32.7		62.0	7-4	28
ND 528	50.6	33.0	35.5	36.3	38.9		60.0	7-5	28
ND 530	41.8	28.6	41.8	30.8	35.8		60.5	7-1	27
Standard error of a treatment mean = 2.2935									
Least significant difference @ 5% = 6.4221									
The c.v. = 13.04 P.C.									

Table 2. Long term yield comparison of hard red spring varieties 1974-Dickinson.

Variety	Yields in bushels per acre							Avg. 1969-1974
	1969	1970	1971	1972	1973	1974		
Chris	40	19	28	22	50	33		32
Fortuna	33	19	27	20	50	34		31
Waldron	43	22	25	25	53	34		34
Era	55	27	28	35	71	42		43
Bonanza		21	28	35	54	36		
Bounty 208			29	32	56	34		
Lark			27	35	58	34		
Napayo				23	48	33		
World Seeds 1809				27	51	31		
Olaf				27	62	38		
ND 510				28	49	38		
Glenlea					56	35		
Nowesta					53	33		
Norana						31		
Ellar						33		
Tioga						29		
11-64-33						36		
S 6916						36		

Table 2. Long term yield comparison of hard red spring varieties 1974-Dickinson –continued.

Variety	Yields in bushels per acre							Avg. 1969-1974
	1969	1970	1971	1972	1973	1974		
ND 519						33		
ND 521						26		
ND 522						42		
ND 523						33		
W.S. 6						38		
Protor						36		
Prodax						37		
Wared						41		
S 7003						33		
ND 496-153						38		
ND 496-158						40		
ND 526						39		
ND 527						33		
ND 528						39		
ND 530						33		
L.s.d. @5%	4.1	2.9	5.1	6.1	5.2	6.4		

Table 3. Off Station hard spring wheat variety trial 1974-Beach.

Variety or treatment	Yields in bushels per acre					Test Weight
	Rep 1	Rep 2	Rep 3	Rep 4	Avg.	
Waldron	29.7	39.6	40.7	42.9	38.2	61.0
Ellar	31.9	29.7	42.9	44.0	37.1	61.5
Olaf	33.0	38.5	34.1	37.4	35.8	61.0
Tioga	41.8	37.4	27.5	50.6	39.3	61.0
Bonanza	27.5	37.4	36.3	42.9	36.0	60.5
Bounty 208	23.1	38.5	34.1	48.4	36.0	59.5
World Seeds 1809	31.9	33.0	39.6	40.7	36.3	61.0
Fortuna	31.9	39.6	37.4	46.2	38.8	61.0
Norana	27.5	38.5	35.2	39.6	35.2	61.5
Glenlea	26.4	52.8	42.9	48.4	42.6	60.5
Era	40.7	47.3	45.1	60.5	48.4	61.5

Standard error of a treatment mean = 2.5274

Least significant difference @ 5% = 7.2987

The c.v. = 13.12 P.C.

Table 4. Off Station hard spring wheat variety trial 1974-Bowman.

Variety or treatment	Yields in bushels per acre					Test Weight
	Rep 1	Rep 2	Rep 3	Rep 4	Avg.	
Waldron	37.4	38.5	41.8	39.6	39.3	59.5
Ellar	35.2	38.5	40.7	38.5	38.2	60.5
Olaf	36.3	39.6	42.9	37.4	39.1	61.0
Tioga	34.1	38.5	37.4	37.4	36.9	60.0
Bonanza	37.4	39.6	38.5	38.5	38.5	58.0
Bounty 208	35.2	42.3	42.9	42.9	40.8	61.0
World Seeds 1809	35.7	36.3	37.9	35.2	36.3	61.5
Fortuna	37.4	39.6	37.4	36.3	37.7	59.5
Norana	34.1	39.6	39.6	39.6	38.2	60.5
Glenlea	37.4	40.7	41.8	39.6	39.9	57.5

Standard error of a treatment mean = 0.7252

Least significant difference @ 5% = 2.1045

The c.v. = 3.77 P.C.

Table 5. Off Station hard spring wheat variety trial 1974-Glen Ullin.

Variety or treatment	Yields in bushels per acre					Test Weight
	Rep 1	Rep 2	Rep 3	Rep 4	Avg.	
Waldron	17.6	19.8	26.4	23.1	21.7	57.5
Ellar	18.7	17.6	28.6	24.2	22.3	58.5
Olaf	17.6	18.7	23.1	20.9	20.1	59.5
Tioga	17.6	16.5	22.0	23.1	19.8	58.0
Bonanza	12.1	17.6	16.5	26.4	18.2	57.5
Bounty 208	12.1	17.6	25.3	22.0	19.3	59.0
World Seeds 1809	15.4	16.5	29.7	22.0	20.9	58.0
Fortuna	9.9	14.3	15.4	16.5	14.0	58.5
Norana	12.1	24.2	25.3	25.3	21.7	59.5
Glenlea	9.9	17.6	20.9	19.8	17.1	56.5

Standard error of a treatment mean = 1.3995

Least significant difference @ 5% = 4.0613

The c.v. = 14.36 P.C.

Table 6. Off Station hard spring wheat variety trial 1974-Hettinger.

Variety or treatment	Yields in bushels per acre					Test Weight
	Rep 1	Rep 2	Rep 3	Rep 4	Avg.	
Waldron	13.2	15.9	17.6	20.9	16.9	59.5
Ellar	13.2	17.6	18.7	20.9	17.6	59.5
Olaf	11.0	14.3	17.6	20.9	16.0	54.0
Tioga	8.8	11.0	13.2	18.7	12.9	60.0
Bonanza	13.2	14.3	12.6	15.9	14.0	60.0
Bounty 208	6.6	12.1	15.9	16.5	12.8	60.5
World Seeds 1809	5.5	5.5	9.9	11.5	8.1	60.5
Fortuna	12.1	16.5	18.7	20.9	17.1	59.5
Norana	13.2	13.7	16.5	19.8	15.8	60.0
Glenlea	9.9	11.0	14.3	17.6	13.2	56.5

Standard error of a treatment mean = 0.6919

Least significant difference @ 5% = 2.0080

The c.v. = 9.59 P.C.

Table 7. Off Station hard spring wheat variety trial 1974-Killdeer.

Variety or treatment	Yields in bushels per acre					Test Weight
	Rep 1	Rep 2	Rep 3	Rep 4	Avg.	
Waldron	41.8	37.4	36.3	24.2	34.9	58.0
Ellar	51.1	36.3	34.1	30.2	37.9	59.0
Olaf	51.7	41.8	34.6	25.3	38.4	58.0
Tioga	45.6	44.0	27.5	28.0	36.3	59.5
Bonanza	47.3	44.0	29.7	23.1	36.0	59.5
Bounty 208	46.7	31.3	34.6	24.7	34.3	59.0
World Seeds 1809	45.6	35.2	34.1	26.9	35.5	58.0
Fortuna	39.6	30.8	30.8	23.1	31.1	60.0
Norana	48.4	48.9	50.6	30.2	44.5	55.0
Glenlea	48.4	50.0	30.8	23.1	38.1	56.5

Standard error of a treatment mean = 2.2321

Least significant difference @ 5% = 6.4775

The c.v. = 12.17 P.C.

Table 8. Off Station hard spring wheat variety trial 1974-Mandan.

Variety or treatment	Yields in bushels per acre					Test Weight
	Rep 1	Rep 2	Rep 3	Rep 4	Avg.	
Waldron	26.4	18.7	19.8	25.3	22.6	59.0
Ellar	30.8	22.5	24.2	20.9	24.6	59.5
Olaf	30.8	19.8	18.7	23.1	23.1	61.0
Tioga	33.0	22.0	17.6	17.0	22.4	60.5
Bonanza	24.2	14.8	13.2	16.5	17.2	59.5
Bounty 208	24.2	17.0	15.4	22.0	19.7	59.5
World Seeds 1809	25.3	20.3	22.0	23.1	22.7	59.0
Fortuna	22.0	17.6	14.3	20.0	18.5	61.5
Norana	23.1	24.2	15.9	24.2	21.9	62.0
Glenlea	18.7	19.8	16.5	16.5	17.9	58.0

Standard error of a treatment mean = 1.4389

Least significant difference @ 5% = 4.1755

The c.v. = 13.68 P.C.

Table 9 Wheat variety trials Dickinson and off-station sites 1974.

	Yields in bushels per acre								
Variety	Dickinson	Beach	Bowman	Glen Ullin	Hettinger	Killdeer	Mandan	1974 Avg. 7-Station	
Waldron	34	38	39	22	17	35	23	30	
Ellar	32	37	38	22	18	38	25	30	
Olaf	38	36	39	20	16	38	23	30	
Tioga	29	39	37	20	13	36	22	28	
Bonanza	36	36	39	18	14	36	17	28	
Bounty 208	34	36	41	19	13	34	20	28	
World Seeds 1809	31	36	36	21	8	36	23	27	
Fortuna	34	39	38	14	17	31	19	27	
Norana	31	35	38	22	16	45	22	30	
Glenlea	35	43	40	17	13	38	18	29	
Era	42	48	--	--	--	--	--	--	
L.s.d. @ 5%	6.4	7.3	2.1	4.1	2.0	6.5	4.2	1.9	

Table 10. Wheat variety trials Dickinson and off-station sites 1974.

	Test weight in pounds per bushel								
Variety	Dickinson	Beach	Bowman	Glen Ullin	Hettinger	Killdeer	Mandan	1974 Avg. 7-Station	
Waldron	60.0	61.0	59.5	57.5	59.5	58.0	59.0	59.2	
Ellar	61.5	61.5	60.5	58.5	59.5	59.0	59.5	60.0	
Olaf	60.5	61.0	61.0	59.5	54.0	58.0	61.0	59.3	
Tioga	58.5	61.0	60.0	58.0	60.0	59.5	60.5	59.6	
Bonanza	62.0	60.5	58.0	57.5	60.0	57.5	59.5	59.3	
Bounty 208	62.5	59.5	61.0	59.0	60.5	59.0	59.5	60.1	
World Seeds 1809	62.0	61.0	61.5	58.0	60.5	58.0	59.0	60.0	
Fortuna	60.0	61.0	59.5	58.5	59.5	60.0	61.5	60.0	
Norana	59.5	61.5	60.5	59.5	60.0	55.0	62.0	59.7	
Glenlea	57.0	60.5	57.5	56.5	56.5	56.5	58.0	57.5	
Era	57.0	61.5	--	--	--	--	--	59.3	

Table 11. Wheat variety trials Dickinson and off-station sites 1974, protein data.

	Wheat protein at 14% moisture basis								
Variety	Dickinson	Beach	Bowman	Glen Ullin	Hettinger	Killdeer	Mandan	1974 Avg. 7-Station	
Waldron	17.0	15.5	17.0	17.6	16.6	17.8	17.3	17.0	
Ellar	17.2	14.6	16.9	17.2	16.3	17.3	17.4	16.7	
Olaf	16.5	15.5	16.6	17.9	17.1	17.2	17.4	16.9	
Tioga	16.7	14.3	16.6	17.4	16.5	17.3	17.3	16.6	
Bonanza	15.5	13.6	15.8	16.8	15.7	17.0	16.5	15.8	
Bounty 208	14.6	14.3	15.8	17.6	15.0	17.3	16.8	15.9	
World Seeds 1809	16.0	14.4	16.7	16.5	17.4	17.0	16.5	16.4	
Fortuna	15.9	13.4	16.1	17.7	15.0	17.3	16.9	16.0	
Norana	15.4	13.2	14.0	15.9	15.4	16.0	15.7	15.1	
Glenlea	16.5	12.3	16.0	16.9	16.7	17.6	18.0	16.3	
Era	13.5	12.6	--	--	--	--	--	--	

Table 12. Hard red winter wheat trial, 1974-Dickinson [1/].

Variety	Yield Bu/A Avg.	Test weight	Heading date	Height cm.	Lodging %	% Survival [2/]
Sundance	48.3	57.7	6-26	122	2.0	58
Froid	44.7	59.5	6-25	122	2.0	72
Minter	45.7	59.5	6-25	123	2.3	70
ND 7121	49.6	62.2	6-23	110	2.0	79
Winoka	50.0	62.8	6-22	113	2.0	54
Bronze	47.0	59.8	6-21	110	2.0	47
Lancer	52.2	61.7	6-22	105	1.0	44
Centurk	47.0	60.7	6-22	107	1.7	54

1/ Data supplied by John R. Erikson, Agronomy Department, NDSU

2/ Survival notes recorded at Minot and Williston

Table 13. Off Station winter wheat variety trial 1974-Beach.

Variety or treatment	Yields in bushels per acre					Test Weight
	Rep 1	Rep 2	Rep 3	Rep 4	Avg.	
Froid	45.2	41.9	40.6	38.5	41.6	62.0
Hume	45.2	38.5	39.4	44.7	42.0	63.0
Winoka	47.7	45.2	42.7	49.4	46.3	64.5
Trapper	49.0	47.7	42.3	47.7	46.7	63.5
Lancer	51.9	48.6	46.1	50.3	49.2	64.5
Centurk	57.4	49.4	55.3	42.8	51.2	64.5
Sundance	46.1	43.1	46.1	47.3	45.7	62.0
Bronze	44.0	48.2	42.7	51.1	46.5	63.0

Standard error of a treatment mean = 1.2742

Least significant difference @ 5% = 3.7481

The c.v. = 5.49 P.C.

Table 14. Off Station winter wheat variety trial 1974-Bowman.

Variety or treatment	Yields in bushels per acre					Test Weight
	Rep 1	Rep 2	Rep 3	Rep 4	Avg.	
Bronze	22.2	26.4	24.7	24.7	24.5	62.0
Hume	26.4	23.1	21.4	21.4	23.1	64.0
Winoka	31.3	18.9	25.5	25.5	25.3	65.5
Trapper	26.4	22.2	22.2	14.8	21.4	65.0
Lancer	28.0	28.0	30.5	23.9	27.6	65.0
Centurk	22.2	31.3	18.1	28.8	25.1	64.5
Sundance	28.0	22.2	35.4	23.9	27.4	59.5
Froid	25.5	26.4	30.5	25.5	27.0	61.5

Standard error of a treatment mean = 2.1497

Least significant difference @ 5% = 6.3234

The c.v. = 17.08 P.C.

Table 15. Off Station winter wheat variety trial 1974-Hettinger.

Variety or treatment	Yields in bushels per acre					Test Weight
	Rep 1	Rep 2	Rep 3	Rep 4	Avg.	
Froid	19.3	21.4	22.2	21.4	21.1	59.0
Hume	21.4	25.9	24.3	23.1	23.7	62.0
Winoka	24.3	24.7	25.5	25.9	25.1	62.5
Trapper	21.0	26.4	25.9	24.7	24.5	62.0
Lancer	25.5	24.7	25.1	25.5	25.2	61.5
Centurk	24.3	30.5	27.2	26.4	27.1	61.5
Sundance	23.1	24.7	25.5	26.4	24.9	58.0
Bronze	22.2	26.4	24.7	25.5	24.7	60.5

Standard error of a treatment mean = 0.5968

Least significant difference @ 5% = 1.7554

The c.v. = 4.86 P.C.

Table 16. Off-station winter wheat variety trials 1974.

	Yield in bushels per acre			
Variety	Beach	Bowman	Hettinger	1974 Avg, 3-station
Froid	42	27	21	30
Hume	42	23	24	30
Winoka	46	25	25	32
Trapper	47	21	25	31
Lancer	49	28	25	34
Centurk	54	25	27	35
Sundance	46	27	25	33
Bronze	47	25	25	32
L.s.d. @ 5%	3.8	6.3	1.8	2.5

Table 17. Off-station winter wheat variety trials 1974.

Variety	Test weight in pounds per bushel								
	Beach	Bowman	Hettinger		1974 Avg, 3-station				
Froid	62.0	61.5	59.0		60.8				
Hume	63.0	64.0	62.0		63.0				
Winoka	64.5	65.5	62.5		64.2				
Trapper	63.5	65.0	62.0		63.5				
Lancer	64.5	65.0	61.5		63.7				
Centurk	64.5	64.5	61.5		63.5				
Sundance	62.0	59.5	58.0		59.8				
Bronze	63.0	62.0	60.5		61.8				

Table 18. Off-station winter wheat variety trials 1974.

	Wheat protein at 14% moisture basis								
Variety	Beach	Bowman	Hettinger		1974 Avg, 3-station				
Froid	13.1	11.0	13.0		12.4				
Hume	13.2	11.8	12.1		12.4				
Winoka	12.4	10.6	11.6		11.5				
Trapper	12.1	11.1	11.0		11.4				
Lancer	12.0	9.6	11.6		11.1				
Centurk	11.7	10.6	11.3		11.2				
Sundance	12.3	13.1	13.5		13.0				
Bronze	13.2	13.0	11.7		12.6				

Table 19. Durum wheat variety trial, 1974-Dickinson.

	Yields in bushels per acre								
Variety	Rep 1	Rep 2	Rep 3	Rep 4	Avg.		Test Weight	Heading date	Height inches
Wells	29.7	38.5	26.4	42.9	34.4		57.5	7-2	30
Leeds	27.5	37.9	31.9	40.7	34.5		61.5	7-1	30
Rolette	26.4	38.5	32.4	45.6	35.7		60.5	6-29	28
Ward	27.5	35.2	34.6	40.7	34.5		59.0	6-30	29
Wakooma	22.0	26.4	27.5	40.7	29.2		57.0	7-5	31
Crosby	20.9	29.7	43.4	43.4	34.4		58.5	7-1	30
Botno	24.2	39.6	28.6	39.6	33.0		60.0	7-1	29
Rugby	24.2	33.0	36.3	40.1	33.4		59.0	7-1	31
Macoun	22.0	35.2	29.7	33.0	30.0		58.5	7-3	31
D 6962	20.9	29.1	22.0	34.1	26.5		60.0	7-2	21
D 7025	27.5	35.2	33.5	45.1	35.3		58.5	7-1	25
D 7047	24.2	31.9	31.3	40.1	31.9		60.5	7-1	23
D 7057	22.0	31.9	25.8	38.5	29.6		58.5	7-2	23
D 70101	18.7	27.5	26.4	31.3	26.0		59	7-2	33
D71110	25.3	39.6	35.2	42.9	35.8		59.5	7-1	31
D71111	29.7	30.8	36.3	47.3	36.0		59	7-1	31
D71117	29.1	33.0	31.9	44	34.5		59	7-1	30

Table 19. Durum wheat variety trial, 1974-Dickinson continued.

Variety	Yields in bushels per acre						Test Weight	Heading date	Height inches
	Rep 1	Rep 2	Rep 3	Rep 4	Avg.				

Standard error of a treatment mean = 1.6686

Least significant difference @ 5% = 4.7195

The c.v. = 10.23 P.C.

Table 20. Durum wheat variety trial, 1974-Dickinson.

Variety	Yields in bushels per acre				Avg. 1972-1974				
	1972	1973	1974						
Wells	24	46	34		35				
Leeds	19	36	35		30				
Rolette	23	41	36		33				
Ward			35						
Wakooma			29						
Crosby			34						
Botno			33						
Rugby			33						
Macoun			30						
D 6962			27						
D 7025			35						
D 7047			32						
D 7057			30						
D 70101			26						
D71110			36						
D71111			36						
D71117			35						
L.s.d. @ 5%	3.5	3.9	4.7						

Table 21. Off-station Durum wheat variety trial, 1974-Beach

	Yields in bushels per acre					
Variety	Rep 1	Rep 2	Rep 3	Rep 4	Avg.	Test Weight
Leeds	33.0	37.4	48.4	48.4	41.8	58.5
Ward	41.8	41.8	62.7	61.6	52.0	58.0
Rolette	39.6	46.2	52.8	53.9	48.1	59.5
Crosby	36.3	41.8	46.2	51.7	44.0	59.5
Rugby	41.8	42.9	53.9	59.4	49.5	59.5
Botno	42.9	42.9	56.1	60.5	50.6	59.0

Standard error of a treatment mean = 1.3854

Least significant difference @ 5% = 4.1753

The c.v. = 5.81 P.C.

Table 22. Off-station Durum wheat variety trial, 1974-Bowman.

	Yields in bushels per acre					
Variety	Rep 1	Rep 2	Rep 3	Rep 4	Avg.	Test Weight
Leeds	33.0	41.8	41.8	29.7	36.6	63.0
Ward	40.7	42.9	46.2	38.5	42.1	61.0
Rolette	38.5	43.4	44.0	39.6	41.4	63.5
Crosby	38.5	38.5	42.9	37.4	39.3	60.5
Rugby	44.0	46.2	45.1	36.3	42.9	61.5
Botno	40.1	41.8	42.9	38.5	40.8	60.5

Standard error of a treatment mean = 1.0891

Least significant difference @ 5% = 3.2822

The c.v. = 5.38 P.C.

Table 23. Off-station Durum wheat variety trial, 1974-Glen Ullin.

	Yields in bushels per acre					
Variety	Rep 1	Rep 2	Rep 3	Rep 4	Avg.	Test Weight
Leeds	30.8	17.6	19.8	20.9	22.3	60.5
Ward	34.1	17.6	22.0	25.3	24.8	59.5
Rolette	28.6	16.5	17.6	25.3	22.0	60.0
Crosby	26.4	19.8	19.8	20.9	21.7	60.0
Rugby	23.1	25.3	22.0	24.2	23.7	60.0
Botno	20.9	26.4	19.8	25.3	23.1	59.5

Standard error of a treatment mean = 1.9218

Least significant difference @ 5% = 5.7916

The c.v. = 16.77 P.C.

Table 24. Off-station Durum wheat variety trial, 1974-Hettinger.

	Yields in bushels per acre					
Variety	Rep 1	Rep 2	Rep 3	Rep 4	Avg.	Test Weight
Leeds	20.9	18.7	16.5	15.9	18.0	54.0
Ward	20.9	20.9	17.6	20.9	20.1	56.0
Rolette	18.1	18.1	17.6	18.1	18.0	61.5
Crosby	17.0	16.5	19.2	18.1	17.7	53.5
Rugby	16.5	21.4	18.7	18.7	18.8	56.5
Botno	17.6	23.1	18.7	20.9	20.1	60.5

Standard error of a treatment mean = 0.8985

Least significant difference @ 5% = 2.7078

The c.v. = 9.57 P.C.

Table 25. Off-station Durum wheat variety trial, 1974-Killdeer.

	Yields in bushels per acre					
Variety	Rep 1	Rep 2	Rep 3	Rep 4	Avg.	Test Weight
Leeds	23.1	21.4	24.2	28.0	24.2	59.5
Ward	25.3	23.6	28.0	35.2	28.0	60.0
Rolette	21.4	20.9	28.0	31.3	25.4	57.5
Crosby	20.3	18.1	24.7	28.6	22.9	58.5
Rugby	22.0	22.0	27.5	30.8	25.6	60.0
Botno	23.1	23.1	24.7	33.0	26.0	62.5

Standard error of a treatment mean = 0.6782

Least significant difference @ 5% = 2.0438

The c.v. = 5.35 P.C.

Table 26. Off-station Durum wheat variety trial, 1974-Killdeer.

	Yields in bushels per acre					
Variety	Rep 1	Rep 2	Rep 3	Rep 4	Avg.	Test Weight
Leeds	18.1	13.2	16.5	16.5	16.1	61.5
Ward	17.6	19.8	17.6	18.7	18.4	62.5
Rolette	21.4	15.9	13.7	15.4	16.6	62.0
Crosby	14.3	13.7	18.7	17.0	15.9	62.0
Rugby	15.4	17.6	19.2	16.5	17.2	61.0
Botno	11.0	15.9	18.1	19.8	16.2	62.5

Standard error of a treatment mean = 1.3495

Least significant difference @ 5% = 4.0671

The c.v. = 16.13 P.C.

Table 27. Durum variety trials-Dickinson and off-station sites 1974.

	Yields in bushels per acre								
Variety	Dickinson	Beach	Bowman	Glen Ullin	Hettinger	Killdeer	Mandan	1974 Avg. 7-Station	
Leeds	35	42	37	22	18	24	16	28	
Ward	35	52	42	25	20	28	18	31	
Rolette	36	48	41	22	18	25	17	30	
Crosby	31	44	39	22	18	23	16	28	
Rugby	33	50	43	24	19	26	17	30	
Botno	33	51	41	23	20	26	16	30	
L.s.d. @ 5%	4.7	4.2	3.3	5.8	2.7	2.0	4.1	1.5	

Table 28 Durum variety trials-Dickinson and off-station sites 1974.

	Test weight in pounds per bushel								
Variety	Dickinson	Beach	Bowman	Glen Ullin	Hettinger	Killdeer	Mandan	1974 Avg. 7-Station	
Leeds	61.5	58.5	63.0	60.5	54.0	59.5	61.5	59.8	
Ward	59.0	58.0	61.0	59.5	56.0	60.0	62.5	59.4	
Rolette	60.5	59.5	63.5	60.0	61.5	57.5	62.0	60.6	
Crosby	58.5	59.5	60.5	60.0	53.5	58.5	62.0	58.9	
Rugby	59.0	59.5	61.5	60.0	56.5	60.0	61.0	59.6	
Botno	60.0	59.0	60.5	59.5	60.5	62.5	62.5	60.6	

Table 29. Oat variety trial, 1974-Dickinson.

	Yields in bushels per acre								
Variety	Rep 1	Rep 2	Rep 3	Rep 4	Avg.		Test Weight	Heading date	Height inches
Burnett	45.3	49.5	49.5	61.8	51.5		34.5	7-1	32
Kota	47.4	59.8	35.0	57.7	50.0		31.5	7-1	35
Otter	45.3	53.6	41.2	61.8	50.5		35.0	6-30	31
Chief	41.2	49.5	33.0	51.5	43.8		35.5	6-28	33
Garry	59.8	61.8	59.8	76.3	64.4		35.5	7-4	37
Grundy	41.2	47.4	30.9	49.5	42.3		30.5	6-28	32
Lodi	59.8	63.9	43.3	53.6	55.2		35.0	7-6	39
Cayuse	74.2	74.2	63.9	76.3	72.2		35.0	7-5	30
Kelsey	57.7	68.0	43.3	76.3	61.3		34.5	7-4	35
Sioux	53.6	66.0	41.2	74.2	58.8		37.5	7-4	34
Froker	49.5	55.6	45.3	43.3	48.4		35.0	7-4	34
Random	43.3	55.6	37.1	57.7	48.4		35.0	7-5	32
Dal	47.4	53.6	47.4	59.8	52.1		38.5	7-7	32
Mariner	51.5	55.6	51.5	61.8	55.1		41.5	7-4	35
Nodaway 70	45.3	55.6	43.3	59.8	51.0		42.5	6-27	33
Astro	51.5	57.7	39.1	49.5	49.5		31.0	7-8	25
Goodland	37.1	41.2	37.1	45.3	40.2		40.0	7-1	29
Hudson	47.4	51.5	37.1	51.5	46.9		34.0	7-6	29

Table 29. Oat wheat variety trial, 1974-Dickinson continued.

Variety	Yields in bushels per acre						Test Weight	Heading date	Height inches
	Rep 1	Rep 2	Rep 3	Rep 4	Avg.				

Standard error of a treatment mean = 2.5110

Least significant difference @ 5% = 7.1022

The c.v. = 9.60 P.C.

Table 30. Long term yield comparison of oat varieties 1974-Dickinson.

Variety	Yields in bushels per acre						Avg. 1969-1974
	1969	1970	1971	1972	1973	1974	
Burnett	107	43	46	40	67	52	59
Kelsey	115	54	58	47	89	61	71
Sioux	110	57	73	41	85	59	71
Garry	107	[1/]	[1/]	47	87	64	-
Lodi	112	46	49	43	87	55	65
Kota	104	51	60	38	72	50	63
Otter	110	47	59	52	80	51	67
Cayuse	113	56	53	57	90	72	74
Froker			40	30	82	48	
Chief				36	72	44	
Random				49	85	48	
Mariner					82	55	
Astro					67	50	
Grundy						42	
Dal						52	
Nodaway 70						51	
Goodland						40	

[1/] Not included in 1970-71 trials.

Table 30. Long term yield comparison of oat varieties 1974-Dickinson–continued.

Variety	Yields in bushels per acre 1969	1970	1971	1972	1973	1974		Avg. 1969-1974	
Hudson						47			
L.s.d. @ 5%	9.1	3.7	6.2	9.5	8.2	7.1			

Table 31. Off Station oat variety trial 1974-Beach.

Variety or treatment	Yields in bushels per acre					Test Weight
	Rep 1	Rep 2	Rep 3	Rep 4	Avg.	
Kelsey	78.3	78.3	63.9	84.5	76.3	34.0
Otter	90.7	82.5	86.6	82.5	85.6	37.0
Chief	76.3	74.2	68.0	68.0	71.6	37.5
Cayuse	72.1	80.4	84.5	88.6	81.4	28.5
Random	43.3	55.6	51.5	59.8	52.6	31.0
Mariner	53.6	61.8	61.8	68.0	61.3	38.5
Kota	88.6	86.6	86.6	86.6	87.1	38.5

Standard error of a treatment mean = 2.9229

Least significant difference @ 5% = 8.6847

The c.v. = 7.93 P.C.

Table 32. Off Station oat variety trial 1974-Bowman.

Variety or treatment	Yields in bushels per acre					Test Weight
	Rep 1	Rep 2	Rep 3	Rep 4	Avg.	
Kelsey	66.0	64.9	58.8	66.0	63.9	35.5
Otter	52.5	45.3	47.4	67.0	53.1	35.0
Chief	51.5	53.6	45.3	37.1	46.9	36.0
Cayuse	63.9	99.0	103.1	76.3	85.6	31.0
Random	53.6	74.2	66.0	45.4	59.8	32.0
Mariner	72.1	68.0	76.3	51.5	67.0	36.0
Kota	49.5	46.4	55.6	55.6	51.8	33.0

Standard error of a treatment mean = 5.4046

Least significant difference @ 5% = 16.0586

The c.v. = 17.68 P.C.

Table 33. Off Station oat variety trial 1974-Glen Ullin.

Variety or treatment	Yields in bushels per acre					Test Weight
	Rep 1	Rep 2	Rep 3	Rep 4	Avg.	
Kelsey	20.6	26.8	24.7	26.8	24.7	36.0
Otter	24.7	24.7	30.9	30.9	27.8	35.5
Chief	16.5	22.6	18.5	24.7	20.6	34.5
Cayuse	41.2	35.0	33.0	49.5	39.7	31.0
Random	16.5	26.8	20.6	37.1	25.3	30.5
Mariner	18.5	33.0	22.6	41.2	28.8	37.5
Kota	12.3	22.6	20.6	28.8	21.1	34.0

Standard error of a treatment mean = 2.2029

Least significant difference @ 5% = 6.5453

The c.v. = 16.41 P.C.

Table 34. Off Station oat variety trial 1974-Hettinger.

Variety or treatment	Yields in bushels per acre					Test Weight
	Rep 1	Rep 2	Rep 3	Rep 4	Avg.	
Kelsey	24.7	28.8	24.7	26.3	26.1	37.0
Otter	22.6	29.9	31.9	31.9	29.1	36.5
Chief	18.5	30.9	33.0	26.8	27.3	37.0
Cayuse	30.9	42.2	39.1	34.0	36.6	34.0
Random	20.6	28.8	27.8	24.7	25.5	32.5
Mariner	14.4	30.9	23.7	22.6	22.9	34.5
Kota	24.7	28.8	28.8	34.0	29.1	34.0

Standard error of a treatment mean = 1.4726

Least significant difference @ 5% = 4.3754

The c.v. = 10.49 P.C.

Table 35. Off Station oat variety trial 1974-Killdeer.

Variety or treatment	Yields in bushels per acre					Test Weight
	Rep 1	Rep 2	Rep 3	Rep 4	Avg.	
Kelsey	63.9	63.9	38.1	59.8	56.4	39.0
Otter	54.6	39.1	42.2	55.6	47.9	37.5
Chief	49.5	40.2	47.4	43.3	45.1	38.5
Cayuse	58.7	68.0	61.8	67.0	63.9	34.5
Random	45.3	41.2	53.6	63.9	51.0	36.5
Mariner	45.3	53.6	53.6	55.6	52.0	40.5
Kota	43.3	67.0	33.0	49.5	48.2	34.5

Standard error of a treatment mean =4.4750

Least significant difference @ 5% = 13.2965

The c.v. = 17.19 P.C.

Table 36. Off Station oat variety trial 1974-Mandan.

Variety or treatment	Yields in bushels per acre					Test Weight
	Rep 1	Rep 2	Rep 3	Rep 4	Avg.	
Kelsey	52.5	50.5	55.6	63.9	55.6	37.5
Otter	45.3	56.7	51.5	53.6	51.8	38.0
Chief	36.0	35.0	40.2	44.3	38.9	38.0
Cayuse	52.5	61.8	66.0	71.1	62.9	35.5
Random	45.3	46.4	54.6	51.5	49.5	35.0
Mariner	41.2	43.3	45.3	45.3	43.8	36.5
Kota	17.1	37.1	34.0	43.3	32.9	41.5

Standard error of a treatment mean =1.7668

Least significant difference @ 5% = 5.2496

The c.v. = 7.27 P.C.

Table 37. Oat variety trials-Dickinson and off-station sites 1974.

	Yields in bushels per acre								
Variety	Dickinson	Beach	Bowman	Glen Ullin	Hettinger	Killdeer	Mandan	1974 Avg. 7-Station	
Kelsey	61	76	64	25	26	56	56	52	
Otter	51	86	53	28	29	48	52	50	
Chief	44	72	47	21	27	45	39	42	
Cayuse	72	81	86	40	37	64	63	63	
Random	48	53	60	25	26	51	50	45	
Mariner	55	61	67	29	23	52	44	47	
Kota	50	87	52	21	29	48	38	46	
L.s.d. @ 5%	7.1	8.7	16.1	6.5	4.4	13.3	5.3	3.7	

Table 38. Oat variety trials-Dickinson and off-station sites 1974.

	Test weight in pounds per bushel								
Variety	Dickinson	Beach	Bowman	Glen Ullin	Hettinger	Killdeer	Mandan	1974 Avg. 7-Station	
Kelsey	34.5	34.0	35.5	36.0	37.0	39.0	37.5	36.2	
Otter	35.0	37.0	35.0	35.5	36.5	37.5	38.0	36.4	
Chief	35.5	37.5	36.0	34.5	37.0	38.5	38.0	36.7	
Cayuse	35.0	28.5	31.0	31.0	34.0	34.5	35.5	32.8	
Random	35.0	31.0	32.0	30.5	32.5	36.5	35.0	33.2	
Mariner	41.5	38.5	36.0	37.5	34.5	40.5	36.5	37.9	
Kota	31.5	38.5	33.0	34.0	34.0	34.5	41.5	35.3	

Table 39. Barley variety trial, 1974-Dickinson.

	Yields in bushels per acre							
Variety	Rep 1	Rep 2	Rep 3	Rep 4	Avg.	Test Weight	Heading date	Height inches
Larker	33.0	27.5	26.1	30.6	29.3	48.5	6-30	26
Dickson	34.3	44.0	28.8	36.4	35.9	50.0	7-2	25
Beacon	42.6	44.0	37.1	37.1	40.2	48.0	6-29	23
Conquest	41.2	48.1	46.7	39.8	44.0	47.0	6-30	25
Bonanza	49.5	42.6	42.6	38.5	43.3	46.5	6-30	26
Nordic	39.8	37.8	38.5	38.5	38.7	47.0	7-1	25
Cree	37.1	39.8	30.2	37.1	36.1	48.5	6-30	23
Burk	44.0	42.6	42.6	33.6	40.7	51.0	6-29	22
Prilar	42.6	46.7	39.8	30.2	39.8	48.5	6-29	22
Vanguard	42.6	53.6	48.8	48.1	48.3	50.0	7-1	25
Shabet	43.3	48.1	37.8	48.1	44.3	50.5	7-3	26
Hector	52.2	62.5	52.2	55.0	55.5	49.0	7-2	24
Manker	46.7	52.9	37.1	38.5	43.8	49.0	6-30	22
Steptoe	47.4	48.1	45.3	48.1	47.2	42.5	6-30	20
Klages	36.4	27.5	48.8	38.5	37.8	49.0	7-8	24
B 141	38.5	39.8	38.5	44.0	40.2	46.5	6-30	22
ND 231	50.1	34.3	34.3	31.6	37.6	49.0	6-30	24
ND 718	44.0	38.5	45.3	37.1	41.2	47.5	6-29	21

Table 39. Barley variety trial, 1974-Dickinson continued.

Variety	Yields in bushels per acre Rep 1	Rep 2	Rep 3	Rep 4	Avg.		Test Weight	Heading date	Height inches
ND 759	44.0	44.0	24.7	33.0	36.4		45.0	6-30	21
Firlbecks III	46.0	53.6	55.0	52.9	51.9		49.0	7-3	26
Hulless	37.1	36.4	34.3	32.3	35.0		60.0	6-29	23

Standard error of a treatment mean = 2.5271

Least significant difference @ 5% = 7.1478

The c.v. = 12.21 P.C.

Table 40. Long term yield comparison of barley varieties 1974-Dickinson.

Variety	Yields in bushels per acre 1971	1972	1973	1974	Avg. 1961-1974
Dickson	31	57	64	36	47
Conquest	35	45	67	44	48
Bonanza	39	59	67	43	52
Nordic	33	59	67	39	50
Burk	40	54	69	41	51
Vanguard	41	63	75	48	57
Shabet	38	62	73	44	54
Cree	36	53	67	36	48
Beacon (B 140)	33	46	63	40	46
B 141		50	66	40	
Prilar		57	66	40	
ND 231		47	66	38	
ND 718		48	65	41	
Firlbecks III			76	52	
Steptoe			55	47	
ND 759			72	37	
Larker				31	
Hector				56	

Table 40. Long term yield comparison of barley varieties 1974-Dickinson continued.

Variety	Yields in bushels per acre 1971	1972	1973	1974		Avg. 1961-1974			
Manker				44					
Klagews				3358					
Hulless									
L.s.d. @ 5%	4.6	9.6	3.1	7.1					

Table 41. Off Station barley variety trial 1974-Beach.

Variety or treatment	Yields in bushels per acre					Test Weight
	Rep 1	Rep 2	Rep 3	Rep 4	Avg.	
Vanguard	43.6	50.8	59.1	76.3	57.5	44.5
Firlbecks III	34.3	50.8	71.5	68.7	56.3	44.0
Shabet	34.3	48.1	59.1	60.5	50.5	45.0
Steptoe	50.8	55.6	56.3	93.5	64.1	43.0
Dickson	45.3	52.2	41.2	57.7	49.1	45.0
Beacon	50.8	55.6	42.6	63.2	53.1	46.0
Cree	52.2	46.7	64.6	68.7	58.1	48.0
Nordic	45.3	52.2	50.8	64.6	53.2	45.5
Hulless	31.6	39.8	50.8	49.5	42.9	55.5

Standard error of a treatment mean = 4.0039

Least significant difference @ 5% = 11.6871

The c.v. = 14.87 P.C.

Table 42. Off Station barley variety trial 1974-Bowman.

Variety or treatment	Yields in bushels per acre					Test Weight
	Rep 1	Rep 2	Rep 3	Rep 4	Avg.	
Vanguard	45.3	60.5	59.1	66.0	57.7	48.5
Firlbecks III	57.7	71.5	79.7	70.1	69.8	46.0
Shabet	52.2	67.3	74.2	61.8	63.9	47.0
Steptoe	52.2	72.8	77.0	75.6	69.4	44.5
Dickson	27.5	60.5	63.2	57.7	52.2	46.5
Beacon	34.3	52.2	57.7	52.2	49.1	43.5
Cree	35.5	53.8	44.0	52.2	46.4	44.5
Nordic	35.7	66.0	61.8	55.0	54.6	45.0
Hulless	46.7	48.1	49.5	46.7	47.8	58.0

Standard error of a treatment mean = 2.7533

Least significant difference @ 5% = 8.0367

The c.v. = 9.70 P.C.

Table 43. Off Station barley variety trial 1974-Glen Ullin.

Variety or treatment	Yields in bushels per acre					Test Weight
	Rep 1	Rep 2	Rep 3	Rep 4	Avg.	
Vanguard	34.3	23.3	23.3	34.3	28.8	48.5
Firlbecks III	22.0	23.3	19.2	31.6	24.0	46.0
Shabet	24.7	26.1	24.7	33.0	27.1	45.0
Steptoe	27.5	38.5	27.5	48.1	35.4	44.0
Dickson	23.3	20.6	28.8	31.6	26.1	47.0
Beacon	15.1	30.2	26.1	27.5	24.7	45.5
Cree	16.5	28.8	20.6	35.7	25.4	47.5
Nordic	19.2	23.3	27.5	31.6	25.4	45.5
Hulless	16.5	22.0	12.3	26.1	19.2	56.0

Standard error of a treatment mean = 2.2792

Least significant difference @ 5% = 6.6529

The c.v. = 17.37 P.C.

Table 44. Off Station barley variety trial 1974-Hettinger.

Variety or treatment	Yields in bushels per acre					Test Weight
	Rep 1	Rep 2	Rep 3	Rep 4	Avg.	
Vanguard	13.7	15.1	16.5	15.1	15.1	48.5
Firlbecks III	17.8	20.6	20.6	20.6	19.9	47.0
Shabet	17.1	17.8	20.6	18.5	18.5	46.5
Steptoe	17.9	24.0	21.3	19.9	20.8	45.5
Dickson	12.3	8.2	8.2	6.8	8.9	45.0
Beacon	15.8	19.2	17.2	13.0	16.3	43.0
Cree	10.3	11.0	9.6	11.0	10.5	42.5
Nordic	6.8	9.6	11.0	6.8	8.6	41.0
Hulless	15.1	19.2	17.1	17.8	17.3	58.0

Standard error of a treatment mean = 0.8559

Least significant difference @ 5% = 2.4984

The c.v. = 11.35 P.C.

Table 45. Off Station barley variety trial 1974-Killdeer.

Variety or treatment	Yields in bushels per acre					Test Weight
	Rep 1	Rep 2	Rep 3	Rep 4	Avg.	
Vanguard	35.0	35.0	42.6	46.7	39.8	50.5
Firlbecks III	37.1	41.2	50.8	48.8	44.5	50.5
Shabet	34.3	29.5	46.7	44.0	38.6	49.0
Steptoe	35.7	45.3	42.6	52.9	44.1	46.5
Dickson	29.5	40.5	35.7	45.3	37.8	50.5
Beacon	25.4	34.3	37.1	45.3	35.5	48.5
Cree	31.6	31.6	40.5	45.3	37.3	48.0
Nordic	27.5	34.3	37.8	42.6	35.6	45.5
Hulless	22.0	27.5	33.0	38.5	30.3	55.5

Standard error of a treatment mean = 1.5808

Least significant difference @ 5% = 4.6143

The c.v. = 8.29 P.C.

Table 46. Off Station barley variety trial 1974-Mandan.

Variety or treatment	Yields in bushels per acre					Test Weight
	Rep 1	Rep 2	Rep 3	Rep 4	Avg.	
Vanguard	37.1	30.2	32.5	38.5	34.6	51.0
Firlbecks III	28.1	30.2	33.6	38.5	32.6	50.5
Shabet	30.9	33.0	37.8	40.5	35.6	49.0
Steptoe	27.5	35.7	33.6	46.0	35.7	49.0
Dickson	27.5	26.8	29.5	35.7	29.9	49.5
Beacon	22.6	24.7	28.8	34.3	27.6	45.5
Cree	22.6	30.2	26.1	36.4	28.8	45.0
Nordic	28.1	30.2	31.6	34.3	31.1	48.5
Hulless	23.3	24.0	23.3	26.8	24.4	60.5

Standard error of a treatment mean = 1.3506

Least significant difference @ 5% = 3.9422

The c.v. = 8.68 P.C.

Table 47. Barley variety trials-Dickinson and off-station sites 1974.

	Yields in bushels per acre								
Variety	Dickinson	Beach	Bowman	Glen Ullin	Hettinger	Killdeer	Mandan	1974 Avg. 7-Station	
Vanguard	48	58	58	29	15	40	35	40	
Firlbecks III	52	56	70	24	20	45	33	43	
Shabet	44	51	64	27	19	39	36	40	
Steptoe	47	64	69	35	21	44	36	45	
Dickson	36	49	52	26	9	38	30	34	
Beacon	40	53	49	25	16	36	28	35	
Cree	36	58	46	25	11	37	29	35	
Nordic	39	53	55	25	9	36	35	36	
Hulless	35	43	48	19	17	30	31	32	
L.s.d. @5%	7.2	11.7	8.0	6.7	2.5	4.6	3.9	2.6	

Table 48. Barley variety trials-Dickinson and off-station sites 1974.

	Test weight in pounds per bushel								
Variety	Dickinson	Beach	Bowman	Glen Ullin	Hettinger	Killdeer	Mandan	1974 Avg. 7-Station	
Vanguard	50.0	44.5	48.5	48.5	48.5	50.5	51.0	48.8	
Firlbecks III	49.0	44.0	46.0	46.0	47.0	50.5	50.5	47.6	
Shabet	50.5	45.0	47.0	45.0	46.5	49.0	49.0	47.4	
Steptoe	42.5	43.0	44.5	44.0	45.5	46.5	49.0	45.0	
Dickson	50.0	45.0	46.5	47.0	45.0	50.5	49.5	47.6	
Beacon	48.0	46.0	43.5	45.5	43.0	48.5	45.5	45.7	
Cree	48.5	48.0	44.5	47.5	42.5	48.0	45.0	46.3	
Nordic	47.0	45.5	45.0	45.5	41.0	45.5	48.5	45.4	
Hulless	60.0	55.5	58.0	56.0	58.0	55.5	60.5	57.6	

Table 49. Winter rye variety trial, 1974-Dickinson.

Variety	Yields in bushels per acre						Test Weight	
	Rep 1	Rep 2	Rep 3		Avg.			
Cougar	41.9	48.6	48.2		46.2		56.5	
Rymin	37.7	52.4	45.7		45.3		58.0	
Puma	37.7	38.5	34.8		37.0		58.0	
Frontier	37.7	46.9	45.3		43.3		60.5	

Results of 1973
Uniform feed grain trial grown at Dickinson,
Carrington, Fargo, Langdon, Minot, and
Williston Experiment Stations.

The objectives of this trial were to obtain: (1) reliable information about yield potential across North Dakota of triticale varieties obtainable by the producer in comparison to other established cereal crops: (2) other agronomic data.

1973 Results

The yields obtained from each seeding date at each location are presented in table 50. Langdon station data were not obtained due to severe hail damage. Fargo anf Minot had good to excellent environmental conditions while Carrington and Williston were below average. Among the triticale, in 1973, the 200 numbered varieties again were superior to the 400 numbered varieties. Nordic barley, Kelsey oats, and Era wheat out-yielded the triticale as in 1972 by about 20% at first seeding data and by 60% at the late seeding data. Barley and oats would be the choice for maximum production of carbohydrates per acre.

The two year averages, over both dates of seeding are presented in table 51. Barley out-yielded the best Tritticale (Fargo 205) by 29%, oats out-yielded Fasgro 205 by 22%, and Era wheat out-yielded Fasgro 205 by 11% overall dates and locations. When grown in higher yielding environments, Fargo, Langdon, and Minot, barley and oats out-yielded the best triticale, Fasgro 204 or 205, by 28%, while in poorer yielding environments, Williston, Dickinson, and Carrington by only 10%.

Two year averages of early and late seeding dates at each location are presented in table 52. Late seeding reduced the average yield of triticale from 27% to 38%, oats by 4%, bsrley by 10%, durum by 19% and Era wheat by 28%. Triticale yielded relatively better in early seeding compared to barley (20% less) than late seeding (40% less). This large decrease in relative yield performance of the triticale could be a function of their late maturity since Era wheat (late maturing) yielded 9% less than barley planted early and 26% less planted late.

Test weight, plant height, and maturity are presented in table 53, 54, and 55. Barley averaged 6 to 8 days earlier in heading, oats 5 to 7 days earlier, and Era wheat only 1 to 3 days earlier.

Lodging was not a problem in 1973. Only Fargo, late seeding date had a measurable amount of ergot in 1973, and then only in the triticale. The numbered triticale contained less ergot than the Rosner Triticale variety.

Table 50. Uniform feed grain trial for grain yield (lb/A), 1973. Early (I) and late (II) seeding dates were used at each location. Langdon was hailed.

	Grain Yield (lb/A)								
	Fargo Planting Date			Williston Planting Date			Dickinson Planting Date		
Variety	I	II	Mean	I	II	Mean	I	II	Mean
Fasgro 203	3416	1064	2240	1485	1179	1332	1892	814	1353
Fasgro 204	3709	750	2229	1654	1284	1469	2024	749	1387
Fasgro205	3584	1398	2491	1577	1178	1377	2024	704	1364
Fasgro 418	3763	783	2273	1586	1165	1375	1847	704	1276
Fasgro 419	3490	988	2239	1435	1209	1322	1847	835	1341
209	3394	1015	2204	1783	1349	1566	1957	749	1353
Kelsey Oats	4054	3486	3770	2262	1541	1902	2090	1056	1573
Nordic Barley	4814	2748	3781	2003	1303	1653	2331	1608	1970
Rolette Durum	3631	1024	2327	1477	1153	1315	1758	858	1308
Era Wheat	4048	674	2361	1755	1492	1624	2420	1518	1969
Vanguard Barley				2520	1756	2138			
Rosner Triticale	2978	512	1745	1438	980	1209	1717	792	1254
LSD .05	425	312	733	182	260	253	310	256	320

Table 50. Uniform feed grain trial for grain yield (lb/A), 1973. Early (I) and late (II) seeding dates were used at each location. Langdon was hailed continued.

	Grain Yield (lb/A)								
	Minot Planting Date			Carrington Planting Date			Average Planting Date		
Variety	I	II	Mean	I	II	Mean	I	II	Mean
Fasgro 203	3071	2053	2562	1880	1715	1798	2349	1365	1857
Fasgro 204	3280	2053	2667	1775	1704	1740	2488	1308	1898
Fasgro 205	3189	1885	2537	1946	1761	1853	2464	1385	1925
Fasgro 418	3389	1520	2213	1524	1547	1686	2422	1144	1783
Fasgro 419	3053	1372	2454	1825	11394	1459	2330	1160	1745
209	2972	1940	2456	1812	1681	1746	2384	1347	1866
Kelsey Oats	3794	3446	3620	1997	1958	1977	2839	2297	2595
Nordic Barley	4107	3830	3969	1932	1983	1957	3037	2294	2666
Rolette Durum	2930	2467	2699	1685	1729	1707	2296	1446	1871
Era Wheat	3707	2537	3122	1838	1788	1813	2754	1602	2178
Vanguard Barley									
Rosner Triticale	2964	1451	2208	1524	1394	1482	2124	1026	1575
LSD .05	211	264	836	236	260	157			

Table 51. Uniform feed grain trial for grain yield (lb/A) for 1972 and 1973. Average are computed over both early and late seeding dates to provide and overall average per location.

	Grain Yield (lb/A)						
	Location						
Variety	Fargo	Williston	Dickinson	Minot	Carrington [1/]	Langdon [2/]	Average
Fasgro 203	2519	1613	1377	2311	1939	2310	2012
Fasgro 204	2540	1648	1310	2407	1931	2381	2036
Fasgro 205	2623	1495	1517	2394	2102	2187	2053
Fasgro 418	2318	1565	1326	2212	1948	2357	1954
Fasgro 419	2246	1488	1387	2069	1621	2324	1856
209	2326	1605	1342	2235	1863	2378	1958
Kelsey Oats	3721	2018	1447	2915	1993	1883	2330
Nordic Barley	3745	1741	1663	3538	2554	2689	2655
Rolette Durum	2756	1537	1284	2418	1826	1711	1922
Era Wheat	2640	1876	1641	2900	2007	2621	2281
Location mean	2743	1659	1429	2539	1978	2284	2105

1/ 1972 early seeding date hailed.

2/ 1973 Langdon data not obtained due to hail.

LSD .05 = approximately 300 lb/A for average of six locations.

Table 52. Uniform feed grain trial for grain yield (lb/A) for 1972 and 1973. Averages are computed for early and late seeding dates.

	Grain Yield (lb/A)							
	Fargo Planting Date		Williston Planting Date		Dickinson Planting Date		Average Planting Date	
Variety	I	II	I	II	I	II	I	II
Fasgro 203	3456	1581	1718	1507	1590	1164	2255	1417
Fasgro 204	3505	1574	1727	1569	1550	1069	2261	1404
Fasgro205	3518	1728	1657	1334	1818	1215	2331	1426
Fasgro 418	3278	1358	1696	1435	1580	1071	2185	1288
Fasgro 419	3004	1488	1561	1415	1568	1137	2044	1347
209	3120	1532	1756	1453	1579	1106	2152	1364
Kelsey Oats	3843	3598	2262	1773	1645	1248	2583	2206
Nordic Barley	4275	3216	2078	1405	1880	1446	2744	2022
Rolette Durum	3621	1891	1760	1315	1427	1142	2269	1449
Era Wheat	3755	1525	2050	1701	1893	1389	2566	1538

Table 52. Uniform feed grain trial for grain yield (lb/A) for 1972 and 1973. Averages are computed for early and late seeding dates continued.

	Grain Yield (lb/A)							
	Langdon 1/ Planting Date		Minot Planting Date		Carrington 2/ Planting Date		Average Planting Date	
Variety	I	II	I	II	I	II	I	II
Fasgro 203	2078	2541	2702	1920	1880	1902	2220	2121
Fasgro 204	2223	2539	2899	1865	1775	1913	2299	2106
Fasgro205	1946	2428	2852	1936	1946	2056	2248	2140
Fasgro 418	2309	2405	2971	1693	1524	1673	2268	1924
Fasgro 419	2269	2378	2498	1399	1825	1588	2197	1788
209	2178	2577	2566	1903	1812	1830	2185	2103
Kelsey Oats	1384	2382	3145	2684	1997	1983	2175	2350
Nordic Barley	2468	2909	3693	3382	1932	2567	2698	2953
Rolette Durum	1311	2110	2675	2161	1685	1837	1890	2036
Era Wheat	2223	3018	3359	2196	1838	1994	2473	2403

1/ No data in 1973 due to hail, 1972 data only.

2/ No data in 1972, first seeding date due to hail.

LSD .05 = approximately 276 lb/A date I average.

LSD .05 = approximately 390 lb/A date II average.

Table 53. Uniform feed grain trial for test weight (lb/bu), 1973. Early (I) and late (II) seeding dates were used at each location. Langdon was hailed.

	Test Weight (lb/bu)								
	Location								
	Fargo Planting Date			Williston Planting Date			Dickinson Planting Date		
Variety	I	II	Mean	I	II	Mean	I	II	Mean
Fasgro 203	48.3	37.3	42.8	47.0	49.4	48.2	52.0	50.5	51.3
Fasgro 204	48.7	36.2	42.5	47.5	49.4	48.5	52.0	49.5	50.8
Fasgro205	49.7	41.2	45.5	48.0	50.0	49.0	51.0	50.0	50.5
Fasgro 418	47.7	36.2	42.0	46.5	48.8	47.7	50.0	48.0	49.0
Fasgro 419	46.3	36.5	41.4	45.5	48.2	46.9	49.0	49.0	49.0
209	48.0	38.2	43.1	47.5	49.8	48.7	51.0	48.0	49.5
Kelsey Oats	32.0	34.2	33.1	32.0	35.6	33.8	41.0	29.0	35.0
Nordic Barley	47.7	41.8	44.8	46.0	43.8	44.9	44.0	44.0	44.0
Rolette Durum	62.0	57.0	59.5	60.0	61.1	60.6	62.5	61.0	61.8
Era Wheat	60.7	47.3	54.0	57.5	59.9	58.7	60.5	62.0	61.3
Vanguard Barley			0.0	50.1	48.0	49.1			
Rosner Triticale	46.7	32.3	39.5	47.0	48.0	47.5	53.0	51.0	52.0
LSD .05	1.4	2.3							

Table 53. Uniform feed grain trial for test weight (lb/bu), 1973. Early (I) and late (II) seeding dates were used at each location. Langdon was hailed continued.

	Test Weight (lb/bu)					
	Location					
	Minot Planting Date			Carrington Planting Date		
Variety	I	II	Mean	I	II	Mean
Fasgro 203	50.2	48.5	49.4	46.3	48.3	47.3
Fasgro 204	50.2	45.5	47.9	45.7	48.0	46.9
Fasgro205	50.5	47.2	48.9	46.8	48.2	47.5
Fasgro 418	49.0	43.0	46.0	46.0	46.7	46.4
Fasgro 419	48.3	43.5	45.9	45.0	45.7	45.4
209	49.7	45.7	47.7	46.0	47.5	46.8
Kelsey Oats	36.5	38.7	37.6	36.0	36.2	36.1
Nordic Barley	50.5	48.0	49.3	38.8	41.0	39.9
Rolette Durum	63.7	63.0	63.4	59.3	60.2	59.8
Era Wheat	61.0	63.0	62.0	57.3	57.2	57.3
Vanguard Barley			0.0			0.0
Rosner Triticale	48.2	44.3	46.3	45.0	47.3	46.2
LSD .05	1.2	0.9	1.1	1.0	1.1	1.1

Table 54. Uniform feed grain trial for plant height (cm), 1973. Early (I) and late (II) seeding dates were used at each location. Langdon was hailed.

	Plant Height (cm)								
	Location								
	Fargo Planting Date			Williston Planting Date			Dickinson Planting Date		
Variety	I	II	Mean	I	II	Mean	I	II	Mean
Fasgro 203	114	94	104	88	69	79	85		
Fasgro 204	118	84	101	94	75	85	90		
Fasgro205	112	97	105	92	72	82	90		
Fasgro 418	107	88	98	88	69	79	85		
Fasgro 419	110	96	103	93	73	83	90		
209	117	97	107	101	79	90	96		
Kelsey Oats	99	84	92	82	74	78	78		
Nordic Barley	96	76	86	76	65	71	69		
Rolette Durum	95	83	89	77	62	70	71		
Era Wheat	80	64	72	66	52	59	59		
Vanguard Barley				71	59	65			
Rosner Triticale	92	75	84	82	65	74	78		
LSD .05	6	4	5	4	5				

Table 54. Uniform feed grain trial for plant height (cm), 1973. Early (I) and late (II) seeding dates were used at each location. Langdon was hailed continued.

	Plant Height (cm)					
	Location					
	Minot Planting Date			Carrington Planting Date		
Variety	I	II	Mean	I	II	Mean
Fasgro 203	113	119	116	91	89	90
Fasgro 204	115	117	116	89	91	90
Fasgro205	115	114	115	102	89	96
Fasgro 418	105	118	112	89	81	85
Fasgro 419	118	120	119	94	79	87
209	112	120	116	102	91	97
Kelsey Oats	95	90	93	76	76	76
Nordic Barley	85	82	84	76	76	76
Rolette Durum	87	84	86	66	76	71
Era Wheat	74	70	72	61	61	61
Vanguard Barley			0			0
Rosner Triticale	92	106	99	76	79	78
LSD .05	9		5			0

Table 55. Uniform feed grain trial for date head (days from June 1), 1973. Early (I) and late seeding dates were used at ach location. Langdon was hailed.

	Heading date (days from June 1)								
	Location								
	Fargo Planting Date			Williston Planting Date			Dickinson Planting Date		
Variety	I	II	Mean	I	II	Mean	I	II	Mean
Fasgro 203	26	52	39	30	41	36	36		
Fasgro 204	26	51	39	27	38	33	31		
Fasgro205	25	51	38	28	39	34	33		
Fasgro 418	27	51	39	29	40	35	35		
Fasgro 419	27	51	39	30	41	36	36		
209	24	51	38	28	39	34	33		
Kelsey Oats	19	40	30	24	34	29	30		
Nordic Barley	18	41	30	23	34	29	28		
Rolette Durum	18	42	30	25	36	31	28		
Era Wheat	24	49	37	26	37	32	33		
Rosner Triticale	23	48	36	25	39	32	30		
LSD .05	1	2	2	1	1				

Table 55. Uniform feed grain trial for date head (days from June 1), 1973. Early (I) and late seeding dates were used at each location. Langdon was hailed continued.

	Heading Date (days form June 1)					
	Location					
	Minot Planting Date			Carrington Planting Date		
Variety	I	II	Mean	I	II	Mean
Fasgro 203	33	53	43			
Fasgro 204	33	53	43			
Fasgro205	32	52	42			
Fasgro 418	34	56	45			
Fasgro 419	34	53	44			
209	32	52	42			
Kelsey Oats	26	45	36			
Nordic Barley	26	43	35			
Rolette Durum	25	45	35			
Era Wheat	28	49	39			
Rosner Triticale	30	56	43			
LSD .05	1	1	1			

NURSERY TRIALS WITH SMALL GRAIN

The cooperative nursery trials grown at Dickinson in 1974, and the leaders responsible for each trials are:

Uniform Regional Hard Red Spring Wheat Nursery; Dr. R.E. Heiner, ARS-USDA, Institute of Agriculture, St. Paul, Minnesota.

Uniform Reginal Durum Nursery; Dr. J.S. Quick, Agronomy Department, North Dakota State University, Fargo, North Dakota.

Uniform Early Oat Nursery, and Uniform Midseason Oat Nursery; Dr. L.W. Briggle, ARS-USDA, Institute of Agriculture, St. Paul, Minnesota.

Great Plains Barley Nursery; Dr. P.B. Price, ARS-USDA, Agronomy Department, South Dakota State University, Brookings, South Dakota.

Westerm Sprin Barley and Western Dryland Spring Barley; Dr. E.A. Hockett, ARS-USDA, Plant and Soil Science Department, Montana State University, Bozeman, Montana.

Uniform Regional Flax Nursery; Dr. T.E. Thompson, AgronomyDepartment, North Dakota State University, Fargo, North Dakota.

In addition to the cooperative trials, on F-4 bulk selection nursery was grown for Dr. Robert Busch, Agronomy Department, North Dakota State University, Fargo, North Dakota.

Data deom the 1974 nursery trials are summarized in tables 56 though 62.

Table 56. Uniform regional hard spring wheat nursery, 1974-Dickinson.

	Yields in bushels per acre							
Variety	Rep 1	Rep 2	Rep 3	Avg.		Test Weight	Heading date	Height inches
Marquis	17.6	25.4	28.4	23.8		57.5	7-3	36
Justin	20.6	34.6	33.1	29.4		61.0	7-2	36
Selkirk	21.3	25.8	20.2	22.4		56.5	7-1	34
Chris	28.2	26.4	32.6	29.1		61.5	7-2	37
Waldron	30.8	30.9	20.6	27.4		59.0	7-2	33
ND 510	35.6	25.5	25.3	28.8		59.5	7-1	34
ND 519	25.6	32.5	32.9	30.3		62.0	6-30	32
MT 711	24.9	31.8	24.4	27.0		61.5	7-4	35
ND 496-153	38.3	31.6	25.5	31.8		61.5	7-2	35
ND 496-158	39.4	31.2	27.7	32.8		62.0	6-30	34
ND 526	33.9	32.3	45.0	37.1		62.0	7-1	34
ND 427	28.8	25.2	30.5	28.2		61.5	7-2	35
MT 7031	24.5	37.5	31.5	31.2		60.0	7-3	28
MT 7156	25.7	29.1	27.0	27.3		61.0	7-3	27
WI 262T	29.6	21.8	34.6	28.7		59.0	6-27	28
Era	28.1	28.8	44.0	33.6		60.0	7-5	28
II-64-27	39.1	33.7	30.3	34.4		62.5	7-1	29
II-64-33	33.5	35.5	42.4	37.1		58.0	7-2	28

Table 56. Uniform regional hard spring wheat nursery, 1974-Dickinson continued.

Variety	Yields in bushels per acre					Test Weight	Heading date	Height inches
	Rep 1	Rep 2	Rep 3	Avg.				
ND 521	32.2	32.1	26.5	30.3		61.5	7-2	30
ND 522	32.8	33.5	40.6	35.6		58.5	7-3	33
ND 523	33.5	24.7	29.4	29.2		61.0	7-3	32
ND 528	43.3	32.6	43.9	39.9		58.0	7-3	35
ND 529	42.5	34.3	39.6	38.8		61.0	6-27	30

Standard error of a treatment mean = 3.1250

Least significant difference @ 5% = 8.8388

The c.v. = 17.41 P.C.

Table 57. Uniform regional durum nursery, 1974-Dickinson.

Variety	Yields in bushels per acre						Test Weight	Days to heading	Height cm
	Rep 1	Rep 2	Rep 3	Rep 4	Avg.				
Mindum	21.7	33.5	22.7	27.7	26.4		61.0	62	110
Wells	25.3	30.3	35.5	34.8	31.5		61.0	60	91
Leeds	28.8	28.7	39.7	42.1	34.8		60.5	60	88
Rolette	26.9	28.3	33.5	31.2	30.0		61.0	58	91
Ward	41.1	32.7	34.7	36.4	36.2		60.5	60	88
Wakooma	33.8	31.6	38.6	36.2	35.1		56.0	63	93
Crosby	25.4	33.7	34.9	32.2	31.6		59.0	59	91
Botno	25.7	31.7	29.9	28.7	29.0		62.5	58	88
Rugby	33.5	31.6	26.6	33.0	31.2		60.5	60	90
Macoun	33.6	36.0	31.1	32.8	33.4		60.0	61	93
D6962	31.7	33.3	34.2	33.0	33.1		62.0	60	67
D7057	34.9	26.9	37.7	39.1	34.7		60.0	61	66
D70101	24.1	33.2	26.3	37.1	30.2		62.5	60	92
D7025	34.9	37.3	36.3	32.7	35.3		60.0	61	74
D7047	31.2	36.9	35.9	28.5	33.1		62.5	61	66
D71110	34.3	30.4	33.5	36.4	33.7		60.0	58	88
D71117	32.4	29.7	31.5	32.2	31.5		61.5	59	92
D7150	37.1	31.7	36.2	28.3	33.3		63.5	60	93

Table 57. Uniform regional durum nursery, 1974-Dickinson continued.

Variety	Yields in bushels per acre Rep 1	Rep 2	Rep 3	Rep 4	Avg.	Test Weight	Heading date	Height inches
D 7171	37.1	36.6	41.8	43.7	39.8	59.5	61	66
D 7176	39.2	37.9	35.9	39.8	38.2	59.5	60	65
D 7111	36.2	37.8	36.7	34.5	36.3	61.0	60	90
DT 411	22.0	27.8	35.7	34.6	30.0	59.5	60	88
D 7131	35.3	27.2	31.4	37.1	32.8	58.0	62	89
D 7158	24.0	44.4	38.4	41.3	37.0	59.0	62	73
D 7169	30.5	32.9	35.3	38.3	34.3	56.5	62	64
D 7175	30.3	28.0	34.3	36.7	32.3	61.0	60	90

Least significant difference @ 5% = 5.6

The c.v. = 11.9%

Average yield = 33.2

Table 58. Uniform early oat nursery 1974-Dickinson.

Variety	Yields in bushels per acre Rep 1	Rep 2	Rep 3	Avg.		Test Weight	Heading date	Height inches	Straw wt. Tons
Mo-0-205	33.0	65.4	67.0	55.1		33.0	7-1	32	2.5
Mo-06072	43.4	38.1	33.2	38.2		37.0	7-1	30	1.9
Mo-05859	29.0	77.0	74.4	60.1		37.5	6-27	32	2.1
Mo-06057	62.4	77.0	67.0	68.8		33.0	6-28	26	2.4
Mo-06232	59.0	37.2	79.2	58.5		36.0	7-3	27	2.1
Mo-06066	68.4	41.0	79.2	62.9		36.5	7-3	34	2.6
Andrew	82.4	45.2	61.0	62.9		32.5	7-4	35	2.8
Multiline E74	71.4	31.0	87.0	63.1		35.0	6-28	34	2.4
Jaycee	38.2	74.4	82.4	65.0		34.0	7-1	34	2.3
III. 67-1514	30.2	88.0	39.0	52.4		35.0	7-1	35	2.4
III. 69-6059	62.2	60.2	39.0	53.8		34.0	7-2	31	2.2
III. 69-6305	44.2	59.2	47.0	50.1		34.5	7-3	35	2.8
III. 68-1639	73.0	53.0	39.0	55.0		33.5	7-1	38	2.6
III. 68-1643	33.0	43.4	37.0	37.8		34.5	7-2	33	2.3
III. 68-1469	34.2	42.0	36.0	37.4		35.0	7-1	32	2.1
Clintford	24.2	48.0	35.4	35.9		33.5	6-30	34	1.9

Table 59. Uniform great plains barley nursery 1974-Dickinson.

	Yields in bushels per acre							
Variety	Rep 1	Rep 2	Rep 3	Avg.		Test Weight	Heading date	Height inches
Firlbecks III	53.0	45.0	52.0	50.0		48.0	7-7	29
Primus II	39.1	55.1	54.0	49.4		52.0	6-30	28
Larker	50.0	44.0	43.0	45.7		50.0	7-4	28
Galt	44.0	49.0	46.0	46.3		46.0	7-5	28
Cree	53.2	53.0	49.0	51.7		47.5	7-4	28
Manker	64.2	48.0	49.0	53.7		48.0	7-3	30
Beacon	52.0	49.0	43.1	48.0		46.0	7-3	31
ND 759	57.0	53.4	60.1	56.8		46.0	7-4	29
ND 1265	60.0	46.0	50.0	52.0		45.5	7-3	30
ND 1311	57.0	44.0	57.0	52.7		47.0	7-4	30
Br 6355-28	47.1	42.0	46.4	45.2		44.5	7-7	31
Br YG 3-4	50.0	58.0	40.1	49.4		44.0	7-5	29
Steptoe	55.0	55.0	57.0	55.7		42.0	7-5	24
Prilar	52.0	46.4	57.0	51.8		47.0	7-2	30
SD 67-278	40.0	40.0	49.0	43.0		45.0	7-6	29
SD 69-1781	46.0	40.0	41.4	42.5		46.5	7-5	34
SD 71-979	47.0	61.0	39.0	49.0		50.0	6-28	30
SD 71-980	53.3	53.0	44.0	50.1		50.5	6-28	29

Table 59. Uniform great plains barley nursery 1974-Dickinson contined.

Variety	Yields in bushels per acre Rep 1	Rep 2	Rep 3	Avg.		Test Weight	Heading date	Height inches	
SD 71-672	37.0	70.3	43.3	50.2		47.5	7-7	32	
SD 71-698	54.0	35.1	42.0	43.7		48.0	7-7	32	

Standard error of a treatment mean = 4.2486

Least significant difference @ 5% = 12.1430

The c.v. = 14.91 P.C.

Table 60. Uniform western spring barley 1974-Dickinson.

Variety		Yields in bushels per acre Avg.	Test Weight	Heading date Fr 1/1	% Above Screen Seeded 6/64	Pan
Firlbecks III	CI 10088	37.7	41.0	189	50.0	20.0
Trebi	CI 936	36.1	33.0	189	20.2	49.2
Steptoe	CI 15229	45.0	37.0	187	47.6	25.6
Shabet	CI 13827	47.3	37.0	188	21.2	39.8
Vanguard	CI 11868	34.7	47.5	186	30.4	39.2
Larker	CI 10648	39.9	46.5	188	32.6	37.2
Klages	CI 15478	41.5	41.5	190	33.6	38.0
Kz/Domen 60 Ab 1810-43	ID 181043	41.5	38.0	189	24.8	39.6
Kz/Domen 60 Ab 1810-53	ID 181053	34.4	42.0	192	38.4	27.4
Kz/Fbc III Bz/Domen	ID 67516	38.3	43.0	187	36.0	30.2
Sel 7698-62/ Foma	WA 853768	40.4	40.5	189	49.6	21.6
Steveland/Woodvale	ID 691839	32.3	39.5	193	27.6	41.4
WA 3654/Unitan	WA 641566	44.6	45.5	187	56.8	17.4
Stiff Freja	MT 8553	39.4	43.5	187	57.2	16.4
Hnh/HH/Pon	WA 766467	46.6	43.0	188	52.2	22.4
Hnh/HH/Pon	WA 765267	44.3	45.0	190	32.4	36.2
Fbc III/Bz TR 506	AT 506	44.6	45.0	188	59.6	15.6
Hannchen	CI 531	41.4	46.0	189	19.8	42.0

Table 60. Uniform western spring barley 1974-Dickinson continued.

Variety			Yields in bushels per acre Avg.		Test Weight	Heading date Fr 1/1	% Above Screen Seeded 6/64	Pan	
Hannchen 2/ Large I	MT 028421		31.4		45.5	189	10.6	56.0	
Hannchen 2/ Small i	MT 58490		43.9		42.0	190	15.2	46.4	
Hannchen 6/ Large I	MT 02841		47.0		46.0	187	3.0	87.2	
Hannchen 6/ Small i	MT 548448		42.8		40.5	187	4.8	78.6	

Table 61. Uniform western dryland barley nursery 1974-Dickinson.

Variety		Yields in bushels per acre Avg.	Test Weight	% Above Screen Seeded 6/64	Pan
Munsing	CI 6009	43.2	47.0	34.5	37.6*
Unitan	CI 10421	37.7	43.5	25.2	47.4
Galt	CI 11770	41.9	46.5	10.7	65.3
Piroline/Vance Smyrna	ID 143411	55.5	48.5	25.8	32.4
Steptoe	CI 15229	38.1	44.0	34.3	34.0
Shabet	CI 13827	48.1	45.5	13.3	50.9
Piroline	CI 9558	52.9	50.0	28.0	33.6
Hector	CI 15514	47.5	48.0	37.7	32.0
Hypana/Unitan	MT 125235	42.8	48.0	75.6	8.5
Hypana/Unitan	MT 125122	39.9	45.0	56.4	17.9
Hypana/Unitan	MT 125265	42.2	50.0	76.4	9.2
Hiproly	CI 3947	18.8	48.0	0.6	86.2
Piroline/Vance Smyrna	ID 143413	54.1	48.0	36.3	28.7
Mentor/Vance Smyrna	ID 711180	42.4	47.0	34.6	37.2
Steveland/Unitan	ID 701962	43.0	42.0	27.7	43.0

* Station average

Table 62. Uniform regional flax nursery 1974-Dickinson.

Variety	Yields in bushels per acre					Test Weight	Heading date	Height inches	
	Rep 1	Rep 2	Rep 3	Avg.					
Bison	10.9	13.1	8.9	11.0		55.0	7-5	21	
Nored	13.3	12.7	14.5	13.5		54.5	7-20	20	
Linott	12.6	13.9	8.8	11.8		55.0	7-14	18	
CI 2489	12.1	9.5	8.7	10.1		54.5	7-14	21	
CI 2776	15.2	15.2	8.9	13.1		55.0	7-13	21	
CI 2797	15.7	11.7	8.9	12.1		55.5	7-15	23	
CI 2798	16.2	16.1	10.2	14.2		54.5	7-13	21	
CI 2799	16.4	13.8	11.7	14.0		55.5	7-18	22	
CI 2800	7.3	15.2	9.7	10.7		55.5	7-16	22	
CI 2801	17.4	9.5	9.5	12.1		54.5	7-15	20	
CI 2802	19.4	19.8	11.9	17.0		55.0	7-18	22	
CI 2803	15.3	12.8	10.6	12.9		55.0	7-18	23	
CI 2804	18.2	19.6	10.4	16.1		54.5	7-17	24	
CI 2805	13.8	9.5	9.4	10.9		55.0	7-15	20	
CI 2806	17.3	12.4	10.2	13.3		54.5	7-18	20	
CI 2807	14.5	8.7	9.6	10.9		54.0	7-18	19	
CI 2808	18.6	9.6	11.5	13.2		54.5	7-21	20	
CI 2810	15.4	18.8	10.8	15.0		55.0	7-18	20	

Table 62. Uniform regional flax nursery 1974-Dickinson continued.

Variety	Yields in bushels per acre Rep 1	Rep 2	Rep 3	Avg.		Test Weight	Heading date	Height inches	
CI 2811	13.4	9.6	9.4	10.8		54.5	7-16	22	
CI 2541	13.8	8.5	8.5	10.3		53.5	7-17	22	

TRIALS WITH FERTILIZER

A trial to determine the effect of urea, DAP and ammonium nitrate on the germination and growth of hard red spring wheat was continued for the second year under the direction of Dr. W.C. Dahnke, Soils Department, North Dakota State University.

The report of this trial was prepared by Dr. Dahnke, and is included here to provide a record of the data relating to the trial at this location.

Project: (Farmers Union Central Exchange)

Title: Effect of urea, DAP and ammonium nitrate on the germination and growth of Waldron hard red spring wheat

Personnel: W.C. Dahnke, Associate Professor of Soils
Larry Swenson, Assistant in Soils
Tom Conlon, Superintendent of Dickinson Branch Experiment Station
Ben Hoag, Superintendent of the Minot Experiment Station
and Howard Olson, Superintendent of the Carrington Branch Experiment Station

Objectives:

Determine the effect of several rates of N applied as urea, DAP or ammonium nitrate applied near the seed on the germination and yield of small grain.

Results and Present Status:

Plots were established at six sites at three Branch Experiment Stations in 1974. The soil test results and soil names are given in Table 63.

A basic application of 80 pounds per acre of N was made on site 1 to insure that nitrogen would not be a limiting factor. Sites 3 and 4 were planted on 4/25/74, sites 5 and 6 were planted on 5/18/74 and sites 1 and 2 were planted on 6/5/74. All plots were planted with rows six inches apart using a six foot Kirshman disc drill. The fertilizer treatments were applied through the drill. Each treatment was replicated four times.

Counts were made of the number of seedlings per forty feet of row (Table 64) when the seedlings were 2 to 3 inches tall. These counts were made on 5/29/74 (site 3 and 4), 6/18/74 (site 5 and 6) and 7/19/74 (site 1 and 2). The application of 10 to 40 pounds of N per acre as ammonium nitrate or urea through the drill had little effect on seedling count on sites 5 and 6 at the Carrington Branch Station. These plots were planted on 5/18/74 which was a cold (around 35° F) and misty day. Yield of grain (Table 65) was not affected by the treatments. On sites 3 and 4 at the Dickinson Branch Station drill row application of both ammonium nitrate and urea caused a reduction in stand (Table 64) but did not affect the yields (Table 65). On sites 1 and 2 at the Minot Branch Station the drill row application of 40 pounds of N per acre as urea greatly reduced the seedling count. The drill row application of 40 pounds of N per acre as ammonium nitrate reduced the stand count on site 1 but did not reduce stand on site 2. Site 1 and 2 were side by side on the same soil type. Site 1 however was cropped in 1973 and site 2 was fallow in 1973. The biggest difference however between these 2 sites was the fact that the seedbed on site 1 was very cloddy due tot he fact that the soil was probably worked when it was too wet. Site 1 and 2 were planted on 6/5/74. The higher temperatures at this time of the year could have also contributed to decreased germination where fertilizer was applied. On site 1 the stand reduction was great enough to also result in a lower yield (Table 65). The yield dropped from 20 bushels per acre on the check plot to 13 bushels per acre where 40 pounds of N were applied as ammonium nitrate and to 9 bushels per acre where 40 pounds were applied as urea.

Table 63. Soil test data at planting, 1974.

Site & Soil Series	pH	NO3-N	P	K	Depth	H2O
		lbs/A-2'			Inches	%*
1. Minot East	7.2	17	13	355	0-6	13.8
Williams 1					6-24	13.6
2. Minot West	7.0	121	27	473	0-6	14.7
Williams 1					6-24	15.0
3. Dickinson East	5.5	137	36	462	0-6	13.4
Parshall fsl					6-24	13.5
4. Dickinson West	5.5	176	38	590	0-6	18.8
Morton sil					6-24	17.9
5. Carrington East	6.8	132	33	305	0-6	16.6
Svea sl					6-24	13.8
6. Carrington West	7.2	94	38	295	0-6	19.4
Svea sl					6-24	16.5

*% H2O based on air dry soil.

Table 64. Effect of source and rate of drill row applied nitrogen on wheat germination and survival at six sites in North Dakota, 1974.

Treatment			Site						Average
			1	2	3	4	5	6	
lbs	N/A	Source	----------Seedlings per 40' of row----------						
1.	0	-	192	229	184	144	138	159	174
2.	10	AN	141	224	152	198	129	170	169
3.	20	AN	145	253	152	201	143	194	181
4.	30	AN	131	188	134	187	132	195	161
5.	40	AN	104	215	113	177	131	172	152
6.	10	Urea	132	247	199	199	138	174	182
7.	20	Urea	100	217	155	136	125	162	149
8.	30	Urea	91	196	162	141	130	175	149
9.	40	Urea	53	152	176	119	141	174	136
10.	10	DAP	159	235	134	121	124	170	157
11.	20	DAP	137	240	165	155	130	181	168
		Average	126	218	157	162	133	175	

Table 65. Effect of rate and source of drill row applied N on yield of wheat at six sites in North Dakota, 1974.

Treatment			Site						
			1*	2*	3**	4**	5*	6*	Average
lbs	N/A	Source	----------	----------	----------	Bu/A	----------	----------	----------
1.	0	-	20	28	12	27	15	24	21
2.	10	AN	18	31	11	31	12	24	21
3.	20	AN	16	32	13	32	22	23	23
4.	30	AN	19	26	12	30	14	25	21
5.	40	AN	13	26	12	30	15	24	20
6.	10	Urea	16	31	12	24	13	23	20
7.	20	Urea	14	27	11	27	13	22	19
8.	30	Urea	15	30	13	29	14	22	20
9.	40	Urea	9	27	12	25	12	27	19
10.	10	DAP	23	26	13	28	14	20	21
11.	20	DAP	14	31	14	31	15	26	22
		Average	16	29	12	29	14	24	

* Ellar hard spring wheat.
** Waldron hard red spring wheat.

REPORT OF

LIVESTOCK INVESTIGATIONS

AT THE

DICKINSON EXPERIMENT STATION

DICKINSON, NORTH DAKOTA

1974

by

James L. Nelson and Douglas G. Landblom

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WINTERING REPLACEMENT HEIFER CALVES

Research from the U.S. Range Livestock Station, Miles City, Montana; South Dakota State University's Antelope Range Field Station and this station, indicates that replacement heifer calves should be fed to gain from 1.25 to 1.50 pounds per head per day during their first winter. This rate of gain will promote good, economical growth without causing the heifers to get overly fleshy or fat.

It has also been suggested by Wiltbank and others that about 50% more heifers than needed for replacement purposes be kept so that selection can be based on number actually pregnant.

In this trial, straightbred Hereford heifer calves were wintered from November 1, 1973 to May 1, 1974, a total of 181 days. Two lots of 12 were wintered in lots having a nine foot slotted board fence shelter while another lot of 8 head were held in a lot with a conventional pole barn for weather protection. A total of 32 head were wintered which was about 33% more than needed for replacement purposes. Two lots, one slotted and one with pole barn, were self-fed while one lot with slotted fence was hand fed.

The self-fed ration was prepared by weight through a portable grinder-mixer. All heifers were provided with straw for bedding on a regular interval and had access to automatic water fountains.

Sixteen head were vaccinated for brucellosis November 21, with the balance being vaccinated on January 14.

All heifers were combined and turned on crested wheatgrass pasture on May 1, 1974 and to native pasture on May 22. The heifers were exposed to fertile Angus bulls from May 1 to September 5th, 1974. A pregnancy check of all heifers was performed on October 14th.

Table 1. Performance of 1973-1974 replacement heifer calves under two feeding systems.

	Hand fed heavy wts.	Self-fed heavy wts.	Self-fed light wts.
No. head	12	12	8
Days fed	181	181	181
Initial wt., lb	417	417	344
May 1st wt., lb	660	700	661
Winter gain, lb	243	284	318
Avg. daily gain, lb	1.34	1.57	1.75

Table 2. Average feed consumption and cost of gain.

	Hand fed heavy wts.	Self-fed heavy wts.	Self-fed light wts.
Ration as fed lbs/hd/days			
Oats	4.98	3.40	3.66
Tame hay	10.13	9.53	10.26
Alfalfa	1.94	0.68	0.73
Di-calcium phosphate	0.15	0.10	0.10
Salt	0.05	0.27	0.29
Total feed consumed/day, lb	17.25	13.98	15.04
Feed cost/hd	$79.47		
Feed cost/hd/day	43.91¢	37.27¢	45.78¢
Feed cost/cwt gain	$28.01	$23.78	$22.84

Table 3. Two year average gain, feed consumption and cost of wintering heifers either self-fed or hand fed.

	Hand fed			Self-fed		
	1973	1974	Avg.	1973	1974	Avg.
No. head	12	12	24	12	12	24
Days fed	168	181	174	168	181	174
Initial wt., lb	410	417	413	408	417	412
Spring wt., lb	588	660	624	650	700	675
Winter gain, lb	178	243	211	241	284	262
Avg. daily gain, lb	1.06	1.34	1.21	1.44	1.57	1.50
Lbs. feed/hd/day	13.1	17.2	15.2	14.8	14.0	14.4
Feed cost/hd	$33.02	$79.47	$56.24	$34.29	$67.46	$50.87
Feed cost/hd/day	19.6¢	43.9¢	31.8¢	20.4¢	37.3¢	38.8¢
Feed cost/cwt gain	$18.50	$28.01	$23.25	$14.20	$23.78	$18.99

The effects of bangs vaccination at two different weights was monitored. Half the heifers were vaccinated by a local veterinarian with strain 19 Brucella organisms on November 21, while the rest of the heifers were vaccinated on January 14. No serious upsets were observed at either vaccination and weight gains do not appear to have suffered at either age of vaccination as shown in table 4.

Table 4. Effects of brucellosis vaccination on winter gain.

	Vaccinated on November 21	Vaccinated on January 14
No. head	16	16
Avg. wt. gain/hd- (Nov. 1 to Dec. 18), lb	68	76
Avg. wt. gain/hd- (Nov. 1 to Feb. 14), lb	136	1/151
Total wt. gain/hd- (Nov. 1 to May 1), lb	221	283

1/ Significant at 5% level.

Table 5. Weight gain on grass May 1 to October 7 (159 days) and percent pregnant.

	Hand fed heavy wts.	Self-fed heavy wts.	Self-fed light wts.
No. head	12	12	8
Initial wt. (May 1), lb	660	700	661
Final wt. (Oct 7), lb	825	848	800
Pasture gain	165	148	139
Avg. daily gain, lb	1.04	0.93	0.87
No. bred	10	10	7
No. open	2	2	1
Percent open	16.6	16.6	12.5

Summary:

Heifers self-fed a ration of 25% oats and 75% hay plus minerals made gains of 1.57 to 1.75 pounds per head per day. Although the hand fed heifers appeared to make slower winter gains, they compensated for this by making faster summer gains on pasture. There was no difference between the two winter feeding regimes as shown by the percent pregnant in October.

The extra 33% heifers wintered proved adequate to provide the necessary early bred replacement females.

USING STRAW IN COW WINTERING RATIONS

Past research at this station has indicated that small grain straw and adequate supplemental protein can replace up to two-thirds of the hay fed in wintering rations to pregnant beef cows.

This trial compares a 100% hay ration with a 50% hay-50% straw ration for wintering pregnant beef cows with no supplemental protein fed in either rations.

The station's commercial Hereford cow herd is being used in this trial. In 1972, the calves were weaned about November 1, and the cow herd was grazed on good to excellent native range until the end of the month. During this one month period, despite supplemental feeding of protein blocks, the cows lost an average of 47 pounds of weight, with a corresponding loss of body condition. In 1973 the calves were weaned on November 1, and the cow herd was grazed on grain stubble aftermath until the end of the month. Cow weight loss in 1973 averaged 45 pounds per head.

On December 1, the cows were randomly allotted by age into two feeding groups. Group A received a ration of mixed brome and crested wheatgrass hay while Group B was fed a ration of hay and oat straw. A salt-mineral mixture and water were available free choice. During the trial, both groups were held inlots with a slotted board fence for protection from the wind and weather.

On February 1, 1973, one month before the first calves were due, the straw feeding was discontinued. At this time the straw was replaced with hay and supplemental grain feeding (1 pound/head/day of rolled barley) was started.

Cow weight changes, feed consumption and cost of wintering, and calf birth weights and mortality are summarized in tables 6, 7, and 8.

Summary:

It appears that feeding a ration of 50% hay and 50% oat straw for a 60 day feeding period did not adversely affect calf birth weight or livability when compared to cows fed 100% tame hay. As expected, the young cows wintered on the 50% hay-50% oat straw ration lost most weight. Normally, this weight loss would not be serious for cows that started the winter feeding period in moderately good conditions.

Using straw in the ration reduced the cost of wintering about one dollar per cow per month in 1972. With the substantially higher feed costs in 1973 wintering costs were reduced by $2.35 per cow per month.

Straw can be used effectively in cow rations to reduce wintering costs and stretch insufficient feed supplies.

Table 6. Cow weight change-cow wintering trial, 1973-1974.

	Aug. wt. on hay			Aug. wt. on hay & straw		
	3 yr. old	4-5-6 yr. old	7 yr. & older	3 yr. old	4-5-6 yr. old	7 yr. & older
Pre-trial:						
Nov. 1, 1973	952	1085	1171	971	1107	1179
Nov. 1, 1974	913	1135	1166	914	1098	1192
Dec. 1, 1973	917	1043	1121	924	1054	1126
Dec. 1, 1974	906	1092	1098	890	1044	1116
Wt. change 1/						
1973	-35	-42	-50	-47	-53	-53
1974	-7	-43	-68	-24	-54	-76
Feb. 1, 1973	921	1052	1118	899	1037	1118
Feb. 1, 1974	912	1020	1145	920	1074	1164
Wt. change-Dec. 1-Feb. 1						
1973	+4	+9	-3	-25	-17	-8
1974	+6	+28	+47	+30	+30	+48

1/ Weight loss on native grass pasture in 1973 and on grain stubble aftermath in 1974, prior to starting wintering trial.

Table 7. Feed consumption and cost of wintering-cow wintering trial 1973-1974.

1973 Data	Hay	Hay & Straw
Mixed hay, lb 2/	69,300	43,350
Oat straw, lb	--	27,750
Feed/hd/day, lb	21.4	21.4
Feed cost @- $18/ton, hay-$10/ton, straw		
Per head/day	0.19¢	0.16¢
Per head-entire trial	$11.71	$9.79
1973 Data		
Mixed hay, lb	76,320	37,274
Oat straw, lb	--	37,274
Feed/hd/day, lb	21.6	21.4
Feed cost @- $30/ton, hay-$15/ton, straw		
Per head/day	0.32¢	0.24¢
Per head-entire trial	$19.08	$14.22

2/ One calf born dead, 2 late calves-no birth weight.

Table 8. Calf birth weights and mortality-cow wintering trial, 1973-1974.

		Hay			Hay & Straw		
		3 yr. old	4-5-6 yr. old	7 yr. & older	3 yr. old	4-5-6 yr. old	7 yr. & older
Heifer calves:							
No. head	1973	6	10	10	8	10	9
	1974	4	7	7	5	16	4
Birth wt.	1973	61	64	65	53	62	66
	1974	61	66	73	61	68	73
Steer calves:							
No. head	1973	2	12	8	5	13	6
	1974	7	17	14	7	14	13
Birth wt.	1973	56	66	65	67	68	69
	1974	67	72	71	72	73	63

Combined avg. birth wt., lb							
1973		26 heifers	64		27 heifers	60	
1974		22 steers	65		24 steers	68	
	1/	all calves	64	2/	all calves	64	
1973		18 heifers	68		25 heifers	67	
1974		38 steers	71		34 steers	69	
	3/	all calves	70	4/	all calves	68	

1/ One cow died, 2 cows open, 1 cow aborted, 1 calf died.
2/ One calf born dead, 2 late calves-no birth weight.
3/ One cow open, 2 cows died, 1 calf died.
4/ One cow open.

EFFECTS OF EARLY CASTRATION AND LATE CASTRATION OF BULL CALVES COMPARED

Is there any advantage to be gained from fall castration of spring calves? Does fall castration affect weight gains at weaning? How does late castration affect performance in the feedlot? What problems are encountered, and are there any risks involved in fall castration of spring calves?

This trial, begun in the spring of 1972, and continued in 1973 and 1974, was designed to evaluate and compare the effects of early castration, (at 3 to 8 weeks of age), and late castration, (at 6 months of age). Bull calves from the station herd were assigned by age, at random, to either the early or late castration dates. A total of 186 calves have been included in this trial to date.

All calves were operated on using an approved veterinary procedure which minimized blood loss and stressed strict sanitation.

The calves in the late castration group were allowed to remain with their mothers for approximately thirty days following the operation.

In addition to the record of weight gains for both groups from birth to weaning for 1972 through 1974, as summarized in tables 9 and 10, weight gains in the feedlot for the respective treatment groups in 1972 and 1973 are presented in table 11.

Summary:

Delaying castration until the calves are about 6 months old was of no value in improving weight at weaning. Combined data for 1972 through 1974 also shows no advantage for delayed castration.

Feedlot data presented in table 11 shows no difference of significance in gain, dressed weight, dressing per cent, grade or value.

Although no serious problems were encountered at either time of castration, the job is simpler, easier and offers less risk tot he calf when performed at an early age.

Table 9. Comparison of effect of spring and fall castration on weight gains of calves in 1974.

Castration date	Weight gain May 15-Sept. 26	Weight gain Sept.27-Oct. 16	Total Avg. Gain
June 4 (38 head)	211	22	233
Sept. 26 (36 head)	208	23	231

Table 10. Weight gains of spring castrated and fall castrated calves compared 1972-1974.

Spring castrated calves:				
Year	No. head	May-Sept.	Oct.	Total
1972	32	218	44	256
1973	25	238	41	279
1974	38	211	22	233
Total	95	220	34	253
Fall castrated calves:				
Year	No. head	May-Sept.	Oct.	Total
1972	30	219	36	255
1973	25	244	35	279
1974	36	208	23	231
Total	91	222	30	252

Table 11. Gains in the feedlot, carcass data and value of steers castrated early and late in 1972 and 2973.

	Feedlot gain	Dressed weight	Dressing per cent	Grade	Value
Early castration:					
1972 (20 head)	702	650	59.3	12.0	$412
1973 (20 head)	641	627	59.8	11.8	$385
2-year avg.	672	639	59.5	11.9	$399
Late castration:					
1972 (15 head)	692	650	59.5	12.1	$408
1973 (15 head)	662	640	59.5	11.7	$387
2-year avg.	677	645	59.5	11.9	$398

VALUE OF INJECTING CALVES AT BIRTH WITH VITAMINS A, D_2, AND E

Supplementary vitamin sources are readily available to livestock producers in several forms. These include feed additives, tablets and injectable solutions. This trial was designed to evaluate the effects of a vitamin injection to calves at birth.

In this trial, straight bred calves born at the Dickinson Station from February to May were allotted by age to either the treatment group or the untreated control group. Within twenty four hours after birth, every half in the treatment group was injected intramuscularly with two cubic centimeters of a vitamin A, D_2, and E solution. This solution contained 500,000 I,U. Of vitamin A, 75,000 I.U. vitamin D_2 and 50 I.U. of vitamin E cubic centimeter.

The mothers of these calves were wintered on a high straw plus protein ration in 1971-72. In 1972-73 and 1973-74, half the cows were wintered on a ration of ½ hay and ½ straw. The other half of the cow herd was wintered on an all hay ration. About the first of February each year, each cow received a 5cc injection of the vitamin combination.

A record of all treatments administered for lung congestion and scours was kept until calves were turned on grass, about the first of May. The calves were weighed and weaned on November 1st.

Tables 12, 13, and 14 summarize the results of this study.

Summary:

The administration of injectable vitamin A. D_2, and E combination to calves from cows adequately fed and supplemented had no apparent influence on either the calves disease resistance or on its subsequent summer gains. However, the use of vitamin injections did required handling, labor and expense.

Table 12. Effect of injectable vitamins on weight gains of calves in 1974.

	Average weight gains			
	Treatment group		Untreated group	
Steers	(38 hd.)	294 lbs	(40 hd.)	296 lbs
Heifers	(27 hd.)	320	(27 hd.)	298
Average 1/	(65 hd.)	305	(67 hd.)	297

1/ Eight pound weight difference not statistically significnat.

Table 13. Effect of injectable vitamins on weight gains of calves 1972-1974.

	Average weight gains			
	Treatment group		Untreated group	
1972 Steers	(33 hd.)	305 lbs	(33 hd.)	304 lbs
19773 Steers	(29 hd.)	328	(27 hd.)	330
1974 Steers	(38 hd.)	294	(40 hd.)	296
3-yea avg.	(100 hd.)	308	(100 hd.)	308
1972 Steers	(22 hd.)	301 lbs	(23 hd.)	296 lbs
19773 Steers	(32 hd.)	294	(31 hd.)	293
1974 Steers	(27 hd.)	320	(27 hd.)	298
3-yea avg.	(81 hd.)	304	(81 hd.)	296
Combined total	(181 hd.)	306 lbs	(181 hd.)	303 lbs

Table 14. Number of calves treated for scours and lung congestion in the trial with injectable vitamins.

	With vitamin A	Without vitamin A
1972	19	10
1973	6	7
1974	21	20
3-year avg.	15	12

PROGENY TEST FOR SIRE CERTIFICATION

To better evaluate new sire selections and build a more productive cow herd, the Dickinson Experiment Station has begun progeny testing as outlined by the Sire Certification Program of the North Dakota Beef Cattle Improvement Association.

In the first years' test, the calves were sired by a Polled Hereford registered as O.G. Domestic Anxiety 8405, bred by Kubik Polled Hereford Ranch, Manning, North Dakota.

To qualify this bull as a certified sire, the progeny under test had to meet USDA quality grade requirements and, weight per day of age, live grade, minimum backfat requirements as established by the NDBCIA.

As a result of the test, O.G. Domestic Anxiety 8405 has been rated a "Certified Meat Sire" by the NDBCIA.

Tables 15 and 16 summarize the test results and describe the rations used.

Information about the Sire Certification Program of the NDBCIA may be obtained from Mr. Melvin Kirkeide, Secy., NDBCIA, Department of Animal Science, North Dakota State University, Fargo, North Dakota.

Table 15. Gain and carcass data, progeny test for sire certification.

Weight Nov. 1	Weight June 25	Days fed	Total gain	Average daily gain
454	992	237	538	2.27

Carcass weight	Dressing per cent	Carcass grade	Carcass value	Net return over feed
57.1	57.6	6 good 1 choice	$316.43	$142.33

Table 16. Self-fed rations used in the progeny test for sire certification-1974.

	Rations as fed:			
	Weaning to 650 lbs.		650 lbs. to finish	
	Lbs/ton	Lbs/hd/day	Lbs/ton	Lbs/hd/day
Oats	900	7.24	500	3.62
Barley	300	2.41	500	3.62
Corn	300	2.41	570	4.12
Alfalfa	450	3.62	350	2.53
Dry molasses	20	0.16	20	0.14
Soymeal	20	0.16	50	0.36
Vitamin A	60 grams	-	60 grams	-
Vitamin D	20	-	20	-
Di-cal	10	0.08	10	0.07
Trace minral salf	1/40	0.32	1/40	0.28
Total		16.40		14.74

1/40 pounds salt added per ton of feed.

EARLY CALVING AND LATE CALVING COMPARED

Income from beef cows is in direct proportion to the number (calving percent) and weight of marketable calves at weaning.

Calf weight at weaning is dependent on three primary variables: genetic potential, adequate nutrition and, age at weaning. Early calving is one management tool that allows for older calves at weaning.

Early calving is not traditional in this area, and may require additional feed, labor and housing facilities. Because of the length of gestation in beef cattle, (283 days) special care is required to move a cow's calving interval forwad after she drops her first calf. It is important to breed heifers so they will calve at the desired time. We recommend the breeding season for heifers begin three weeks before the cow herd is exposed.

This trial was begun in the spring of 1972 to study the effects of shifting a cow herd from April 1 to March 1 calving.

The station's cow herd was split into two groups, with calving date uniformly distributed between lots. In 1974 one lot was fed a tame hay ration, and the other lot received a ration of half hay and half straw, from December 1 to February 1. After February 1 both lots were fed 23 pounds tame hay until calving. After calving, each cow was fed a ration of 2 pounds barley, 5 pounds tame hay and 40 pounds corn silage per head per day until May 23, when they were turned on grass.

The early calving lot was exposed to fertile bulls in late May, for March calving. The late calving lot was exposed late in June for April calving.

Replacement heifers were wintered to gain 1.25 to 1.50 pounds per head per day, and were exposed to bulls early in May so calving could start about February 10, three weeks before the early calving lot was due to begin.

During the summer all calves were handled in a uniform manner and were weighed and weaned on October 17.

A summary of weather conditions at the station during the 1974 calving season shows that the mean temperature for February was well above average. Both April and May were cool and wet.

Table 17. Temperature and precipitation, 1974 calving season-Dickinson Experiment Station.

Month	Degrees Farenheit avg. high	avg. low	Deviation	Inches precipitation
February	33.9	10.3	+8.7	.08
March	37.9	15.4	+1.4	0.38
April	55.3	29.7	+0.8	2.82
May	62.7	37.5	-2.7	4.15

Table 18. Average ration and costs February 1 to May 23, 1974.

	Early calving lot	Late calving lot
Number of head	70	45
Days fed	112	112
Hay/cow/day, lb	1587	1948
Barley/cow/day, lb	107	67
Corn silage/cow/day, lb	2147	1344
Total feed cost/cow	$42.28	$40.78
Avg. cost/cow/day	0.38¢	0.36¢

Table 19. Calf weights and ages from each breeding herd.

	No. calves	Birth wt. lbs.	Weaning wt. lbs.	Age	Avg. daily gain
Early calving herd:					
Heifers	28	67	380	208	1.50
Steers	42	70	357	195	1.47
Late calving herd:					
Heifers	15	68	358	185	1.57
Steers	29	72	366	177	1.66

Table 20. Calf weights arranged by date of birth.

	No. calves	Birth wt. lbs.	Weaning wt. lbs.	Summer gain lbs.	Age	Avg. daily gain
Calves from 2-yr old heifer born Feb.-March: 1/						
Steers	6	80	442	362	221	1.64
Heifers	10	74	413	326	224	1.45
Avg.	8	77	428	344	223	1.54
Calves from cows born Feb. 22-April 1:						
Steers	26	69	395	326	213	1.50
Heifers	21	67	395	328	217	1.53
Avg.	24	68	395	327	215	1.52
Calves from cows born April-May:						
Steers	30	73	363	290	184	1.57
Heifers	18	68	364	294	186	1.59
Avg.	24	71	364	293	185	1.58
Calves from cows born May-June or later:						
Steers	15	69	296	227	145	1.57
Heifers	4	68	288	219	139	1.57
Avg.	10	69	291	223	142	1.57

1/ Crossbred Angus-Hereford.

Summary:

With the additions of the three-year old cows to the early calving lot and a subsequent loss of old cows from both herds we now have twenty five more cows in the early calving herd. Average age at weaning of calves in the early calving herd was 200 days, compared to 180 days in the late calving herd. The actual weaning weight of all calves from the early calving herd was 366 pounds while in the late calving herd it was 363 pounds. However, it should be remembered that the early calving herd includes a large number of young cows.

It appears to date that the best way to change a cow herd's calving data is to start with the replacement heifers.

Table 20 clearly shows the importance of early calves, since the calves actually born from February 22 to April were 31 pounds heavier at weaning than the calves dropped during April and May, and over 100 pounds heavier at weaning than the May-June calves.

It is also worth noting that the calves from the two-year old heifers averaged 414 pounds, about 50 pounds heavier than either the early or late cow herds. Part of this weight advantage is probably due to hybrid vigor since these calves were Angus-Hereford crossbreds.

BACKGROUNDING STEERS FOR TWO LEVELS OF WINTER GAIN

It has been suggested that wintering calves for a moderate gain of 1.75 to 2.00 pounds per day may be more profitable than wintering for gains of 2.25 to 2.50 pounds per day.

This trial, designed to compare moderate with maximum feedlot gains showed that when feed grain prices are high and cattle prices low, feeding for moderate gain was more profitable, primarily because moderate gains can be obtained using a large amount of roughage in the ration, as shown in table 21.

Steers wintered for higher gain were 35-40 pounds heavier, but the selling price was about $1.00 per hundredweight less than for steers on moderate gain, when sold as background feeders on May 2.

Under the conditions of high feed prices and low cattle prices which prevailed in 1974, backgrounding at both levels resulted in a net loss of about $50.00 per head.

Table 21. Average feed consumption and feed cost/cwt gain.

	Higher gain		Moderate gain	
Avg. feed consumption:				
Oats, lb	1095	1097	409	409
Tame hay, lb	443	443	1145	1146
Alfalfa, lb	81	81	82	82
Di-cal, lb	8	8	8	8
Salt, lb	32	32	33	33
Total, lb	1659	1661	1677	1678
Feed/hd/day, lb	16.4	16.5	16.6	16.6
Feed/lb/gain, lb	8.0	6.6	8.9	8.3
Feed cost/cwt. gain, $	30.63	25.22	23.53	22.04

Table 22. Feeding for two levels of winter gain, January 21-May 2, 1974.

	Higher gain		Moderate gain	
Initial wt., lb	457	457	456	456
May 2 wt., lb	665	710	644	658
Winter gain, lb	208	253	188	202
Days fed	101	101	101	101
Avg. daily gain, lb	2.06	2.50	1.87	2.00
Initial cost– @$58.20/cwt., $	266	266	266	266
Feed cost/hd., $	64	64	44	44
Total cost, $	330	330	310	310
Selling price:				
@$39.75/cwt, $	264	282	--	--
@$40.70/cwt, $	--	--	262	268
Net loss, $	66	48	48	42

BACKGROUNDING OR FINISHING AS FEEDING ALTERNATIVES

The calf producer in this area has three ways to go with calf crop. He can sell at weaning; wean and background; or, wean, background and finish, depending upon his feed supplies and available labor and facilities.

This trial was designed to compare the economics of a backgrounding program with a finishing program for the North Dakota calf producer.

Steers backgrounded for two levels of gain, as reported in the previous experiment, were finished to slaughter weights in trials January 21 and ending November 5.

Pertinent details for both the backgrounding phase and the finishing phase of this trial are summarized in table 23. Details on feed consumption, feed costs, gains, carcass data and returns for the finishing phase are presented in tables 24 through 26.

Table 23. Summary of backgrounding or finishing as feeding alternatives.

	Backgrounding		Finishing
	January 21-May 2		Jan. 21-Nov. 5
	Moderate fed	Heavier fed	Moderate & heavy fed
Initial weight, lb	457	457	450
Weight out, lb	651	688	1069
Gain, lb	195	213	619
Selling value, $	264.96	273.48	365.54
Initial cost, $	265.97	265.97	262.19
Feed cost, $	44.37	63.87	208.74
Net loss, $	45.38	56.36	105.74
Feed consumed/hd.			
Oats, lb	409	1096	2228
Barley, lb	--	--	1050
Tame hay, lb	1146	443	1869
Alfalfa, lb	82	81	291
Di-cal, lb	8	8	29
Salt, lb	33	32	117

Table 24. Average feed consumption and feed cost/cwt gain, May 2-November 5, 1974.

	Heavier gain lots		Moderate gain lots	
Avg. feed consumption				
Oats, lb	1703	1709	1252	1239
Barley, lb	1431	1441	666	660
Tame hay, lb	836	840	1316	1308
Alfalfa, lb	209	210	212	210
Di-cal, lb	21	21	21	21
Salt, lb	84	84	85	84
Feed/hd/day, lb	23	23	19	19
Feed/lb/gain, lb	9.6	9.9	8.9	9.9
Feed cost/cwt. gain, $	38.91	42.70	32.70	36.22
Feed cost/hd., $	173	186	130	129

Table 25. Gains at two feeding levels-finishing phase, May 2-November 5, 1974.

	Heavier gain lots		Moderate gain lots	
Initial wt., lb	651	677	657	660
Final wt., lb	1095	1113	1056	1017
Gain, lb	444	436	399	357
Days fed	187	187	187	187
Avg. daily gain, lb	2.37	2.33	2.13	1.91

Table 26. Carcass data and returns for two feeding levels-January 21-November 5, 1974.

	Heavier gain lots		Moderate gain lots	
Avg. carcass wt., lb	652	665	632	599
Avg. carcass grade	3 ch, 2 gd	3 ch, 2 gd	4 ch, 1 gd	3 ch, 2 gd
Dressing %	59.5	59.7	59.8	58.9
Avg. carcass value, $	374.10	382.36	368.82	336.89
Initial cost @ $58.20/cwt	266	266	266	266
Feed cost/hd., $	237	250	174	173
Total cost, $	503	516	440	439
Net loss, $	129	134	71	102

COMPARISON OF SELF FED RATIONS FOR BEEF AND DAIRY STEERS

This trial, initiated at the request of cattle feeders and the North Dakota Milk Producers Association, was designed to compare dairy bred steers with beef steers. Feeders have reported that under certain conditions rate of gain and feed efficiency is less with dairy bred steers than with beef steers fattened under the same conditions. Information was desired on: returns realized from dairy bred steers and beef steers when fed under the same conditions, and, how the two types of animals compare in the management required to produce a carcass of equal grade.

Beef calves weighing 457 pounds and Holstein calves averaging 470 pounds were allotted tot he trial, beginning on January 21. After a warm up period, a self-fed ration of 75% oats, 20% tame hay, 5% alfalfa, di-cal and salt was fed throughout the backgrounding phase. For the finishing phase, grain in the ration was 60% barley and 40% oats.

When the beef steers reached an average slaughter weight of 1050 to 1100 pounds they were sold on a grade and yield basis along with a random selection of half the dairy bred steers. The remaining half of the dairy bred steers are being continued on feed to determine the feed requirements necessary to get them to high good and low choice grades comparable to the beef steers.

Table 27. Average feed consumption and feed cost/cwt gain for beef bred and dairy bred steers in the feedlot 1/.

	Beef steers	Dairy steers
Avg. feed consumption		
Oats, lb	10.0	9.4
Barley, lb	3.69	4.36
Tame hay, lb	4.44	4.35
Alfalfa, lb	0.96	0.95
Di-cal, lb	0.10	0.09
Salt, lb	0.38	0.38
Total/head/day, lb	19.6	19.6
Feed/lb. gain, lb	9.0	9.4
Feed cost/cwt gain	$36.66	$39.02

Table 28. Weights, gains and return for beef bred and dairy bred steers in the feedlot, 1974.

	Beef steers	Dairy steers
Initial wt., lb	457	470
Final wt., lb	1104	1071
Gain, lb	647	601
Days fed	288	288
Avg. daily gain, lb	2.25	2.09
Initial cost--		
@ $45.80/cwt., $	--	215
@ $58.20/cwt., $	266	--
Feed cost/hd, $	222	235
Total cost, $	488	450
Avg. carcass wt., lb	659	623
Avg. carcass grade	6 ch, 4 gd	1 ch, 1 gd, 3 L. gd, 2 std
Dressing %	59.6	57.3
Avg. carcass value	378.23	347.35
Initial cost	266	215
Feed cost/hd., $	222	235
Total cost, $	488	450
Net loss, $	109.77	102.65

Feed prices and feed analysis, 1974.

Ingredient	Price/unit	% Protein
Alfalfa hay	$40/ton	15.8
Crested wheatgrass	30/ton	12.2
Oat straw	15/ton	6.3
Barley	$2.50/bushel	12.4
Oats	1.40/bushel	11.6
Soybean oilmeal	$186/ton	
Di-cal	$236/ton	
Trace mineral salt	55/ton	
Granulated salt	50/ton	

IS SUPPLEMENTAL PROTEIN NECESSARY FOR FATTENING STEERS ON COMPLETE MIXED RATIONS

Complete mixed rations which include alfalfa as 5% of the ration have performed well in trials at this station in the past. However, performance on higher levels of alfalfa had not been determined at this station prior to the beginning of these trials in 1973.

There is concern about the problem of bloat, and its relationships to the level of alfalfa in the ration. Some producers have plenty of alfalfa and would like to use as much as is practicable. Others have limited amounts and want to use it to the best possible advantage, in combination with other hay. The value of soybean oilmeal as an additional protein in self-fed rations is also being determined.

Self-fed rations containing no alfalfa, and alfalfa in the amount of 5%, 15% and 25% of the total ration, and a 5% alfalfa ration which included soybean oilmeal as a supplemental protein were fed to steers calves, from an average starting weight of 420 pounds to slaughter weights of about 1050 pounds.

The feeding period in 1973 extended fro February 2 until November 19, a total of 308 days. In 1974 the 340 day feeding period was from November 1, 1973 to October 7, 1974.

During the feeding period, oats in the ration was replaced by barley as shown in table 29. The trial summary is presented in tables 30, 31, and 32. Carcass data are summarized in tables 33, 34, and 35.

Table 29. Composition of self-fed rations by weight for the feeding period November 6, 1973 to October 7, 1974 1/.

Lot 3-5% alfalfa, 20% tame hay Lot 4-15% alfalfa, 10% tame hay Lot 5-25% alfalfa, no tame hay Lot 7-no alfalfa, 25% tame hay	
November 6-November 12	25% oats, 75% hay
November 13-November 25	50% oats, 50% hay
November 26-March 20	65% oats, 10% barley, 25% hay
March 21-April 22	50% oats, 25% barley, 25% hay
April 23-May 15	40% oats, 35% barley, 25% hay
May 16-October 7	30% oats, 45% barley, 25% hay
Lot 6-5% alfalfa, 20% tame hay, 7.4% soybean oilmeal	
November 6-November 12	25% oats, 75% hay
November 13-November 25	50% oats, 50% hay
November 26-March 20	65% oats, 25% hay, 2.6% barley, 7.4% SBOM
March 21-April 22	50% oats, 25% hay, 17.6% barley, 7.4% SBOM
April 23-May 15	40% oats, 25% hay, 27.6% barley, 7.4% SBOM
May 16-October 7	30% oats, 25% hay, 37.6% barley, 7.4% SBOM

1/ all lots received minerals at the rate of 10 pounds di-calcium phosphate and 20 pounds granulated salt, added to 1000 pounds of mixed feed for the first two months, after which the di-calcium phosphate was reduced to 5 pounds.

Table 30. Weights, gains and feed costs in the 1974 trial comparing alfalfa and soybean oilmeal as a protein supplement, fed to Hereford steers.

	Self-fed rations including:				
	No alfalfa	5% alfalfa	15% alfalfa	25% alfalfa	Soybean oilmeal
Initial wt., lb	409	411	409	411	410
Final wt., lb	1049	1090	1035	1049	1078
Gain, lb	640	679	626	638	668
Days fed	340	340	340	340	340
Avg. daily gain, lb	1.88	1.99	1.84	1.87	1.96
Lbs., feed/hd/day	16.5	17.9	17.5	17.6	17.9
Feed cost/100 lbs. gain	$36.75	$38.02	$40.56	$40.58	$40.90
Feed cost/hd/day	0.69¢	0.76¢	0.75¢	0.76¢	0.80¢

Table 31. Two year average eights, gains and feed costs in the trial comparing alfalfa and soybean oilmeal as a protein supplement, fed to Hereford steers.

	Self-fed rations including:				
	No alfalfa	5% alfalfa	15% alfalfa	25% alfalfa	Soybean oilmeal
Initial wt., lb	419	420	419	420	420
Final wt., lb	1054	1098	1063	1074	1047
Gain, lb	635	679	644	654	627
Days fed	324	324	324	324	324
Avg. daily gain, lb	1.97	2.10	2.00	2.02	1.93
Lbs., feed/hd/day	17.1	17.8	19.4	18.1	18.3
Feed cost/100 lbs. gain	$26.90	$27.38	$30.33	$29.09	$34.00
Feed cost/hd/day	0.52¢	0.76¢	0.75¢	0.76¢	0.80¢

Table 32. Average daily consumption in the 1974 trial comparing alfalfa and soybean oilmeal as protein supplement.

	Self-fed rations including:				
Ingredients	No alfalfa	5% alfalfa	15% alfalfa	25% alfalfa	Soybean oilmeal
Oats, lb	7.20	7.74	7.60	7.72	7.85
Barley, lb	44.50	5.02	4.81	4.82	3.62
Soybean oilmeal, lb	--	--	--	--	1.21
Tame hay, lb	4.34	3.84	2.14	0.52	3.85
Alfalfa, lb	--	0.87	2.46	4.11	0.86
Di-cal, lb	0.10	0.11	0.10	0.10	0.11
Trace mineral salt, lb	0.32	0.35	0.34	0.34	0.35

Table 33. Carcass data. Hereford steers, 1973 protein supplement trial.

	Self-fed rations including:				
	No alfalfa	5% alfalfa	15% alfalfa	25% alfalfa	Soybean oilmeal
Final wt., lb	1059	1106	1091	1098	1015
Hot carcass wt., lb	643	671	644	654	610
Dressing %	61	61	59	60	60
Grades-Choice	4	4	4	2	5
Good	3	2	2	5	2
Carcass value, $	373	397	390	391	365
Net profit, $	265	284	257	273	207

Table 34. Carcass data. Hereford steers, 1974 protein supplement trial.

	Self-fed rations including:				
	No alfalfa	5% alfalfa	15% alfalfa	25% alfalfa	Soybean oilmeal
Final wt., lb	1049	1090	1035	1049	1078
Hot carcass wt., lb	621	643	619	632	648
Dressing %	59	59	60	60	60
Grades-Choice	6	4	6	5	5
Good	1	3	1	2	2
Carcass value, $	383	385	382	385	394
Net profit, $	148	127	128	126	121

Table 35. Carcass data. Hereford steers, protein supplement trial, two year average.

	Self-fed rations including:				
	No alfalfa	5% alfalfa	15% alfalfa	25% alfalfa	Soybean oilmeal
Final wt., lb	1054	1098	1063	1074	1047
Hot carcass wt., lb	632	657	632	643	629
Dressing %	60	60	60	60	60
Grades-Choice	5	4	5	4	5
Good	2	3	2	3	2
Carcass value, $	378	391	386	388	380
Net profit, $	207	206	193	200	164

Summary:

Neither the level of alfalfa in the ration nor the addition of soybean oilmeal protein supplement affected gains significantly. Feed costs were highest for the ration supplemented with soybean oilmeal, but grains were no better with this ration than with rations not supplemented. The lowest net profit for any ration in this comparison was from the ration supplemented with soybean oilmeal.

HEREFORD AND BLACK WHITE FACE STEERS ON SELF-FED FATTENING RATIONS

The feedlot performance of Hereford and Angus X Hereford crossbred steers on self-fed fattening rations has been compared over a two-year period.

The feeding period in 1973 extended from February 2 until November 19, a total of 308 days. In 1974 the 340 days feeding period was from November 1, 1973 to October 7, 1974.

During the feeding period, oats in the ration was replaced by barley as shown in the following table.

Summary:

While the 100 pound difference in gain per head in 1974 in favor of the Hereford steers is statistically significant, no difference is shown in the net profit realized.

Results over the two years of feeding indicate that Hereford and Angus X Hereford crossbreds performed equally well on the self-fed rations used.

Table 36. Composition of self-fed ration by weight for the feeding period November 6, 1973 to October 7, 1974 1/.

Ration of 5% alfalfa-20% tame hay	
November 6-November 12	25% oats, 75% hay
November 13-November 25	50% oats, 50% hay
November 26-March 20	65% oats, 25% hay, 10% barley
March 21-April 22	50% oats, 25% hay, 25% barley
April 23-May 15	40% oats, 25% hay, 35% barley
May 16-October 7	30% oats, 25% hay, 45% barley

1/ All lots received minerals at the rate of 10 pounds di-calcium phosphate and 20 pounds granulated salt, added to 1000 pounds of mixed feed for the first two months, after which the di-calcium phosphate was reduced to 5 pounds.

Average daily consumption of the self-fed ration is shown in table 37.

Table 37. Average daily consumption, self-fed rations, 1974.

Ingredient	Hereford	BWF
Oats, lb	7.74	7.11
Barley, lb	5.02	4.38
Tame hay, lb	3.84	3.50
Alfalfa, lb	0.87	0.78
Di-cal, lb	0.11	0.10
Trace mineral salt, lb	0.35	0.31

Weights, gains feed cost and carcass data are summarized in tables 38 and 39.

Table 38. Weights, gains and feed cost in the trial comparing Hereford and black white face steers on a self-fed fattening ration.

	1974 Trial		1973 Trial		2-Year Avg.	
	Hereford	BWF	Hereford	BWF	Hereford	BWF
Initial wt., lb	411	424	428	428	420	426
Final wt., lb	1090	1003	1106	1042	1098	1023
Gain/hd, lb	679	579	678	614	679	597
Days fed	340	340	308	308	324	324
Avg. daily gain, lb	1.99	1.70	2.20	1.99	2.10	1.85
Lbs., feed/hd/day	17.9	16.2	18.4	19.3	17.8	17.8
Feed cost/100 lbs. gain	$38.02	$40.14	$16.74	$19.41	$27.38	$29.78
Feed cost/hd/day	0.76	0.68	0.37	0.39	0.57	0.54

Table 39. Carcass data-Hereford vs. black white face on self-fed fattening rations.

	1974 Trial		1973 Trial		2-Year Avg.	
	Hereford	BWF	Hereford	BWF	Hereford	BWF
Final wt., lb	1090	1003	1106	1043	1098	1023
Hot carcass wt., lb	643	595	671	629	657	612
Dressing %	59	59	61	60	60	60
Grades-Choice	4	5	4	4	-	-
Good	3	2	2	2	-	-
Carcass value, $	385	362	397	374	391	368
Net Profit, $	127	130	284	255	206	193

COMPARISONS OF BWF AND HEREFORD STEER CALVES UNDER GROWING CONDITIONS

This trial is a phase of a comparison of crossbred Angus-Hereford (BWF) steers with Hereford steers under both pasture and feedlot conditions.

In this trial, steer calves were wintered to gain approximately 1.5 pounds per day on a limited grain-high roughage growing ration. In this trial, two lots of 13 steers each of BWF and Hereford type were wintered for 152 days, from November 30 to May 1, 1974. During this time, each calf was fed a ration of 3 pounds of oats, 2 pounds alfalfa hay, 0.2 pounds mineral mix and tame hay free choice. The calves were weighed monthly and feed consumption per lot was recorded.

Summary:

During this wintering phase, the Hereford steers were more efficient than the BWF steers requiring $4.69 less feed per one hundred pounds gain.

The Hereford steers gained $28 pounds more per head than the BWF, the difference being statistically significant at the 95 percent profitability level.

Twelve steers from each group were pastured together and wil be finished in dry lot following the summer grazing period.

Table 40. Results of the 1974 winter growing period with BXF and Hereford steers.

	BWF	Hereford
Number of head	13	1/12
Initial weight, lb- (Nov. 30, 1973)	366	375
Final weight, lb- (May 1, 1974)	547	583
Average steer gain, lb Difference, lbn	180	208 + 28
Days fed	152	152
Average daily gain, lb	1.18	1.37

1/ One steer removed because of lameness.

Table 41. Ration fed, feed consumption and costs per hundredweight gain.

	BWF Lbs/hd per day	Hererford Lbs/hd per day
Ration as fed:		
Oats	3.0	3.0
Alfalfa hay	2.0	2.0
Tame hay	9.8	9.8
Mineral mix	0.2	0.2
Total feed consumed	15.0	15.0
Lbs. feed/lb gain	12.6	10.8
Ration costs:		
Per head	$51.20	$49.89
Per 100 lb gain	28.39	23.70

Feed costs in this ration figured at:

$0.0438	for oats
0.02	for alfalfa
0.015	for tame hay
0.0955	for mineral mix

CROSSBREDS VS. STRAIGHTBREDS

With the current interest in crossbreeding a trial was started in 1972 to compare Hereford and Angus X Hereford (BWF) steers under uniform conditions in western North Dakota. The steers reported in this trial were pastured for six months and then finished in dry lot for five months.

The steers were wintered under uniform conditions (see previous article) and started on trial at an initial weight of approximately 600 pounds. Twelve steers of each breed (Hereford or BWF) were randomly allotted by weight grazing in late April or early May on crested wheatgrass. About the end of June or early July they grazed on native pastures. The steers were then moved to Russian wildrye pastures. Grazing on the Russian wildrye pastures ran from about September 1 to November 1.

In Phase 2, the steers were fed in dry lot for about 5 months. The steers were fed in straight Hereford or BWF groups in order to measure feed efficiency. At the finish of the dry lot (steers averaged 1050-1100 pounds) carcass information was gathered on all steers.

Discussion:

The three year's data would indicate that approximately 190 days of grazing were obtained using the three pasture types. Average daily gain on pasture averaged about 1.35 pounds per head per day for the grazing period.

In dry lot, the steers were hand fed in 1972 using oats, barley, hay and silage. In 1973, the steers were self fed a high grain ration (see table 43).

Table 42 shows the three year steer gains on pasture.

Table 43 shows the average ration fed in dry lot in 1973.

Table 44 shows the results of dry lot feeding, over-all carcass quality and value returned in 1973.

Table 45 shows the two year average results of dry lot feeding.

Summary:

After three years of grazing, we see that the crossbred steers gained faster averaging 16.3 pounds more gain per head than the Hereford.

Two years results in dry lot show most of the crossbred advantage in higher grading carcasses, and therefore higher carcass values. The average dollar advantage of crossbreds was about $25 per head.

Table 42. Yearling steer gains on pasture, 1972-1974.

Pasture grazed	Grazing period	Hereford	BWF
Crested wheatgrass:			
1972 (56 day)	May 12-July 7	109.5	133.5
1973 (56 days)	April 26-June 21	82.5	84.2
1974 (55 days)	May 1-June 25	90.0	84.1
3 Yr. avg.		94.0	100.6
Native pasture:			
1972 (56 day)	July 7-Sept 1	43.5	41.5
1973 (56 days)	June 21-Aug 23	110.8	104.2
1974 (55 days)	June 25-Sept 4	107.5	130.0
3 Yr. avg.		87.3	91.9
Russian wildrye	Sept 1-Oct 27	84.5	81.0
1972 (56 day)	Aug 23-Nov 2	62.5	77.9
1973 (56 days)	Sept 4-Nov 13	36.4	39.7
1974 (55 days)		61.1	66.2
3 Yr. avg.			
Combined average			
1972 (56 day)	May 12-Oct 27	237.5	256.0
1973 (56 days)	April 26-Nov 2	255.8	266.2
1974 (55 days)	May 1-Nov 13	233.9	253.8
3 Yr. avg.		242.4	258.7
Average daily gain		1.31	1.40

Table 43. Ration fed in dry lot.

	Hereford	BWF
Number of head	12	12
55% barley, lb	13,414	14,233
35% oats, lb	8,609	9,139
10% alfalfa hay, lb	2,358	2,508
tame hay, lb 1/	11,600	11,600
Di-cal, lb	182	189
Salt, lb	525	559
Total feed cost + grinding	$1,459.61	$1,535.53

1/ Tame hay fed while steers were warmed up on feed.

Table 44. Steer gains in dry lot, 1973.

	Hereford	BWF
Number of head	12	12
Initial weight, lb	793.3	833.8
Final weight, lb	1072.5	1112.1
Average gain, lb	279.2	278.3
Days fed	130	130
Average. daily gain, lb	2.15	2.14
Hot carcass weight, lb	605.4	629.7
Dressing percent	56.4	56.6
Grade:		
Choice=$68.00	4	5
Good=$64.00	8	7
Average carcass value	$395.68	$413.72
Average feed cost/animal	121.63	127.96
Value over feed	274.05	285.76
Feed cost/cwt gain	43.57	45.97
Advantage of crossbreds per head = $11.71		

Table 45. Steer gains in dry lot, 2-year average 1972-1973.

	Hereford	BWF
Number of head	22	22
Initial weight, lb	820.2	842.6
Final weight, lb	1073.8	1102.0
Average gain, lb	253.6	259.4
Days fed	133	133
Average. daily gain, lb	1.90	1.95
Hot carcass weight, lb	606.6	635.3
Dressing percent	56.5	57.7
Grade:		
Choice=$68.00	6	14
Good=$64.00	16	8
Average carcass value	$412.67	$441.28
Average feed cost/animal	89.09	92.32
Value over feed	323.58	348.95
Feed cost/cwt gain	34.18	34.77
Advantage of crossbreds per head = $25.38		

THE SLOTTED FENCE SHELTER FOR BEEF CATTLE

The slotted board fence is an effective shlter for beef cattle in western North Dakota, proven by nine years of use at the Dickinson Experiment Station.

The idea as well as the design for the shelter in use at the station was borrowed from a prototype winfbreak at the University of Saskatchewan livestock feedlot at Saskatoon, Saskatchewan, Canada.

Beginning in 1965, the slotted fence was used here in feedlot trials which compared its effectiveness with solid board fence and pole shed shelters. Five years' results showed no marked differences between these types of shelter as measured by rate of grain, efficiency of feed conversion or health of the cattle.

Since 1969, the slotted fence has also been used successfully at Dickinson as winter shelter for the beef breeding herd. During the five years this type of shelter has been used for the breeding herd, satisfactory weight gains have been maintained, calving percentage have been very good and general herd health has been satidfactory.

Table 46. Cow weights during the winter period 1969-1974.

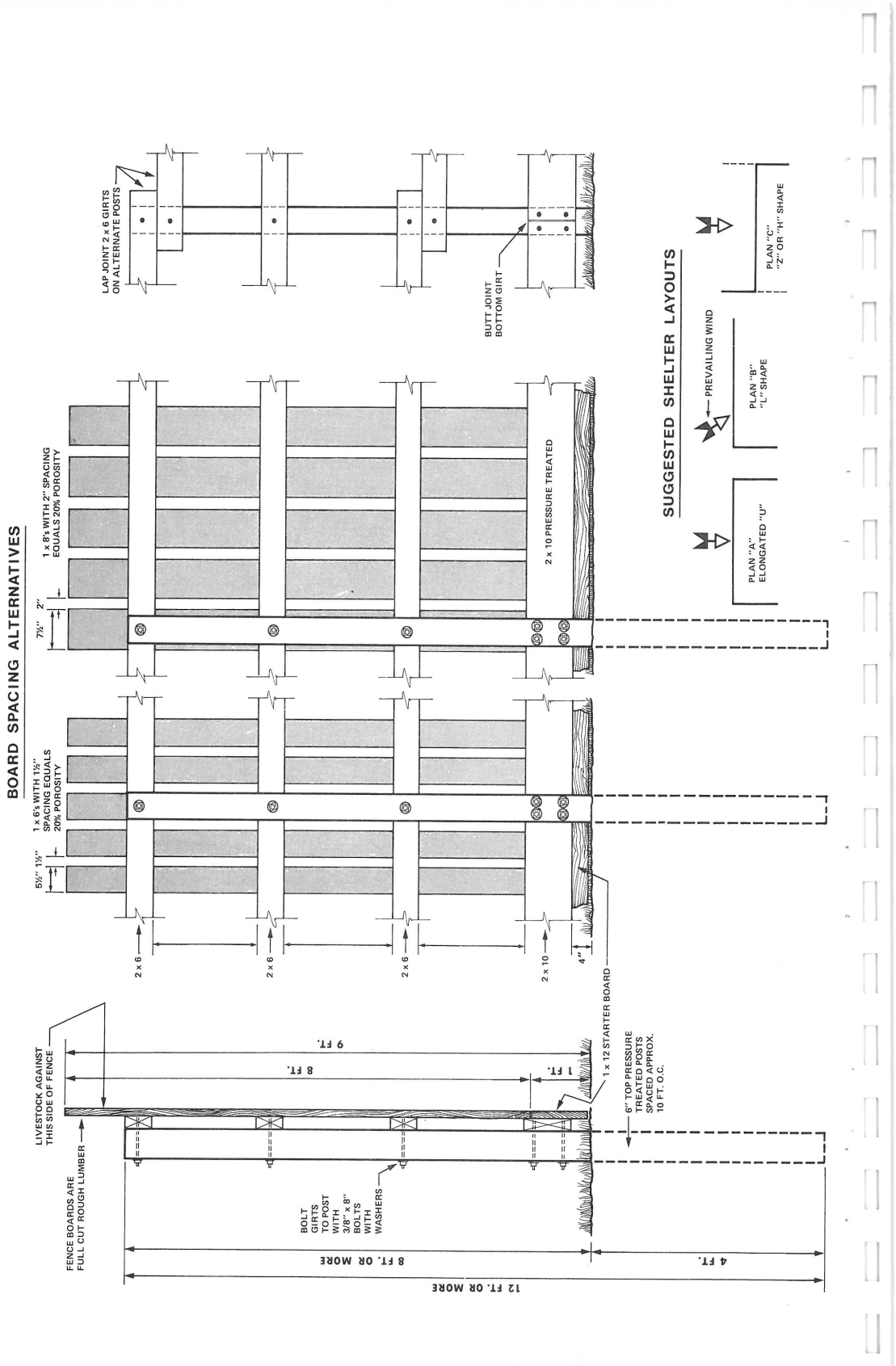
Year	Weight on:				Difference
1969-70	Nov. 26	1072	Mar. 19	1110	+38
1970-71	Nov. 30	1082	Mar. 17	1123	+41
1971-72	Dec. 3	1079	Mar. 15	998	-81
1972-73	Dec. 1	1046	Feb. 28	1107	+61
1973-74	Dec. 3	1052	Jan. 31	1086	+34

Table 47. Percent calf crop, 1969-1974.

Year	Cows	Calves	Percent calf crop
1969-70	81	77	95
1970-71	85	83	98
1971-72	91	90	99 (Two sets twins)
1972-73	105	101	96 (One set twins)
1973-74	119	115	96

Two controlling factors in fence design are; percent slot area to total fence area; and, slot width. Designs which utilize board widths of 6 to 8 inches are recommended because the best combinations of porosity and slot width can be provided with lumber of these dimensions.

Suggested construction detail is shown on the following page.


BOARD SPACING ALTERNATIVES
1 x 6's WITH 1½" SPACING EQUALS 20% POROSITY
5½" 1½"
1 x 8's WITH 2" SPACING EQUALS 20% POROSITY
7½" 2"
2 x 10 PRESSURE TREATED
2 x 6
2 x 6
2 x 6
2 x 10
4"
1 x 12 STARTER BOARD
6" TOP PRESSURE TREATED POSTS SPACED APPROX. 10 FT. O.C.
LIVESTOCK AGAINST THIS SIDE OF FENCE
FENCE BOARDS ARE FULL CUT ROUGH LUMBER
BOLT GIRTS TO POST WITH 3/8" x 8" BOLTS WITH WASHERS
9 FT.
8 FT.
1 FT.
12 FT. OR MORE
8 FT. OR MORE
4 FT.
LAP JOINT 2 x 6 GIRTS ON ALTERNATE POSTS
BUTT JOINT BOTTOM GIRT
SUGGESTED SHELTER LAYOUTS
PREVAILING WIND
PLAN "A" ELONGATED "U"
PLAN "B" "L" SHAPE
PLAN "C" "Z" OR "H" SHAPE

SWINE FEEDING TRIALS
WINTER 1973-1974

Swine fattening rations in which triticale or barley as the major grain ingredient were used in these trials. Both natural protein (soybean oilmeal) and the amino acids (lysine and methionine) were also tested as suitable ration supplements.

Hogs started on trial at an initial weight between 30 and 40 pounds, and were fed for a period of 122 days depending upon sex and ration. All rations were processes in a portable grinder-mixer and self-fed in meal form. The pigs used in the trial were farrowed during August and September, 1973. All pigs were wormed and dichlorvos at the beginning of the trial. Both crossbred and purebred pigs were uniformly distributed within lots.

The ration ingredients, costs and calculated protein levels are shown in table 48. Weights, gains and feed costs are summarized in tables 49 to 51.

Table 48. Rations as fed-winter hog trials, 1974.

Ingredients:	Ration 1 Barley & SBOM	Ration 2 Triticle & SBOM	Ration 3 Triticale & Lysine-Methionine	Ration 4 Triticle Barley & SBOM
Barley, lb	679	--	--	200
Triticale, lb	--	679	772	679
Oats, lb	200	200	200	--
Soymeal, lb	100	100	--	100
Lyamine, 50%, lb	--	--	5	--
Methionine, 99%, lb	--	--	1.5	--
Minerals & vitamins 1/	21	21	21	21
Crude protein, %	14.7	16.3	13.1	16.5
Cost/100 lb feed, $	5.51	5.51	5.55	5.67

1/ Includes: 10 lb. limestone, 5 lb. di-calcium phosphate, 5 lb. trace mineral salt, 1 lb. vitamin B complex, 30 gms. vitamin A, 14 gms. vitamin D_3 and 180 gms. zinc sulphate per 1000 lbs. feed.

Table 49. Weights, gains and feed costs-swine feeding trials, winter 1973-1974.

	Ration 1	Ration 2	Ration 3	Ration 4
Initial wt., lb	30	30	31	32
Final wt., lb	188	197	191	198
Gain, lb	158	167	160	1166
Days fed	122	122	122	122
Avg. daily gain, lb	1.30	1.37	1.31	1.36
Feed/hd/day, lb	4.97	5.26	5.31	4.63
Feed/lbs gain, lb	3.82	3.84	4.04	3.40
Cost/100 lb gain, $	21.07	21.21	22.57	19.32

Table 50. Comparison of crossbreds vs, purebred barrows fed the 14.7% barley + soybean oilmeal ration.

	Yorkshire	Duroc X Yorkshire
Initial wt., lb	39	39
Final wt., lb	199	211
Gain, lb	160	172
Days fed	122	122
Avg. daily gain, lb	1.31	1.41
Feed/hd/day, lb	5.19	6.01
Feed/lbs gain, lb	3.96	4.26
Cost/100 lb gain, $	21.81	23.46

Table 51. Comparison of barley and triticale for swine growing-fattenting rations, 2-year average.

	Barley		Triticale	
	Barrows	Gilts	Barrows	Gilts
Initial wt., lb	41.2	42.8	41.6	42.0
Final wt., lb	203	219	207	213
Gain, lb	162	176	165	171
Days fed	121	135	121	135
Avg. daily gain, lb	1.34	1.30	1.36	1.26
Feed/cwt gain, lb	415	465	411	448
Cost/cwt gain	18.22	20.24	18.12	19.32

Summary:

The 1974 trials show that clean, ergot free triticale will substitute, pound for pound, for barley in growing-finishing rations for pigs. Although triticale contains about 16% crude protein, triticale rations supplemented with soybean oilmeal performed slightly better than those supplemented with the amino acids, lysine and methionine.

Crossbred barrows gained about a tenth of a pound faster than the purebred barrows. However, they consumed about 0.8 pounds more feed per day, and required 0.3 pound more feed per pound of gain than did the purebred barrows. This amounted to an increase of $1.65 in the cost per hundred weight gain for the crossbreds.

Two years' data comparing triticale and barley show the two grains to produce equal results in growing-finishing rations for pigs.

FEEDING LIQUID WHEY IN SWINE FATTENING RATIONS

The disposal of liquid whey, a by-product of cheese manufacture at North Dakota cheese plants, has been a problem. Its resistance to decomposition in sewage systems has made it necessary to find other means of disposal. Its use as a fertilizer is a limited value. However, I can be used in swine feeding to provide necessary protein.

This trial was designed to investigate the use of liquid whey as a supplement in swine fattening rations. In this experiment, whey, soybean oilmeal and lysine are compared , as supplements to a basic barley and oats fattening ration. Pigs of two starting weights were used, and were fed in concrete dry lot, and on winter wheat pasture. The pigs were started on whey gradually, and did not develop any scouring.

Liquid whey was self-fed using nipple type waterers. The whey fed pigs received no extra water after the first month, their entire liquid intake coming from the whey. The whey was furnished daily by the Dickinson Cheese Company, stored in fiber glass tanks at the station for twenty four hours, and fed in sour form. The whey was furnished at no cost, but in rations computations, a change of ½ cent per gallon was made to cover cost of hauling and handling.

Although the utilization of whey was impossible to measure accurately because of waste in feeding, it amounted to approximately 2.55 gallons per pig per day. This is in agreement with figures for liquid consumption as presented by the National Research Council.

Table 52 shows ration composition and costs. Table 53 summarizes weights, gains and feed costs for dry lot trials over the past two years. Table 54 shows results under pasture conditions.

Summary:

Barley-oats supplemented with whey were equal to rations supplemented with either soybean oilmeal or amino acids lysine and methionine. The whey fed pigs were more efficient and had a lower cost of gain than either the soybean oilmeal or the amino acid fed pigs. The whey fed pigs required approximately 100 pounds less dry feed per 100 pounds gain than the other rations. This amounted to a savings of about $4/100 pounds gain over the amino acid fed pigs and $5/100 pounds gain over the soybean oilmeal fed pigs.

It appears from this trial that whey can be utilized very satisfactorily in a swine feeding program if: the source of whey is adequate and dependable; the pigs weigh at least 35 pounds; and, proper liquid feeding devices (stainless steel or PVC plastic) are utilized to minimize contamination, fly and odor problems.

Table 52. Rations as fed, summer hog trials-1974.

	Ration Supplement		
	SBOM	Lysine	Whey
Oats, lb	200	231	236
Barley, lb	676	739	740
Soymeal, lb	100	--	--
Lyamine, lb	--	6	--
Minerals, vitamins 1/	24	24	24
Price/ton, $	111	109	102

1/ Includes: Limestone 9 lb., di-cal 9 lb., trace mineral salt 5 lb., vitamin B complex, 1 lb., 30 gms. vitamin A, 14 gms. vitamin D_3 and 180 gms. zinc sulphate per 1000 lbs. feed.

Table 53. Weights, gain and feed cost in dry lot trials at two starting weights, 2-year average.

	Ration Supplement					
	SBOM		Lysine		Whey	
Initial wt., lb	36	50	36	50	35	50
Final wt., lb	197	220	189	215	192	208
Gain, lb	161	170	126	119	126	119
Days fed	126	119	126	119	126	119
Avg. daily gain, lb	1.28	1.43	1.21	1.39	1.24	1.32
Feed/cwt gain, lb	406	395	411	403	291	301
Cost/cwt gain	18.87	18.44	17.99	17.36	13.16	13.32

Table 54. Weights, gain and feed costs in pasture trials at two starting weights-1974.

	Ration Supplement			
	Whey	Lysine	Whey	SBOM
Initial wt., lb	34	34	47	47
Final wt., lb	209	224	236	217
Gain, lb	175	190	189	170
Days fed	138	138	138	117
Avg. daily gain, lb	1.26	1.38	1.37	1.45
Feed/cwt gain, lb	353	437	347	401
Cost/cwt gain	$20.40	$23.84	$20.00	$22.21

INCLUDING ANTIBIOTICS IN SOW RATIONS TO REDUCE BABY PIG LOSSES

Many baby pigs die before weaning from scours, miscellaneous infections and starvation caused by a sow failing to milk. Feeding high levels of antibiotics two weeks before and for three weeks after farrowing is reported to reduce baby pig losses, improve milk production in the sow and increase number of pigs weaned.

In August 1974, 24 bred sows and gilts were divided into nearly equal groups based on breed and expected farrowing dates. They were moved into the farrowing barn about 5 days prior to farrowing and assigned to either medicated or non-medicated feed. In 1974, the antibiotic (containing 15 gms./lb of oxytetracycline and 10 gms./lb neomycin) was top dressed on the sows rations at the rate of 27 grams per sow per day. This rate of medication was continued to the medicated group until three weeks after farrowing.

Table 55 shows the three rations in 1974. The gestation ration was fed until the sows went into the farrowing barn. The early-lactation ration was fed until the pigs were moved out of the farrowing barn at about seven days of age. The lactation ration was then fed until weaning.

Table 55. 1974 Sow gestation and lactation rations.

	Gestation ration	Early Lactation ration	Lactation ration
Alfalfa hay, lb	300	--	--
Barley, lb	--	--	676
Oats, lb	672	970	175
Soymeal, lb	--	--	125
Limestone, lb	10	10	9
Di-calcium phosphate, lb	10	10	9
Trace mineral salt, lb	7.5	7.5	5
Vitamin B cxomplex, lb.	1	1	1
Vitamin A, gram	75	75	30
Vitamin D_3, gram	14	14	14

Table 56. Results of trial with the use of neomycin-oxytetracycline in sow rations.

	Treated			Check		
	1973	1974	2-yr. Avg.	1973	1974	2-yr. Avg.
Number of litter	12	12	24	1/ 11	12	23
Crossbred	8	6	14	2	5	7
Straightbred	4	6	10	9	7	16
Number living at birth	129	138	134	131	121	126
Avg. birth wt. lb	2.60	2.82	2.71	2.45	2.92	2.68
Number living at weaning	113	109	111	81	94	87.5
Avg. birth wt., lb	28.2	28.2	28.2	29.9	26.4	28.2
Avg. age at weaning, days	51	45	48	56	45	50.5
Avg. daily gain, birth to Weaning, lb	0.50	0.56	0.53	0.52	0.52	0.52
Percent alive at weaning	88	79	84	62	78	70
Sows requiring additional medication	5	4	4.5	3	3	3

1/ One sow not included because she farrowed unattended in a portable house and lost most of her pigs.

Summary:

The 1974 farrowing showed very little difference between the control or medicated groups with about 79% of pigs born alive weaned in both groups. The two year average shows about 14% more pigs weaned from the medicated sows than from the control sows. The cost of medication in 1974 averaged about $1.82 per sow.

REPORT OF

GRASS AND LEGUME INVESTIGATIONS

AT THE

DICKINSON EXPERIMENT STATION

1974

by

Warren C. Whitmen

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THREE-PASTURE SYSTEM GRAZING TRIAL

The grazing trial using crested wheatgrass for spring and early summer grazing, native grass in mid and late summer, and Russian wildrye for fall grazing was continued for the third year in the 1974 season. The trial compares fertilized crested wheatgrass and fertilized native grass with unfertilized pastures of the same kinds. The Russian wildrye pastures used in the trial have all been fertilized each year. The fertilized crested wheatgrass and native grass pastures have been given annual applications 75 lbs N in 1972, 150 lbs N in 1973, and 50 lbs N - 30 lbs P_2O_5 in 1974.

The grazing plan for the 1974 season is shown in table 1. This year 12 yearling steers were used on each pasture, just as in the 1973 season. Two of the 8-acre Russian wildrye pastures were grazed from early September to earlt October, while the remaining two pastures were grazed ib October and early November.

Forage production and grazing utilization of the forage on the pastures for the 1974 season are shown in table 2. Forage production on the crested wheatgrass pastures in the 1974 season was slightly higher than in 1973, averaging about 29% greater on the unfertilized pastures and about 16% greater on the fertilized pastures. Since approximately the same amount of forage was consumed by the grazing animals in both seasons, overall utilization was somewhat less this year than in 1973. The utilization of 46% on the unfertilized crested and 58% on the fertilized pasture was lower than would normally be desirable, and considerable amounts of forage were left on the ground at the end of the grazing period. The grazing period on the crested wheatgrass pastures extended from May 1 to June 25, a total of 55 days.

The production on the native grass pastures was appreciably higher in the 1974 season than in the 1973 season, averaging about 30% higher on the unfertilized pasture and 55% higher on the fertilized pasture. Final utilization values on these pastures were 44% and 42%, respectively, quite similar to utilization values in the 1973 season. The grazing period on the native grass pastures was from June 25 to Sept. 4, a total of 71 days.

Production on the Russian wildrye pastures was about the same in the 1974 season as in the 1973 season. Utilization on the first two 8-acre pastures grazed was quite heavy, averaging 75% on one and 90% on the other with approximately the same total pounds of forage being consumed off each pasture. Overall consumption of forage was not quite as great on these pastures this year as in the 1973 season. The steers grazed the first two Russian wildrye pastures (pastures 3 and 4) from Sept, 4 to Oct. 11, a period of 37 days. The steers were moved to the remaining two wildrye pastures on Oct. 11 and were still grazing there at the time this report was prepared.

The performance of the steers on the pastures is shown in the data of table 3. As in the 1973 season, half of the steers in each lot were black white faces and half were Hereford. Gains per acre on the crested wheatgrass pastures were slightly better in 1974 than in the 1973 season, averaging 71.3 lbs on the unfertilized pastures. Daily gains per head were also slightly better than last year. In all three years of the trial the daily gains per head have been a little bit better on the unfertilized crested wheatgrass than on the fertilized pasture. In the 1974 season daily gains per head average 1.72 lbs on straight crested and 1.44 lbs on the fertilized crested wheatgrass.

The steers were moved from the crested wheatgrass pastures to the native grass pastures on June 25 in order to begin grazing the native grass before it became to mature. The gains of the steers on native grass this year were about the same as last year, averaging 1.53 lbs/head/day on the unfertilized native and 1.82 lbs/head/day on the fertilized native grass. In the 1973 season the steers also made better daily gains on the fertilized native grass than on the unfertilized. Gains per acre this year were somewhat better than last year, averaging 72.2 lbs on the unfertilized native and 129.1 lbs/acre on fertilized native. These gains were 7% better than last year on the unfertilized pasture and 15% better than on the fertilized pasture. The steers were on the native grass pastures from June 25 to Sept 4, a period of 71 days. Utilization on both pastures was less than 45%.

The steers went into the first set of Russian wildrye pastures on Sept. 4 and grazed on these pastures until Oct. 11. They were then moved to the second set of pastures where they continued to graze until about the middle of November (still on pasture at the time this report was prepared.). They were weighted on the second set of pastures on Oct. 25. The weights and gains of the steers on both sets of pastures are given in table 3. On the Russian wildrye pastures the animals were segregated according to whether they had been receiving Kedlor supplement. The group receiving Kedlor was placed in pasture 3 and was transferred to pasture 2 after the Oct. 11 weighing.

The gains of the steers on both pastures averaged 1.32 lbs/head/day for the first 37 days on the Russian wildrye pastures, with those on pasture 3 averaging 1.38 lbs/head/day while those on pasture 4 averaged 1.25 lbs. After transfer to the second set of pastures daily gains decreased, with the decrease being especially marked in the steers in pasture 2. The grass being grazed by the steers during the early part of the period on the Russian wildrye pastures contained considerable green material, estimated to be as much as 50%. There was less green material in the forage as the grazing period continued, and this year there was very little regrowth of the grass after grazing. Gains on pasture 2 between Oct 11 and Oct 25 averaged only 0.74 lbs/head/day, while gains on pasture 1 averaged 1.19 lbs/head/day. Gains per acre on the second set of pastures appear low in table 3, but at the time of the last reported weighing on Oct 25, over half the grazable forage still remained unused in these pastures. Gains per acre should appreciably higher by the end of the grazing period (approximately Nov 15).

As previously mentioned, each of the two lots of animals grazed on the experimental pastures consisted of 6 Hereford and 6 Black white faced steers. The data of table 4 show the average daily gains per head of the Herefords and the black white faces on the different sets of pastures throughout the 163-day grazing period from May 1 to Oct 11. The figures given for the animals on the Russian wildrye pastures are derived from the weights of the animals that were on unfertilized or fertilized pastures prior to the time that they came on to the Russian wildrye pastures. While there are some inconsistencies in the data, the seasonlong average daily gains for the Herefords and the crosses seem to show little overall difference on the same treatment. The animals on the fertilized pastures show slightly low daily gains than do the animals coming from the unfertilized pastures. The average daily gain fr the season on the fertilized pastures was 1.51 lbs, while the average daily gain for the animals from the unfertilized pastures was 1.62 lbs per head. The results of the 1974 season paralleled the results obtained in 1973 season in that on the seasonlong basis there seemed to be very little difference between the daily gains of the black white faces and the Herefords.

Half of each lot og steers was fed Kedlor (biuret) while the animals were on native grass. When the animals were moved from the native grass to the Russian wildrye pastures, all the steers that had been fed Kedlor were put in one and continued to receive the supplement, and sll those that had not received the supplement were placed in the other lot. Kedlor blocks were made available to the steers to see whether this supplement would compensate for the loss of quality in the forage as it matured. The summary of the daily gains per head of the supplemented and non-supplemented steers is given in table 5.

While the results of the Kedlor feeding were not as clear-cut in the 1974 season as they were in the 1973 season, there does seem to have been some effect of Kedlor feeding in the second part of the native grass grazing period. During the period of July 23 to Sept 4 steers receiving Kedlor on unfertilized native grass averaged 2.13 lbs/day. On the fertilized native grass during this same period the steers with Kedlor showed average daily gains of 2.10 lbs/head, while those without Kedlor had an average gain of 1.82 lbs/head/day.

Contradictory results were obtained with Kedor feeding on the Russian wildrye pastures with some benefit indicated during the period of Sept 26 to Oct 11, and some possible detrimental effects appearing during the period from Oct 11 to 25. During this latter period it was observed that the steers with Kedlor were consuming excessive amounts of supplement, while not making as good gains as the steers not receiving the supplement. As in the 1973 season is became apparent that the supplemented steers might be experiencing some kind of nutritional imbalance, though perhaps not as severe as that which occurred on the Russian wildrye pastures in the 1973 season.

A summary of the 1974 results with the 3-pasture grazing system shows that the 12 yearling steers on the fertilized pastures each gained an average of 257 lbs during the 163-day grazing period extending from May 1 to Oct 11. During this period each steer consumed an average of about 55% of the forage produced on 2.3 acres. This represents overall average beef production of 111.7 lbs/acre. The steers grazing the combination of unfertilized crested wheatgrass and native grass with fertilized Russian wildrye gained an average of 252 lbs each during the same period, utilizing about 50% of the forage produced on 3.5 acres. The overall production of beef on these pastures was thus 72 lbs/acre.

Table 6 gives a summary of the 3-year results of the trail. The 3-pasture system with fertilizer on all pastures has produced an average of a little over 100 lbs of beef per acre, while the system with only the Russian wildrye pastures fertilized has produced an average of about 67 lbs of beef per acre over the 3-year period of the trial. The present unfavorable economic situation puts the use of fertilizer in the system below a profitable level despite the obvious increase in beef production per acre. The system itself seems quite well-adapted to the conditions existing in the west river area, although many grazing management problems remain to be worked out.

Table 1. Proposed grazing plan for the three-pasture trial using 12 yearling steers per pasture for the 1974 season.

Pasture	Grazing Period	Pasture size-acres	Stocking rate-acres per steer per month
Crested wheatgrass	May-June	16	0.7
Crested wheatgrass + 50 lbs N	May-June	8	0.3
Native grass	July-Aug.	18	0.7
Native grass + 50 lbs N	July-Aug.	12	0.5
#3 Russian wildrye (fertilized)	Sept.	8	0.3
#4 Russian wildrye (fertilized)	Sept.	8	0.3
#1 Russian wildrye (fertilized)	Oct.	8	0.3
#2 Russian wildrye (fertilized)	Oct.	8	0.3

Table 2. Forage production and utilization during grazing periods on crested wheatgrass, native grass, and Russian wildrye pastures-1974 season.

Pasture	Pasture size-acres	Period grazed	Days in period	Forage produced-lbs/acre	Forage utilized-lbs/acre	Forage left on ground-lbs/acre	% utilization
Crested wheatgrass	16	5/1-6/25	55	1950	905	1045	46
Crested wheatgrass + 50 lbs N	8	5/1-6/25	55	2365	1366	999	58
Native grass	18	6/25-9/4	71	3079	1346	1723	44
Native grass + 50 lbs N	12	6/25-9/4	71	5270	2205	3065	42
Russian wildrye (3) (fertilized)	8	9/4-10/11	37	1739	1304	435	75
Russian wildrye (4) (fertilized)	8	9/4-10/11	37	1542	1388	154	90

Table 3. Pasture systems grazing trial. Weights and gains of yearling steers on crested wheatgrass, native grass and Russian wildrye pastures -1974 season.

Pasture	Period grazed	Days in period	No. of Steers	Avg. initial wt/steer lbs.	Avg. final wt/steer lbs.	Gain per head-lbs	Avg. daily gain per head-lbs	Avg. gain per acre-lbs
Crested wheatgrass	5/1-6/25	55	12	567.5	662.5	95.0	1.72	71.3
Crested wheatgrass + 50 lbs N	5/1-6/25	55	12	567.5	646.7	79.2	1.44	118.8
Native grass	6/25-9/4	71	12	662.5	770.8	108.3	1.53	72.2
Native grass + 50 lbs N	6/25-9/4	71	12	646.7	775.8	129.1	1.82	129.1
#3 Russian wildrye + 50 N & 30 P_2O_5	9/4-10/11	37	12	774.1	825.0	50.9	1.38	76.4 1/
#4 Russian wildrye + 50 N & 30 P_2O_5	9/4-10/11	37	12	772.5	818.8	46.3	1.25	69.5
#2 Russian wildrye + 50 N & 30 P_2O_5	10/11-10/25	14	12	825.0	835.4	10.4	0.74	15.6 1/
#1 Russian wildrye + 50 N & 30 P_2O_5	10/11-10/25	14	12	818.8	835.4	16.6	1.19	24.9

1/ Steers in this pasture all receiving Kedlor.

Table 4. Average daily gains (lbs.) of Hereford and Black White face 1/ steers on unfertilized and fertilized pastures during the 163-day grazing period in the 1974 season.

		Crested wheatgrass		Native grass		Russian wildrye 2/		
Pasture treatment	Steers	5/1-5/29 28 days	5/29-6/25 27 days	6/25-7/23 28 days	7/23-9/4 43 days	9/4-9/26 22 days	9/26-10/11 15 days	Avg. for 163 days
Unfertilized	Herefords	2.05	1.36	0.59	2.43	2.65	0.3.	1.61
	Black WF	1.70	1.79	1.34	1.74	1.55	1.55	1.63
	AVG.	1.89	1.58	0.97	2.09	2.10	0.94	1.62
Fertilized	Herefords	1.57	1.54	1.65	1.51	1.29	0.61	1.57
	Black WF	1.04	1.60	1.58	2.40	0.80	1.22	1.44
	AVG.	1.31	1.57	1.62	1.96	1.05	0.92	1.51

1/ Each lot of 12 steers consisted of 6 Herefords and 6 Angus X Hereford steers.

2/ Both sets of Russian wildrye pastures were fertilized. The gain per head figures represent the weights of the animals distributed as they were on the crested wheatgrass and the native grass pastures.

Table 5. Daily gains per head (lbs.) of steers with and without Kedlor supplement on native grass and Russian wildrye pastures in the 1974 season.

		Native grass		Russian wildrye		
Pasture treatment	Supplement treatment	6/25-7/23 28 days	7/23-9/4 43 days	9/4-9/26 22 days	9/26-10/11 15 days	10/11-10/25 14 days
Unfertilized	With Kedlor	0.59	2.13	---	---	---
	w/o Kedlor	1.34	1.64	---	---	---
Fertilized	With Kedlor	1.37	2.10	1.54	1.14	0.74
	w/o Kedlor	1.85	1.82	1.61	0.72	1.19

Table 6. Pasture systems grazing trial. Weights and gains of yearling steers on crested wheatgrass, native grass and Russian wildrye pastures -1974 season.

Pasture	Pasture size-acres	Avg. no. days grazed	No. of Steers	Avg. initial wt/steer lbs.	Avg. final wt/steer lbs.	Avg. gain per head-lbs	Avg. daily gain per head-lbs	Avg. gain per acre-lbs
Crested wheatgrass	16	56	12	572.8	677.1	104.3	1.87	73.0
Crested wheatgrass + 50 lbs N	8	56	12	575.4	665.7	90.3	1.62	125.6
Native grass	18	63	12	677.2	761.4	84.2	1.30	54.5
Native grass + 50 lbs N	12	63	12	665.7	760.7	95.0	1.46	92.6
#3 Russian wildrye (fertilized)	8	35	12	757.9	810.3	52.4	1.54	74.7
#4 Russian wildrye (fertilized)	8	35	12	764.2	806.8	42.6	1.41	58.6

MORE ON USE OF FEED GRADE BIURET TO SUPPLEMENT NATIVE RANGE AND RUSSIAN WILDRYE FALL PASTURE

In western North Dakota a sizeable number of yearling steers and heifers, 17 to 17 months of age, are pastured on native range from June to October. These animals are expected to gain from 1.50 to 1.75 pounds per head per day during this period. However, past work at this station indicates that by mid-July the protein, carotene and phosphorus levels of most range grasses are on a rapid decline. By the first of August these levels may deteriorate below the minimum requirements for a 660 pound steer to gain 1.6 pounds per day, as presented by the National Research Council on Beef Cattle Nutrition.

As mentioned in the previous report, the trial designed to measure the effect of supplemental feeding of feed grade biuret on both summer range and Russian wildrye fall pasture was continued for the second year.

Results of the 1974 trial are summarized in tables 7 and 8, and show that feed grade biuret can be used on native range in late summer and early fall and improve gains by helping to compensate for loss of forage quality.

However, this does not seem to hold throughout the late fall grazing period on Russian wildrye, with only minor benefit indicated the first month of the late fall period. During the second half of the late fall period, two snow storms occurred which depressed gains, even though there was ample forage available.

Table 7. Using feed grade biuret to supplement native range, 1974.

	Biuret Lots		Control Lots	
	BWF	Hereford	BWF	Hereford
Avg. weight, lb--	669	698	684	712
July 23	769	779	763	783
Sept. 4	100	81	78	71
43 day gain/hd.	91		75	
Combined gain	2.11		1.73	
Avg. daily gain/hd/day				
Biuret/hd/day, lb	0.29			
Cost of biuret:				
Per lb.	18.8¢			
Per head	$2.33			
Per cwt added gain	$14.31			

Table 8. Using feed grade biuret to supplement Russian wildrye, 1974.

	Biuret Lots		Control Lots	
	BWF	Hereford	BWF	Hereford
Avg. weight, lb–:				
Sept. 4	769	779	763	783
Oct. 11	816	834	809	828
37 day gain/hd.	47	55	46	45
Nov. 13	805	823	800	812
33 day loss/hd	11	11	9	16
Total gain, lb	36	44	37	29
Combined gain:				
Total avg./lb	40		33	
Avg. daily gain/lb	0.57		0.48	
Biuret/hd/day, lb	0.45			
Cost of biuret:				
Per lb.	18.8¢			
Per head	$5.94			
Per cwt added gain	$48.50			

PASTURE-TYPE ALFALFA TRIAL

The pasture --type alfalfa trial seeded in 1972 was clipped for yield for the second season in 1974. Two clippings were made on all alfalfa varieties. Stands of all alfalfa varieties continued to be from very good to excellent, although there was some damage from ground squirrels in a few of the plots. The ND-610 trefoil plots were not clipped in 1974 because the stands on these plots appeared to have thinned-out somewhat. The Emerald crownvetch and the Latana cicer milkvetch plots were not clipped either because of the continuing relatively poor stands on these plots. Stands on these latter plots continued to improve throughout the 1974 season, and it may be possible to clip them for yield in the 1975 season.

The clipping yields from the alfalfa and trefoil plots for the 1974 season are given in table 9. Yields were quite good considering the dry season, but the second clipping averaged only about one-third of the production obtained from the second clipping in the 1973 season. The average yiedl from the first clipping at 3201 lbs/acre was very similar to the average yield from the first clipping in the 1973 season (3351 lbs). The average total yield for all varieties in the 1974 season, 3773 lbs/acre, was about 23% less than the average total yield in 1973, primarily because of the lower yield from the second clipping.

In 1974 three varieties, SC-MF-3713, SC-Syn 37025m and Drylander all averaged over 2 tons/acre, and all the other varieties showed total production of over 3000 lbs/acre. The actual range in yield between the top producer, SC-MF-3713, and the lowest producer, SC-Syn-3701L, was only 707 lbs/acre. It is surprising that the pasture type alfalfas continue to yield about the same, or even more than standard alfalfa such as Ladak. However, regrowth after cutting is much slower in some of the varieties than in others.

Regrowth in Travois, SC-SYN 3701L, and Semi-Palatinsk was significantly slower than in most of the other varieties, although final production was not much different. Travois regrowth was appreciably shorter than regrowth of the other varieties. Rambler, Roamer, and Teton especially made fairly rapid regrowth.

Total yields for 1973 and 1974 and average yields for the 2 years are given in table 10. For all practical purposes there is little real difference between the average total production of the first five varieties given in the table, the range of production being only from 4774 lbs/acre for Ranbler to 4503 lbs for Drylander. The range in averge yield for the last seven varieties in the table also is rather narrow, being 4301 lbs/acre for SC-Syn 37045 to 3986 lbs for Semi-Palatinsk. Travois at 4107 lbs is about midway in this range.

So far there has not been any pronounced evidence of the development of a strong creeping habit in any of the varieties. This might be expected, since the treatment of the plots has been that of clipping rather than grazing. Vigor in all varieties seems to be relatively high, and thus far stand maintenance has been good.

Table 9. Production of varieties in pasture-type alfalfa trial-1974 season.

	Dry-weight yield-lb/acre		
Variety	1st clipping	2nd clipping	Total
SC-MF-3713	3731	371	4102
SC-Syn 37025	3348	728	4076
Drylander	3569	446	4015
Roamer	3290	696	3986
Rambler	3331	600	3931
SC-Syn 3703L	3180	671	3851
Semi-Palatinsk	3204	514	3718
SC-Syn 37045	3042	593	3635
Teton	3018	589	3607
Ladak	2890	637	3527
Travois	2898	533	3431
SC-Syn 3701L	2912	483	3395
AVERAGE	3201	572	3773

Table 10. Average yields of alfalfa varieties in the 1973-1974 seasons in the pasture-type alfalfa trial.

	Dry-weight yield-lb/acre		
Variety	1973	1974	2-year average yield
Rambler	5617	3931	4774
SC-Syn 37025	5186	4076	4631
SC-Syn 3703L	5391	3851	4621
Roamer	5254	3986	4620
Drylander	4991	4015	4503
SC-Syn 37045	4966	3635	4301
Lodak	4884	3527	4206
SC-Syn 3701L	4930	3395	4163
Teton	4700	3607	4154
Travois	4783	3431	4107
SC-MF 3713	4024	4102	4063
Semi-Palantinsk	4254	3718	4986
AVERAGE	4915	3773	4344

GRASS ADAPTATION TRIAL

The grass adaptation trial seeded in late summer in the 1972 season was clipped for the second year in the 1974 season. The stands of several species improved markedly in the 1974 season, and yields were taken from the plots of these varieties. Included in the varieties clipped in 1974 but not in 1973 were Turkey brome, Lodorm green stipa, green stipagrass (SCS), and sheep fescue. Plots of Basin wildrye, Mandan ricegrass, and Indian ricegrass have such poor stands that they have been removed fro the trial. Plots of both selections of Altai wildrye were found to be badly overgrown with slender wheatgrass, apparently included with the seed, and were not clipped this year.

Average yields of the varieties clipped in 1973 and 2974 are given in table 11 with the 2-year average yields included for the varieties clipped in both seasons. Overall yields were much better in 1974 than in 1973 with the 1974 yield for all varieties averaging 3505 lbs/acre (oven-dry weight). The highest yields of any variety in 1974 was obtained from Turkey brome 5355 lbs/acre, a variety that was not clipped in 1973. Lincoln brome was second high producer in 1974 with 5001 lbs/acre, followed closely by Topar pubescent wheatgrass #759 at 4042 lbs Yields of Mandan wildrye, Vinall Russian wildrye, and Sodar wheatgrass all exceeded 3800 lbs/acre. Production of the Vinall Russian wildrye plots in 1974 was high, despite the fact that the stands of this variety are still quite open.

The usually high yield of Durar hard fescue was largely the result of a heavy production of seedstalks. The stands of this variety also improved greatly in the 1974 season. Similar stand improvement was shown by sheep fescue, and this improvement was also accompanied by increased seedstalk production. Both of these varieties are short, fine-leaved bunchgrass and would not normally be expected to produce high yields.

Topar pubescent wheatgrass #759, selected at the Plant Materials Center at Bismarck, continued to outproduce the same variety with the seed source from the Pullman, Washington Materials Center. Both, however, are vigorous, high-producing strains. On the basis of the 2-year average yields the North Dakota Topar has been the top-producing variety in the trial.

Lincoln brome is second highest in 2-year average production, primarily because of its unusually high production in the 1974 season. Mandan 404 brome has been as high producing as Lincoln, but it is shorter, somewhat leafier, and may have somewhat better characteristics as a pasture grass. Sodar wheatgrass and Montana wheatgrass both produced unusually well in 1974. Sodar wheatgrass maintained a very good stand in the 1974 season, while the stands of Montana wheatgrass (selection from Agropyron albicans) increased from fair to good. The stands of western wheatgrass #456 also increased from fair to good.

The great increase in slender wheatgrass in the Altai wildrye plots was a disappointment. It is obvious now that slender wheatgrass had made up a large proportion of the yields from the Altai wildrye plots in the 1973 season, althou not much heading of this variety took place in that season. In the 1974 season it became apparent that as much as 75% of the production of some of the plots of Altai was from slender wheatgrass. Slender wheatgrass was rogued from the Altai plots in 1974, but the resultant of the wildrye were too scanty to harvest.

A warm-season grass variety seeding was made in the 1974 season, but again this was judged a failure. It would appear now that pigeon grass competition will have to be eliminated from the plots before the warm-season varieties will be successful.

Table 11. Two-year yields of grass varieties in the grass adaptation trial seeded in summer of 1972.

	Dry-weight yield-lb/acre		
Variety	1973	1974	2-year average yield
Topar, pubescent whtgr #759	3551	4042	3797
Lincoln brome	1512	5001	3257
Mandan 404 brome	1630	3772	2701
Mandan wildrye	1427	3927	2677
Topar pub. whtgr (Pull)	1646	3629	2638
Durar hard fescue	1136	3794	2465
Nordan crested whtgr	2199	2484	2342
Sodar whtgr	829	3908	2317
Montana whtgr	711	3679	2195
Vinall Russian wildrye	471	3891	2181
Western whtgr #456	1381	2689	2035
Turkey brome	-	5355	-
Lodorm green stipa	-	2418	-
Sheep fescue	-	2246	-
Green stipa (SCS)	-	1850	-
Altai wildrye (SCS)	2614	-1	-
Altai wildrye (Sask)	1933	-1	-
AVERAGE	1618	3505	2600

1/ Plots overgrown with slender wheatgrass-not harvested.

FERTILIZER ON GRASS AND ALFALFA

A trial to relate soil test values and the response of alfalfa and/or grass is being conducted at Dickinson and other sites under the direction of Dr. W.C. Dahnke, Associate Professor of Soils, North Dakota State University. The report of this trial was prepared by Dr. Dahnke, and is included here to provide a record of the data relating to the trial at this location.