

**Pasture Management for Western North Dakota
Project No. 1906**

**Complementary Rotation Grazing System in
Western North Dakota**

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Introduction:

Complementary grazing uses domesticated grass, legume or annual crop pastures to add to or complement native range pastures. Management of native range and domesticated grass pastures must be based on sound ecological principles that consider the growth and development of the dominant species and the physiological needs, weaknesses and strengths of the plants to maintain productive stands. The nutritional needs of the livestock must be included in management considerations. Sound management recommendations can only be based on reliable scientific research.

Procedures:

The present complementary rotation grazing system has been in place at the ranch headquarters of the Dickinson Experiment Station since 1983. It consists of a crested wheatgrass (*Agropyron desertorum*) pasture for spring grazing and an altai wildrye (*Elymus angustus*) pasture for fall and early winter grazing. Native range has been grazed during the summer and managed with a three pasture, twice over rotation system.

The intended purpose of the trial is to maximize herbage and livestock production for a cow-calf operation, lengthen the grazing season in the spring and fall, improve range condition of native range, and reduce total acreage required to carry a cow and calf. The intention is to accomplish these goals with a low number of pastures with few rotation times and be flexible enough to be adapted by a wide range of livestock operations. This type of grazing system should improve operation efficiency, reduce costs and decrease labor per unit of production, and increase saleable production per acre.

Data collected on the pastures in this study are above ground herbage production, plant species composition, leaf height measurements and phenological phases of eight major graminoid species, and animal weight performance. Commercial crossbred cattle are used in this trial.

Results and Discussion:

Condition of the pastures has improved since the beginning of this study. Plant species composition (Table 1) has improved and herbage production (Table 2) has generally improved in relation to environmental conditions. Stocking rate (Table 3) has been increased annually as condition of the pastures improved.

Animal weight performance in the first four years of this study have been very good on crested wheatgrass grazed from early May to early June (Table 4). Average cow weight gains have been 3.06 lbs./day and 110.3 lbs./acre. Average calf weight gains have been 2.03 lbs./day and 74.2 lbs./acre.

Cows were generally in very good condition coming off the crested wheatgrass and going onto native range in early June. Cow average weight gains were 0.59 lbs./day and 7.4 lbs./acre on native range (Table 4). Cows on the three pasture, twice over rotation grazing system did not lose weight after July as previously experienced on pastures grazed season long (Manske et al. 1984). Loss of weight was delayed until late September or early October. In 1986, this loss of weight by the cows started earlier than previous years in September. Cows were left on the native range until mid October. Calves generally have not experienced any decrease in weight gains during the period that the cows experienced weight loss, except in 1986. Calf gains had a decrease in weight gains in late September. Calf average weight gains have been 2.12 lbs./day and 26.4 lbs./acre on this native range grazing system in the first four years of the study (Table 4).

Cows and calves were moved to an altai wildrye pasture in mid October. No problems in grazing altai wildrye have occurred during the early period of mid October to mid November. Early gains by cows on altai wildrye were high and considered to be, in part, compensatory after coming off the native range with a couple weeks of weight reduction. Average daily gain for cows has been 0.87 lbs./day for the period of mid October to mid November. Average calf gains were 1.50 lbs./day for the same period.

Problems have developed on altai wildrye during the grazing period after mid November. In 1984, calves were left with the cows until 3 December. The cows lost 1.67 lbs./day between mid November and weaning. After weaning, dry cows maintained their weight with a slight gain of 0.13 lbs./day until 31 December. Calf gain between mid November and 3 December was not very good at 0.84 lbs./day. As a result, it is recommended that calves be weaned before 15 November. In 1985, calves were weaned 12 November with the intent of leaving the dry cows on the altai wildrye as long as weather would permit. An early winter snow storm occurred in November and the cows were fed hay. The cows did not go out and graze the altai wildrye after this single feeding. They lost an average of 7.54 lbs./day from 12 November to 2 December. In 1986, the calves were weaned 10 November. The cows generally lost weight on altai wildrye from 17 October to 12 December. The cows gained weight from 12 December to 29 December while a protein supplement was provided.

Summary:

The management of this complementary rotation grazing system has been based on ecological principles that consider the physiological needs, weaknesses, and strengths of the dominant plant species. Consideration of the nutritional needs of the livestock have been incorporated. Season of use of each pasture type was limited to periods of grazing when the detrimental effects of grazing were minimized and the potential for improvement in animal weight performance was maximized to near potential. Effort has been made to limit the number of pastures and rotation times to the minimum. One pasture of crested wheatgrass was used for spring grazing. A second pasture may be necessary to move the starting date earlier. The native range was managed with three pastures, each grazed two times during the grazing season. One pasture of altai wildrye was used in this system for fall and early winter grazing. The grazing season has been lengthened from the traditional 6 months to 7.1 months. This system has the potential to lengthen the grazing season to 8.4 months with additional research. The acreage required to carry a cow and calf was reduced from 24.4 acres for 6 months to 11.6 acres for 7.1 months.

By using a complementary rotation grazing system similar to the one at the Dickinson Experiment Station, livestock producers have the potential to: lengthen the grazing season, reduce the acreage required to feed a cow and calf, and increase the amount of saleable beef produced from each livestock unit.

Literature Cited:

Manske, L.L., J.L. Nelson, P.E. Nyren, D.G. Landblom, and T.J. Conlon. 1984. "Complementary Grazing System, 1978-1982". Proceedings North Dakota Chapter of the Society for Range Management. Dickinson, North Dakota. Pp 37-50.

**Table 1. Total Percent Basal Cover for Native Range Pastures
Dickinson Experiment Station, 1982 and 1984**

	Live Vegetation	Litter	Soil
1982	30	54	16
1984	36	63	1

Table 2. Above Ground Herbage Production for Crested Wheatgrass, Native Range and Altai Wildrye Pastures, Dickinson Experiment Station, 1983-1986

	Lbs./Acre			
	1983	1984	1985	1986
Crested Wheatgrass	1663	1661	2142	3467
Native Range				
Clayey (18%)	1337	1142	1701	1918
Sandy (26%)	1416	1231	1976	1928
Shallow (28%)	1084	884	1277	1479
Silty (18%)	1618	1413	1901	2022
Altai Wildrye	2020	4058	4115	5284

Table 3. Stocking Rate for Crested Wheatgrass, Native Range and Altai Wildrye Pastures Dickinson Experiment Station, 1983-1986

	Acres/AUM				
	S.C.S. Recommended	1983	1984	1985	1986
# Cow-calf pairs	13	16	19	24	26
Crested Wheatgrass		0.83	0.90	0.72	0.90
Native Range	4.07	3.33	2.75	2.10	1.97
Altai Wildrye		2.70	0.63	0.84	0.48

Table 4. Average Daily Gain per Head (ADG) and Gain per Acre (G/A) for Cows and Calves Grazing Crested Wheatgrass, Native Range and Altai Wildrye Pastures, Dickinson Experiment Station, 1983-1986

	Crested Wheatgrass			Native Range			Altai Wildrye			System	
	ADG	G/A		ADG	G/A		ADG	G/A		ADG	G/A
1983:											
Cow	2.65	97.9		0.82	7.4		0.51	5.7		1.10	11.4
Calf	1.76	65.0		2.21	19.9		1.52	17.0		2.06	21.7
1984:											
Cow	3.11	105.3		0.25	2.8		0.02	1.0		0.46	7.4
Calf	2.14	72.4		1.96	21.7		1.16	35.3		1.81	25.5
1985:											
Cow	2.20	93.4		0.50	7.3		-1.90	-68.4		0.17	3.1
Calf	1.88	79.8		1.99	28.9		2.58	51.6		2.05	33.7
1986:											
Cow	4.26	144.7		0.78	12.0		-1.03	-65.2		0.46	10.0
Calf	2.34	79.5		2.30	35.2		0.49	10.1		2.06	34.9
Mean:											
Cow	3.06	110.3		0.59	7.4		-0.60	-31.7		0.55	8.0
Calf	2.03	74.2		2.12	26.4		1.44	28.5		2.00	29.0

Animal Performance Data for the 1986 Complementary Grazing System

SYSTEM: WEST COWS AND BULL
 PASTURE OFF: FEEDLOT CRESTED
 PASTURE ON: CRESTED

Weigh Dates

3 1 5 3 1 5 ALTAI ALTAI ALTAI
 1 5 3 1 5 ALTAI ALTAI ALTAI

COW #	CALF #	13-May-86	30-May-86	16-Jun-86	01-Jul-86	31-Jul-86	29-Aug-86	30-Sep-86	17-Oct-86	10-Nov-86	12-Dec-86	29-Dec-86
B 032	650	1073	1122	1232	1198	1233	1342	1337	1286	1272	1169	1184
B 913	608	1105	1224	1353	1355	1335	1430	1359	1349	1273	1243	1269
H 929	601	963	1045	1081	1124	1117	1189	1134	1071	1061	977	1028
B 938	681	1143	1227	1264	1303	1300	1358	1262	1238	1180	1090	1122
B 961	6548	1000	1175	1198	1227	1250	1298	1210	1213	1136	1093	1123
B 962	6549	940	1050	1134	1143	1170	1197	1140	1129	1083	1036	1040
B 1002	670	997	1087	1151	1178	1160	1235	1162	1119	1091	1046	1075
B 1018	666	1031	1096	1228	1250	1289	1318	1230	1199	1185	1098	1125
B 1036	6545	1060	1158	1181	1242	1233	1328	1294	1285	1219	1134	1138
B 1039	6523	980	1096	1138	1177	1210	1285	1214	1197	1178	1070	1122
B 1085	664	940	1051	1113	1153	1150	1230	1197	1183	1161	1100	1119
B 1099	621	1032	1119	1211	1260	1294	1363	1290	1231	1221	1147	1180
B 1103	6501	852	922	999	982	1040	1069	1039	1014	983	932	946
B 1140	660	899	982	1068	1078	1138	1080	1134	1138	1046	968	1006
H 2024	627	1015	1090	1161	1075	1239	1293	1248	1241	1167	1094	1148
H 2036	604	1000	1126	1185	1176	1200	1268	1259	1219	1157	1060	1148
B 2044	645	825	924	982	1042	1091	1130	1111	1084	1033	985	1034
B 2061	656	1111	1209	1255	1292	1342	1418	1395	1370	1341	1255	1266
B 2092	6555	1000	1045	1146	1216	1260	1331	1299	1282	1244	1170	1175
B 2097	655	1047	1200	1222	1267	1305	1411	1341	1316	1264	1182	1192
B 3X5	30	855	862	960	937	977	1035	1030	1008	993	940	963
B 3X9	51	982	1014	1080	1096	1109	1215	1149	1115	1080	1023	1026
B 3X51	11	976	1030	1086	1076	1100	1188	1141	1126	1114	1038	1075
B 3X54	6029	983	990	1096	1148	1122	1221	1162	1136	1100	1067	1049
B 3522	8	896	912	1029	952	1062	1145	1040	999	968	955	974
B 3534	661	1030	1138	1245	1216	1307	1365	1360	1338	1298	1220	1245
Bull 13				1300	1310							
Number of animals:		26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
Number of acres:		13.00	75.00	85.00	80.00	75.00	85.00	80.00	80.00	30.00	30.00	30.00
Days from start:		17.00	34.00	49.00	79.00	108.00	140.00	157.00	181.00	213.00	230.00	
Days for period:		17.00	17.00	15.00	30.00	29.00	32.00	17.00	24.00	32.00	17.00	
AUM's: COWS		14.49	14.49	12.79	25.57	24.72	27.28	14.49	20.46	27.28	14.49	
AUM/Acre:		1.11	0.19	0.15	0.32	0.33	0.32	0.18	0.68	0.91	0.48	
Weight (lbs.):												
Total		25735.00	27894.00	29798.00	30163.00	31033.00	32742.00	31537.00	30886.00	29848.00	28092.00	28772.00
Mean		989.81	1072.85	1146.08	1160.12	1193.58	1259.31	1212.96	1187.92	1148.00	1080.46	1106.62
Gain:												
Total (start)			2159.00	4063.00	4428.00	5298.00	7007.00	5802.00	5151.00	4113.00	2357.00	3037.00
Mean			83.04	156.27	170.31	203.77	269.50	223.15	198.12	158.19	90.65	116.81
Total (period)			2159.00	1904.00	365.00	870.00	1709.00	-1205.00	-651.00	-1038.00	-1756.00	680.00
Mean			83.04	73.23	14.04	33.46	65.73	-46.35	-25.04	-39.92	-67.54	26.15
ADG:												
Mean (start)			4.88	4.60	3.48	2.58	2.50	1.59	1.26	0.87	0.43	0.51
(period)			4.88	4.31	0.94	1.12	2.27	-1.45	-1.47	-1.66	-2.11	1.54
Gain/acre:												
(period)			166.08	25.39	4.29	10.88	22.79	-14.18	-8.14	-34.60	-58.53	22.67
Gain/acre/day:												
(period)			9.77	1.49	0.29	0.36	0.79	-0.44	-0.48	-1.44	-1.83	1.33

Animal Performance Data for the 1986 Complementary Grazing System

SYSTEM: WEST CALVES

Weigh Dates

PASTURE OFF: FEEDLOT CRESTED

3 3 1 5 3 1 5 ALTAI

PASTURE ON: CRESTED

3 1 5 3 1 5 ALTAI ALTAI

COW #	CALF #	13-May-86	30-May-86	16-Jun-86	01-Jul-86	31-Jul-86	29-Aug-86	30-Sep-86	17-Oct-86	10-Nov-86
	8	198	259	322	349	445	561	605	601	626
	11	158	201	251	264	310	395	432	441	465
	30	146	185	237	258	325	398	467	476	500
	51	115	158	203	235	294	397	445	450	493
	601	200	236	310	332	418	516	572	577	591
	604	204	250	320	348	429	536	613	617	653
	608	187	230	292	324	408	496	573	607	609
	621	173	216	272	290	359	454	512	539	542
	627	148	187	247	275	356	455	533	573	552
	645	159	197	259	300	370	490	575	582	543
	650	168	212	265	301	374	455	500	534	559
	655	161	197	247	264	313	393	453	486	475
	656	128	158	195	217	270	345	407	437	440
	660	147	184	242	265	327	412	476	497	452
	661	117	145	189	202	245	327	377	400	412
	664	144	172	225	248	322	407	468	500	505
	666	164	207	266	300	370	454	521	538	558
	670	129	156	213	228	293	365	425	453	450
	681	90	126	185	211	283	367	438	465	469
	6029	163	200	245	269	322	411	475	477	499
	6501	170	205	258	284	356	431	496	534	546
	6523	157	193	246	275	340	414	472	495	491
	6545	137	167	218	236	297	362	422	445	449
	6548	166	204	261	286	384	476	544	568	590
	6549	145	179	231	257	325	400	466	489	501
	6555	125	167	215	222	264	322	356	342	350
Number of animals:		26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
Number of acres:			13.00	75.00	85.00	80.00	75.00	85.00	80.00	30.00
Days from start:			17.00	34.00	49.00	79.00	108.00	140.00	157.00	181.00
Days for period:			17.00	17.00	15.00	30.00	29.00	32.00	17.00	24.00
AUM's: COWS			14.49	14.49	12.79	25.57	24.72	27.28	14.49	20.46
AUM/Acre:			1.11	0.19	0.15	0.32	0.33	0.32	0.18	0.68
Weight (lbs.):										
Total		3999.00	4991.00	6414.00	7040.00	8799.00	11039.00	12623.00	13123.00	13320.00
Mean		153.81	191.96	246.69	270.77	338.42	424.58	485.50	504.73	512.31
Gain:										
Total (start)			992.00	2415.00	3041.00	4800.00	7040.00	8624.00	9124.00	9321.00
Mean			38.15	92.88	116.96	184.62	270.77	331.69	350.92	358.50
Total (period)			992.00	1423.00	626.00	1759.00	2240.00	1584.00	500.00	197.00
Mean			38.15	54.73	24.08	67.65	86.15	60.92	19.23	7.58
ADG:										
Mean (start)			2.24	2.73	2.39	2.34	2.51	2.37	2.24	1.98
(period)			2.24	3.22	1.61	2.26	2.97	1.90	1.13	0.32
Gain/acre:										
(period)			76.31	18.97	7.36	21.99	29.87	18.64	6.25	6.57
Gain/acre/day:										
(period)			4.49	1.12	0.49	0.73	1.03	0.58	0.37	0.27

Animal Performance Data for the 1986 Complementary Grazing System

SYSTEM: EAST COWS AND BULL
 PASTURE OFF: FEEDLOT CRESTED
 PASTURE ON: CRESTED

Weigh Dates

4 2 6 4 2 6 6 ALTAI ALTAI ALTAI
 2 6 4 2 6 ALTAI ALTAI ALTAI

COW #	CALF #	13-May-86	30-May-86	16-Jun-86	01-Jul-86	31-Jul-86	29-Aug-86	30-Sep-86	17-Oct-86	10-Nov-86	12-Dec-86	29-Dec-86
B 029	6539	1131	1182	1267	1325	1330	1382	1343	1323	1294	1245	1218
B 902	605	1200	1283	1390	1288	1397	1470	1420	1387	1359	1266	1312
B 911	6556	875	1002	1040	1055	1045	1141	1029	1006	1050	1040	1047
B 917	651	1025	1073	1150	1192	1213	1222	1198	1168	1180	1122	1118
B 923	634	992	1072	1141	1195	1149	1180	1137	1140	1104	1068	1074
H 935	624	1039	1055	1138	1184	1223	1246	1198	1177	1104	1094	1100
B 948	609	1045	1106	1177	1223	1242	1301	1236	1206	1174	1080	1089
B 1011	674	1037	1115	1183	1256	1273	1310	1258	1208	1151	1101	1085
B 1033	6503	998	1084	1207	1205	1143	1292	1228	1192	1195	1130	1155
B 1037	6561	955	1029	1111	1160	1203	1249	1194	1156	1144	1093	1093
B 1047	682	1175	1247	1315	1308	1300	1405	1358	1312	1308	1225	1223
B 1111	667	869	955	1012	1068	1111	1153	1090	1057	1052	983	983
B 1119	654	891	980	1020	1050	1062	1093	1075	1060	1025	984	994
B 2007	642	1165	1242	1307	1330	1343	1400	1377	1302	1324	1241	1278
H 2015	637	1076	1113	1175	1244	1264	1355	1353	1288	1301	1231	1245
B 2025	631	986	1062	1134	1195	1247	1245	1225	1221	1109	1007	980
B 2038	6510	922	1000	1086	1112	1133	1176	1135	1094	1109	1060	1035
B 2096	668	807	852	903	964	982	1028	995	996	960	939	942
B 3X15	6016	853	903	1019	992	1000	1054	1018	979	1000	948	960
B 3X21	35	972	1015	1054	1112	1106	1195	1121	1141	1126	1050	1042
B 3X22	33	900	921	1024	1017	1060	1082	1058	1050	1044	982	994
B 3X57	44	905	934	1007	977	1056	1077	1024	1026	1009	975	980
B 3X59	6017	1172	1188	1242	1271	1310	1370	1360	1344	1333	1245	1238
B 3X69	615	912	1039	1067	1075	1113	1148	1117	1083	1094	1047	1055
B 3515	43	1147	1187	1272	1280	1304	1349	1314	1312	1259	1225	1225
B 3521	18	998	1012	1057	1093	1105	1124	1105	1113	1113	1052	1086
Bull 11				1190	1229							
Number of animals:		26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
Number of acres:		13.00	13.00	75.00	80.00	80.00	75.00	80.00	80.00	30.00	30.00	30.00
Days from start:			17.00	34.00	49.00	79.00	108.00	140.00	157.00	181.00	213.00	230.00
Days for period:			17.00	17.00	15.00	30.00	29.00	32.00	17.00	24.00	32.00	17.00
AUM's: COWS			14.49	14.49	12.79	25.57	24.72	27.28	14.49	20.46	27.28	14.49
AUM/Acre:			1.11	0.19	0.16	0.32	0.33	0.34	0.18	0.68	0.91	0.48
Weight (lbs.):												
Total		26047.00	27651.00	29498.00	30171.00	30714.00	32047.00	30966.00	30341.00	29921.00	28433.00	28551.00
Mean		1001.81	1063.50	1134.54	1160.42	1181.31	1232.58	1191.00	1166.96	1150.81	1093.58	1098.12
Gain:												
Total (start)			1604.00	3451.00	4124.00	4667.00	6000.00	4919.00	4294.00	3874.00	2386.00	2504.00
Mean			61.69	132.73	158.62	179.50	230.77	189.19	165.15	149.00	91.77	96.31
Total (period)			1604.00	1847.00	673.00	543.00	1333.00	-1081.00	-625.00	-420.00	-1488.00	118.00
Mean			61.69	71.04	25.88	20.88	51.27	-41.58	-24.04	-16.15	-57.23	4.54
ADG:												
Mean (start)			3.63	3.90	3.24	2.27	2.14	1.35	1.05	0.82	0.43	0.42
(period)			3.63	4.18	1.73	0.70	1.77	-1.30	-1.41	-0.67	-1.79	0.27
Gain/acre:												
(period)			123.38	24.63	8.41	6.79	17.77	-13.51	-7.81	-14.00	-49.60	3.93
Gain/acre/day:												
(period)			7.26	1.45	0.56	0.23	0.61	-0.42	-0.46	-0.58	-1.55	0.23

Animal Performance Data for the 1986 Complementary Grazing System

SYSTEM: EAST CALVES

Weigh Dates

PASTURE OFF: FEEDLOT CRESTED

4

2

6

4

2

6

ALTAI

PASTURE ON: CRESTED

4

2

6

4

2

6

ALTAI

ALTAI

COW #	CALF #	13-May-86	30-May-86	16-Jun-86	01-Jul-86	31-Jul-86	29-Aug-86	30-Sep-86	17-Oct-86	10-Nov-86
	18	201	250	308	342	424	514	569	614	607
	33	159	184	245	278	348	440	491	522	520
	35	173	216	271	300	372	461	530	567	571
	43	160	212	266	293	382	481	565	600	635
	44	137	161	200	217	274	342	395	408	430
	605	200	237	290	320	399	497	541	578	585
	609	179	222	285	306	404	498	567	589	608
	615	161	210	265	299	372	474	540	569	566
	624	175	229	278	315	414	497	573	623	636
	631	181	227	287	307	384	473	525	546	558
	634	199	253	320	363	450	537	604	620	641
	637	170	217	275	300	355	456	527	554	562
	642	174	221	288	323	410	510	572	608	627
	651	170	212	269	294	376	456	531	536	570
	654	152	189	237	265	336	426	485	510	520
	667	152	201	246	288	355	447	516	538	538
	668	134	167	183	232	301	382	457	478	502
	674	138	172	231	261	347	432	512	518	555
	682	110	147	197	216	290	362	415	417	445
	6016	147	197	253	285	353	441	500	531	554
	6017	121	149	182	200	230	283	330	333	339
	6503	164	192	231	268	333	425	474	496	519
	6510	184	231	288	323	400	498	561	588	581
	6539	147	188	234	264	330	411	479	479	522
	6556	123	172	229	266	345	425	497	493	521
	6561	148	177	227	258	330	422	485	519	532
Number of animals:		26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
Number of acres:			13.00	75.00	80.00	80.00	75.00	80.00	80.00	30.00
Days from start:			17.00	34.00	49.00	79.00	108.00	140.00	157.00	181.00
Days for period:			17.00	17.00	15.00	30.00	29.00	32.00	17.00	24.00
AUM's: COWS			14.49	14.49	12.79	25.57	24.72	27.28	14.49	20.46
AUM/Acre:			1.11	0.19	0.16	0.32	0.33	0.34	0.18	0.68
Weight (lbs.):										
Total		4159.00	5233.00	6585.00	7383.00	9314.00	11590.00	13241.00	13834.00	14244.00
Mean		159.96	201.27	253.27	283.96	358.23	445.77	509.27	532.08	547.85
Gain:										
Total (start)			1074.00	2426.00	3224.00	5155.00	7431.00	9082.00	9675.00	10085.00
Mean			41.31	93.31	124.00	198.27	285.81	349.31	372.12	387.88
Total (period)			1074.00	1352.00	798.00	1931.00	2276.00	1651.00	593.00	410.00
Mean			41.31	52.00	30.69	74.27	87.54	63.50	22.81	15.77
ADG:										
Mean (start)			2.43	2.74	2.53	2.51	2.65	2.50	2.37	2.14
(period)			2.43	3.06	2.05	2.48	3.02	1.98	1.34	0.66
Gain/acre:										
(period)			82.62	18.03	9.98	24.14	30.35	20.64	7.41	13.67
Gain/acre/day:										
(period)			4.86	1.06	0.67	0.80	1.05	0.64	0.44	0.57