Table 2. Planting date and harvest dates of the multipurpose winter grain trial.

	Borderview Farm, Alburgh, VT
Planting date	27-Aug-2010
Seeding rate	175 lbs/ac
Graze one	23-Apr-2010
Graze two	7-May-2010
Forage harvest (barley boot stage)	17-May-2010
Forage harvest (triticale boot stage)	20-May-2010
Forage harvest (wheat boot stage)	24-May-2010
Grain harvest (triticale only)	17-July-2010

WEATHER DATA

Seasonal precipitation and temperatures recorded at a weather station in close proximity to the 2010 research sites are shown in Table 3. This year spring temperatures were higher than usual, and while we had a drier spring, overall, we ended up with above average rainfall. In Alburgh, the growing season resulted in 575 more small-grain Growing Degree Days (GDD) than the thirty year average.

Table 3. Temperature, precipitation, and Growing Degree Day summary, Alburgh, VT.

	April	May	June	July	August	September	October
Average Temperature (°F)	49.3	59.6	66.0	74.1	70.4	64.0	50.6
Departure from Normal	5.80	3.00	0.20	3.00	1.40	3.60	1.80
Precipitation (inches)	2.76	0.92	4.61	4.30	5.48	4.32	missing
Departure from Normal	0.25	-2.01	1.40	0.89	1.63	0.86	data
Growing Degree Days (base 50°)	141	332	479	747	634	419	129
Departure from Normal	101	71.4	4.50	94.6	45.0	107	26.4
Growing Degree Days (base 32°)	521	854	1019	1305	1192	959	578
Departure from Normal	176	91.5	4.5	94.6	45.0	107	57.4

Based on National Weather Service data from cooperative observer stations in close proximity to field trials. Historical averages are for 30 years of data (1971-2000).

SILAGE QUALITY

Silage quality was analyzed by Cumberland Valley Analytical Forage Laboratory in Hagerstown, Maryland. Plot samples were dried, ground and analyzed for crude protein (CP), acid detergent fiber (ADF), neutral detergent fiber (NDF), and various other nutrients. The Nonstructural Carbohydrates (NSC) and Total Digestible Nutrients (TDN) were calculated from forage analysis data. Performance indices such as Net Energy Lactation (NEL) were calculated to determine forage value. Mixtures of true proteins, composed of amino acids, and nonprotein nitrogen make up the crude protein (CP) content of forages. The bulky characteristics of forage come from fiber. Forage feeding values are negatively associated with fiber since the less digestible portions of the plant are contained in the fiber fraction. The

detergent fiber analysis system separates forages into two parts: cell contents, which include sugars, starches, proteins, non-protein nitrogen, fats and other highly digestible compounds; and the less digestible components found in the fiber fraction. The total fiber content of forage is contained in the neutral detergent fiber (NDF). Chemically, this fraction includes cellulose, hemicellulose, and lignin. The NSC or non-fiber carbohydrates (NFC) include starch, sugars, and pectins.

RESULTS

Winter Cereals as a Multipurpose Crop

The barley experienced the most winter kill and had a 75% survival rate, compared to the wheat and triticale, which averaged a 92% survival rate (Images 1 4).

When evaluating the main effect of cereal grain species there was no significant difference in yield. However, barley far out performed other grains in quality (Table 4). Interesting, the wheat variety Maxine was higher in protein than Zorro. This may indicate that variety selection is important even when grains are harvested in the vegetative stages for forage and pasture production.

Table 1. Mean yield and quality of winter grains harvested with different strategies.

Small grain	DM at harvest	DM yield	Forage quality characteristics						
			CP	ADF	NDF	dNDF	TDN	NSC	NEL

When evaluating the effect of harvest time, the first graze gave the lowest yield but highest quality (Table 5). The second graze yielded slightly higher but the fiber content began to increase while the fiber digestibility declined significantly compared to graze 1. The forage harvest in the boot stage resulted in the highest yields but lowest quality forage (Table 5).

Table 2. Dry matter yield and quality of winter cereal grain harvest strategies.

Harvest stage	DM at harvest	DM yield	Forage quality characteristics						
			CP	ADF	NDF	dNDF	TDN	NSC	NEL
	%	lbs/ac	%	%	%	%	%	%	Mcal/lb
Graze 1	**24.4***	899	19.3*	**22.6***	**37.3***	**83.4***	**66.3***	**18.9***	**0.69***
Graze 2	19.3	1130	**20.4***	27.8	47.3	65.6	62.0	13.4	0.64
Forage									

the barley than triticale and wheat. Interestingly, during the second graze the fiber digestibility was lowest in the triticale. When the second harvest of forage occurred at the boot stage there was no significant difference among yields between the cereal grains (Table 8). However, barley clearly outperformed both the wheat and triticale in overall quality. Grain yields were only harvested for the triticale due to bird predation in the other grain plots. The yield of triticale grain was 1775 lbs per acre. The straw yield was an average of 2550 lbs per acre.

significant quantity of high quality forage can be harvested as pasture approximately 2 weeks before the perennial cool season pasture is ready to graze. This will potentially help farmers get the cows out of the barn earlier and onto fresh forage. This could ultimately reduce production costs.

Figure 1. Early season grazing on winter cereals vs. cool season pasture.

If a second harvest of forage is possible it is possible to graze, harvest stored feed, or even take the crop to grain and straw harvest. The decision of what type of feed to harvest will depend somewhat on the forage goals and need of the farm. If we are evaluating the individual systems the research indicates that higher total yields per acre can be obtained if the forage is grazed and a second harvest is made in the boot stage (Figure 2). When comparing the grain species, the data indicates that barley will provide the highest quality feed under all cropping systems. However, it can be difficult to overwinter and may not be appropriate for all climates. Both the triticale and wheat had similar forage quality and would be a good alternative for cold winter climates. The triticale does mature earlier than wheat and might provide earlier grazing opportunities compared to wheat. Overall, fall seeded cereals can sehe inea54(s)9oli5u11(i5(l)ooev245(he)9(at6a

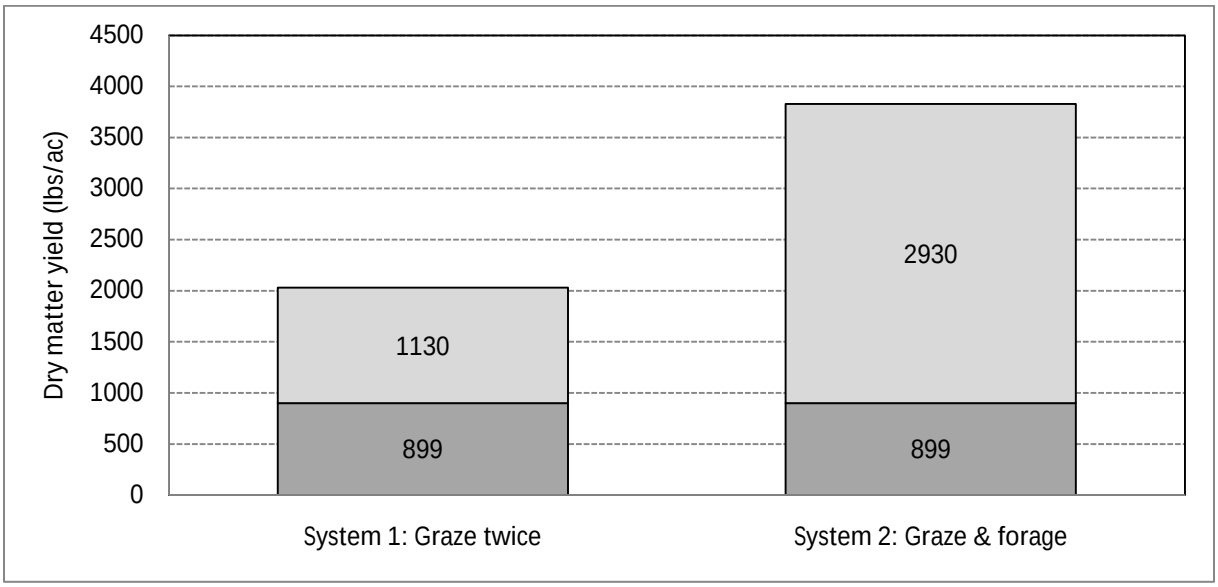

Figure 2. Dry matter yield of the winter cereal cropping systems.

The UVM Extension Crops and Soils Team would like to thank Borderview Research Farm for their generous help with the trials and acknowledge Organic Valley FAFO fund for their financial support.

UVM Extension helps individuals and communities put research-based knowledge to work.

The UNIVERSITY of VERMONT EXTENSION