NNY Agricultural Development Program
2011-2012 Project Results

Tall Fescue Variety Assessment in Northern NY

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Background*:*
Most cropland in northern NY is better suited to perennial grass production than to legumes or row crop production. Previous grass studies at Canton, Chazy and Willsboro have indicated that tall fescue is very persistent in northern NY and will yield as much or more than other cool-season grass species. There continue to be many new tall fescue varieties, most endophyte-free, although a number of the new varieties also have a "Novel endophyte" version. These varieties have an endophytic fungus in the fescue, but it gives the plant added vigor without the toxic side effects of typical endophyte-infected fescue. The Novel or "Friendly endophyte" varieties are being promoted in the Northeast, it is not clear that they are worth the extra seed cost in our region.

Tall fescue often ranks highest for yield among cool-season grass species in New York State. The top tall fescue varieties yielded 16.5 tons silage equivalent/acre in past northern NY trials, with a 3 ton range among entries in a trial. Although tall fescue appears to be less persistent than other grasses in the upper Midwest, it has survived northern New York winters over the past decade and does not appear to have any persistence problems in NYS. Several feeding trials conducted at the Cornell Animal Science Farm in Harford, NY have demonstrated that tall fescue silage can produce as much milk per cow as alfalfa silage when rations are balanced. Tall fescue is typically lower in crude protein than other grasses, except for timothy, but is similar in fiber concentration and quality.

Methods:
We have once again collected all new varieties of tall fescue suitable for northern NY, and planted them at Chazy in the Spring of 2011. This is the most comprehensive tall fescue variety trial in the country, with 40 varieties. Six of the varieties contain the Novel endophyte. Other variety trials are on an entry fee basis, resulting in a very small subset of the total varieties, often mostly experiment germplasm entries. Our objectives are to compare these new fescue varieties, and to test new procedures for comparing the forage quality of varieties. A separate set of plots are established for the purpose of heading date evaluation. The trial was fertilized with recommended N, P and K fertilizer in the spring of 2012. Heading dates were recorded.

Varieties were harvested three times during 2012: May 18, June 13, and Oct. 9. This is an intensive 3-cut system, with the first and second cuts taken at approximately 50-55% NDF, with a 3rd cut in the fall suitable for dry cow forage. Samples were analyzed for forage quality constituents, comparing varietal changes over maturation. There are 3 harvests for yield

evaluation, but the 3rd harvest in the fall, suited for dry cow/heifer forage, was not analyzed for quality.

Separate plots of 4 varieties were sampled periodically through the spring growth, to determine rates of linear change in yield, NDF and fiber digestibility. Results of this sampling were used to adjust NDFD values to the date that each variety reaches 50% NDF in the field. This allows a fair comparison of quality potential for each variety, by estimating yield and NDFD on the optimum harvest date (50% NDF) for each variety. This is a way of correcting for differences due to rate of maturation in the spring.

Serious drought occurred after the mid-May planting of this fescue trial at Chazy, but all entries were well enough established for the 2012 season.

Results

Yields were more variable than normal, in part due to a very abnormal early warm spring growing season followed by very dry conditions (Table 1). Although spring yields were very low, yields for the entire season were reasonable. Yield distribution for 3-cuts at Chazy was 22, 30, and 48%. Yield distribution was very unusual, resulting in only about half of the total yield at Chazy suitable for lactating dairy quality forage. Fall-cut grass is always very low in CP and digestibility, even though NDF is typically low, and it is usually considered dry cow or heifer feed. Overall, it was a very unusual year for grass growth.

Due to very warm weather in March, 2012, perennial grass matured one to two weeks earlier than normal. Tall fescue headed as early as May 14 in Chazy, resulting in a an average NDF of 50% on May 18 in Chazy, at spring harvest (Table 2). The abnormal weather, combined with somewhat less than ideal stands, resulted in higher than normal variability for both yield and quality. The rate of change of both NDF and NDFD was approximately one unit per day. NDFD was adjusted to a common NDF, 50% (average NDF of the trial). For example, if a cultivar was 58% NDF and 70% NDFD at harvest, then NDFD was adjusted by 3 days (58% down to 55% NDF), making the adjusted NDFD 73%. With NDFD of all cultivars adjusted to a common NDF, they are all on a comparable basis.

Although there was a relatively large range in heading date among cultivars, range in NDF among cultivars at spring harvest was small, so NDFD adjustments were relatively minor in 2012. The range in adjusted NDFD was relatively small, suggesting that there has been little improvement in NDFD among newer tall fescue cultivars.

Another possible adjustment is to adjust both NDF and NDFD to the heading date for each cultivar. When this was done, there was only a 6 percentage unit range in NDF at heading, and an 8 percentage unit range in NDFD at heading, among cultivars. Both the NDF and NDFD at heading were highly correlated with the actual heading date. In addition, NDF at heading is highly negatively correlated ($r = -0.76$) with NDFD at heading.

Conclusions/Outcomes/Impacts:

- Spring heading date of a cultivar had very little effect on total seasonal yield.
- There was no relationship between total seasonal yield and spring adjusted NDFD.

- Both NDF and NDFD in tall fescue spring growth are controlled more by plant age (day of year) than they are by morphological maturity (heading date).
- The strong negative relationship between NDF at heading and NDFD at heading implies that there have not been significant advances in breeding for higher NDFD in tall fescue.
- The relatively narrow range in adjusted NDFD (adjusted to the trial average NDF) also suggests that there have not been significant advances in breeding for NDFD.
- It is possible that the unusual spring weather in 2012 caused some of the relationships above, this will be clarified in 2013.
- Choosing a fescue cultivar for either early or late maturity (heading date) in order to better match up with alfalfa may have a minimal impact on overall forage quality at harvest.
- If choosing a fescue cultivar for a pure stand, look for high yield and high adjusted NDFD (adjusted to trial average NDF) at spring harvest.
- In a mixed stand, most producers are looking for a high proportion of alfalfa, with the highest possible NDFD for the grass at harvest. High grass yield potential may not be desirable, as this likely indicates a more competitive grass. Harvest date is usually based on alfalfa maturity, not on the grass. Therefore, if choosing a fescue cultivar to seed with alfalfa, simply select the cultivar in a trial with the highest NDFD at spring harvest, no adjustments necessary.
- It is likely that these conclusions may apply to the other cool-season grass species.

Outreach:
Another year of data collection is necessary before coming to any conclusions and distributing them through meetings and publications.

Next steps if results suggest continued work is needed in the areas of research, demonstration and/or education.
Another year of data collection is needed, particularly due to the very abnormal weather conditions during the 2012 season.

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We gratefully acknowledge the Cornell Agricultural Experiment Station for providing the farm crew for plot maintenance and assistance with harvesting.

Reports/articles in which results of project have already been published.
Another year of data collection is necessary before making any conclusions.

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Table 1. Chazy dry matter yield for tall fescue variety trial, 2012

	Heading	Cut 1	Cut 2	Cut 3	Total
Cultivar	**date, May**	**Tons DM/a**	**Tons DM/a**	**Tons DM/a**	**Tons DM/a**
Stockman	20	0.89	1.28	2.17	4.34
Duramax Armor	19	0.97	1.24	2.07	4.28
Festival	18	0.88	1.31	1.99	4.18
Barduram	22	0.80	1.30	2.04	4.13
Tower	22	0.79	1.33	1.92	4.04
Cajun ll	17	0.89	1.10	2.04	4.03
Tuscany ll	19	0.90	1.22	1.81	3.92
Bronson	16	0.86	1.07	1.98	3.91
Fuego	17	0.75	1.20	1.93	3.88
Rustler	18	0.90	1.19	1.77	3.86
Montebello	19	0.84	1.12	1.89	3.86
BarOptima PLUS E34	21	0.84	1.21	1.79	3.84
Atlas	16	0.84	1.01	1.98	3.83
Duramax	15	0.88	1.11	1.82	3.81
Jesup Max Q	16	0.74	1.15	1.91	3.80
Kora	19	0.94	1.20	1.65	3.79
Enforcer	19	0.71	1.17	1.88	3.76
Teton	15	0.90	1.10	1.77	3.76
Seine	19	0.70	1.15	1.84	3.68
Barcel	21	0.70	1.18	1.79	3.67
Enhance	16	0.86	1.08	1.71	3.65
Savory	19	0.68	1.12	1.84	3.65
Goliath	18	0.77	1.07	1.79	3.63
Martin 2	17	0.78	1.10	1.74	3.62
Jesup L	17	0.74	1.03	1.83	3.60
Seine Happe	19	0.68	1.14	1.78	3.60
Bariane	24	0.73	1.16	1.64	3.54
Orygun	17	0.82	1.05	1.64	3.51
Au Triumph	14	0.82	0.89	1.78	3.49
Tower 647	21	0.73	1.18	1.55	3.46
Bull	16	0.86	0.98	1.61	3.46
KY-31	15	0.83	1.01	1.57	3.41
Hymark	17	0.81	1.02	1.56	3.39
Siberia	21	0.79	1.22	1.32	3.32
Kentucky 32	17	0.59	0.95	1.72	3.26
Fawn	14	0.79	0.93	1.51	3.23
Courtenay	21	0.75	1.26	1.19	3.20
Martin 2 647	16	0.73	1.05	1.36	3.15
Advance	19	0.65	0.93	1.55	3.14
Ranger	19	0.71	0.86	1.54	3.10
Mean	**18**	**0.80**	**1.12**	**1.76**	**3.67**
LSD 0.10		**0.12**	**0.17**	**0.40**	**0.47**

Table 2. First cutting NDF and adjusted NDFD.

Chazy, May 18 cut	NDF on	Adjusted
Cultivar	**18-May**	**NDFD**
Savory	50.0	76.3
Kentucky 32	51.1	76.2
Courtenay	48.4	75.9
Kora	50.2	75.2
BarOptima PLUS E34	49.8	75.2
Siberia	47.7	75.0
Festival	50.2	75.0
KY-31	51.0	75.0
Bariane	47.8	74.5
Atlas	52.5	74.4
Ranger	49.6	74.4
Goliath	49.7	74.3
Enforcer	49.2	74.1
Hymark	51.5	74.1
Orygun	53.0	74.1
Duramax	50.0	74.0
Jesup Max Q	51.5	73.9
Barcel	48.2	73.8
Stockman	49.4	73.8
Fuego	48.7	73.5
Advance	47.5	73.4
Cajun ll	50.4	73.4
Tuscany ll	49.3	73.4
Jesup L	48.8	73.2
Seine	51.2	73.1
Montebello	49.7	73.0
Barduram	49.4	73.0
Seine Happe	50.7	73.0
Au Triumph	51.8	72.9
Fawn	50.6	72.9
Martin 2 647	50.0	72.6
Bronson	52.1	72.5
Duramax Armor	50.6	72.4
Bull	52.4	72.3
Tower 647	48.8	72.2
Martin 2	50.8	72.1
Tower	49.5	72.0
Teton	50.9	71.8
Enhance	50.9	71.8
Rustler	49.0	71.4
Mean	**50.1**	**73.6**
LSD 0.10	**1.69**	**2.25**

Table 3. Second cutting NDF and NDFD.

Chazy, June 13 cut	NDF	NDFD
Cultivar	**%**	**%**
Courtenay	55.5	67.8
Kora	54.1	67.7
Kentucky 32	54.0	66.0
KY-31	53.9	65.9
Advance	53.9	65.8
Tuscany ll	54.8	65.8
Jesup Max Q	54.6	65.3
Bronson	53.5	65.1
Jesup L	54.6	65.1
Barcel	54.7	65.0
Rustler	54.3	64.9
Duramax	55.3	64.8
Enhance	53.9	64.4
Martin 2	52.7	64.3
Siberia	54.8	64.2
Montebello	55.3	64.1
BarOptima PLUS E34	57.4	64.0
Atlas	53.2	63.9
Cajun ll	52.7	63.9
Duramax Armor	54.8	63.7
Goliath	55.3	63.6
Martin 2 647	55.4	63.2
Enforcer	54.1	63.2
Au Triumph	54.8	63.2
Hymark	54.2	63.1
Stockman	53.1	63.0
Festival	54.4	62.7
Bull	55.2	62.7
Teton	55.9	62.2
Ranger	55.3	62.1
Fawn	53.0	62.0
Savory	57.3	62.0
Bariane	56.6	61.7
Fuego	56.3	61.6
Barduram	55.9	61.5
Seine Happe	57.1	60.9
Orygun	54.4	60.2
Tower	57.2	59.7
Tower 647	58.7	59.4
Seine	56.9	58.7
Mean	**55.0**	**63.5**
LSD 0.10	**1.90**	**2.25**