

2020 Northeast Pasture Consortium Conference Proceedings
January 15-16, Lake Morey Resort, 82 Clubhouse Road, Fairlee, VT

plant first: (1) grain; (2) leaves and husks; (3) cobs and stalks [Farming Magazine on-line, 2016].) Graze out cereal rye cover crop in the last rotation cycle before corn planting in the spring.

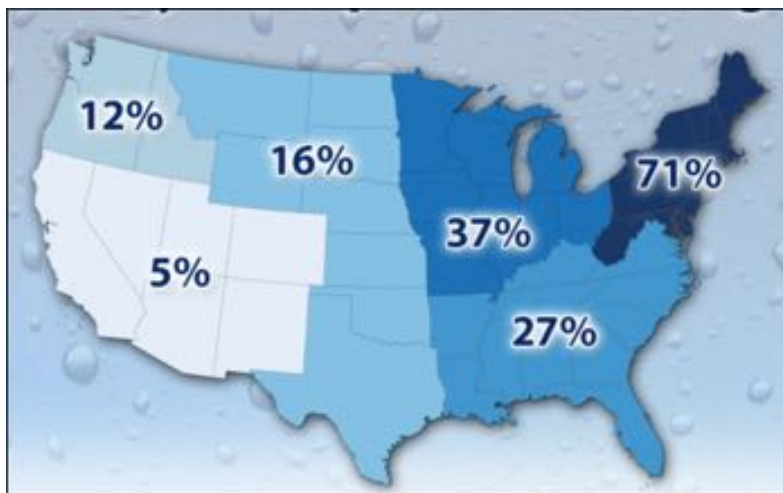
How will this fit on a livestock operation?

Things to consider:

- Permanent fence needed around crop fields to be grazed.
- Ability to remove livestock during bad weather easily.
- Animal and soil hazard (soil compaction issues)
- Additional fertilizer needed, or is residual nitrogen from corn adequate?
- Acreage to spread manure. Will grazing a cover cropped field upset manure spreading plans?
- Keeps animals out of confinement or sacrifice lot longer into the season.
- Great place for calving/lambing season
- High nutritive value of forage with adequate filler from the corn stover if corn harvested for grain, and
- Hardiness of livestock.

The second speaker of Session 4 was **Heather Darby**, Professor, UVM Extension, St. Albans, VT. Her topic was “Extending the Grazing Season in the Northeast”. She started out her presentation posing the question, “Why consider annuals?”. She then listed their strong points:

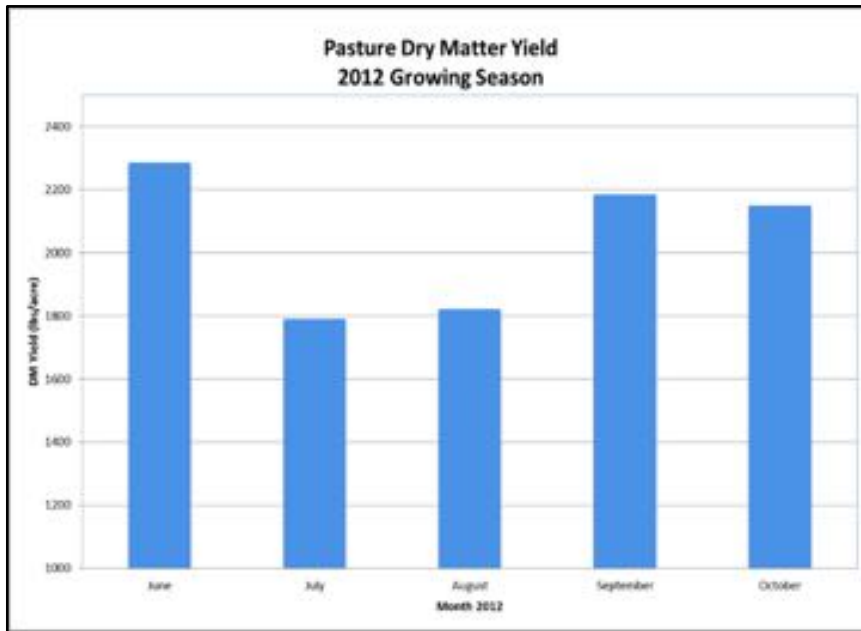
- Drought tolerant
- Cold (or heat – warm-season) tolerant
- Fill gaps in feed (summer slump in cool-season perennial pastures)
- High biomass crop
- Multipurpose
 - Grazing
 - Silage/balage
 - Grain/seed



Increase in the number of 2" rainfalls per year from 1958 to 2011

With the rise in incidences of heavy rainfall, growing cover crops can also aid in reducing soil erosion by water runoff rather than leaving croplands fallow after harvesting a row crop.

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This chart shows the typical summer slump that occurs on cool-season forage perennial pastures. It is muted in Vermont as they still produced 1800 pounds/acre in July and August in 2012 as opposed to 2150 to 2300 pounds/acre in the other 3 cool/wet months shown. The summer slump tends to grow more pronounced further south at lower elevations in the Northeast as average daily temperatures rise and spottier rainfall occurs in July and August.

These are the summer annuals recommended by Heather to fill the summer slump:

- Sorghum,
- Sudangrass,
- Sorghum x Sudangrass,
- Pearl Millet,
- Japanese Millet,
- Teff, and
- Corn.

Most of these regrow after grazing if grazed properly to leave adequate stubble height.

Here are the cool-season annuals recommended by Heather to extend the grazing season beyond what a perennial pasture or a summer annual pasture can provide:

- Small Grains
 - Spring or Winter
 - Forage types preferred in most cases
 - Can use mixtures
- Annual ryegrass
- Brassica forage crops
 - Kale, turnips, radish, etc.
- Legumes (seed earlier if possible)
 - Peas, Crimson clover, red clover, other options

Heather went on to show some different cropping system scenarios. The first one involved planting a summer annual, brown mid-rib (BMR) sorghum-sudangrass cross into an existing

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forage stand. They need to be planted into warm soils that are between 60 and 65°F. At these soil temperatures, the seed will germinate quickly and a dense stand will be established. Under conditions of warm soil temperatures and adequate soil moisture, the forage will be at a 30-inch grazing height 45–50 days after planting. Grazing should begin when the plants are 24–30 inches in height. The grazing pass should end when there is a 6- to 8-inch plant residual. This residual will allow for best plant recovery and rapid regrowth. With this type of management and good growing conditions, a grazing pass can be made every 14–21 days (R. Lewandowski, et al., 2012).

Crop Rotation

Take first and/or second cut of established forage crop (weak stand),
25th of June and 1st of July plant BMR sorghum X sudangrass,
Graze it 3 times,
Leave residue through winter, and
Reseed field in early spring.



Her next example used a cool-season annual, triticale.

Small grains for winter cover crops

- Seed triticale alone on fields renovated in late summer (mid-August to mid-September).
- One graze in spring before reseeding,
- Early feed in fall if weather cooperates.
- Worst case scenario green manure for next crop.
- Reasonable dry matter for early feed.
- Good quality.
- Cows like to graze it, very palatable.

The next scenario used two cereal crops – one spring one and one winter one, oats and triticale.

- Seed oats & triticale together in late summer (mid-August)
- Same as planting triticale – higher seeding rate 150 lbs./acre
- Planting two crops - one for fall, and one for spring grazing.
- Graze oats in fall – Planted August 19th and grazed the first of October. Hard freeze will kill it. Triticale will overwinter.
- High quality and palatable - cows will milk best on oats.
- Same rotation step as before – graze triticale in spring and reseed.

Heather then went into some agronomic details on successfully growing annuals for cover cropping and grazing.

Establishment was covered first taking these things into consideration:

- Grain drill works well but can be broadcast and incorporated with cultipacker or harrow.
- Plant in August for September, October, and November grazing.
- Delayed planting can happen, often poor soil moisture this time of year.
- Planting depth depends on species and/or mixture.
 - Most species fine with ½ to 1-inch depth of planting.

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- Seeding rate depends on species.
 - Small grains 100 to 150 lbs./acre
 - Brassica species 5 to 10 lbs./acre
 - Annual ryegrass 15 to 20 lbs./acre
 - Legumes 15 to 20 lbs./acre.

Establishment was followed by soil fertility requirements for annual forages:

- Relatively low nitrogen (N) requirements depending on species – 50 to 100 lbs. of N/ac.
- Prior crop will determine at least N needs.
- Manure application before planting likely adequate.
- The P & K requirements determined from soil test but overall, like other grass species.
- Soil pH should be between 6.0 and 7.0.

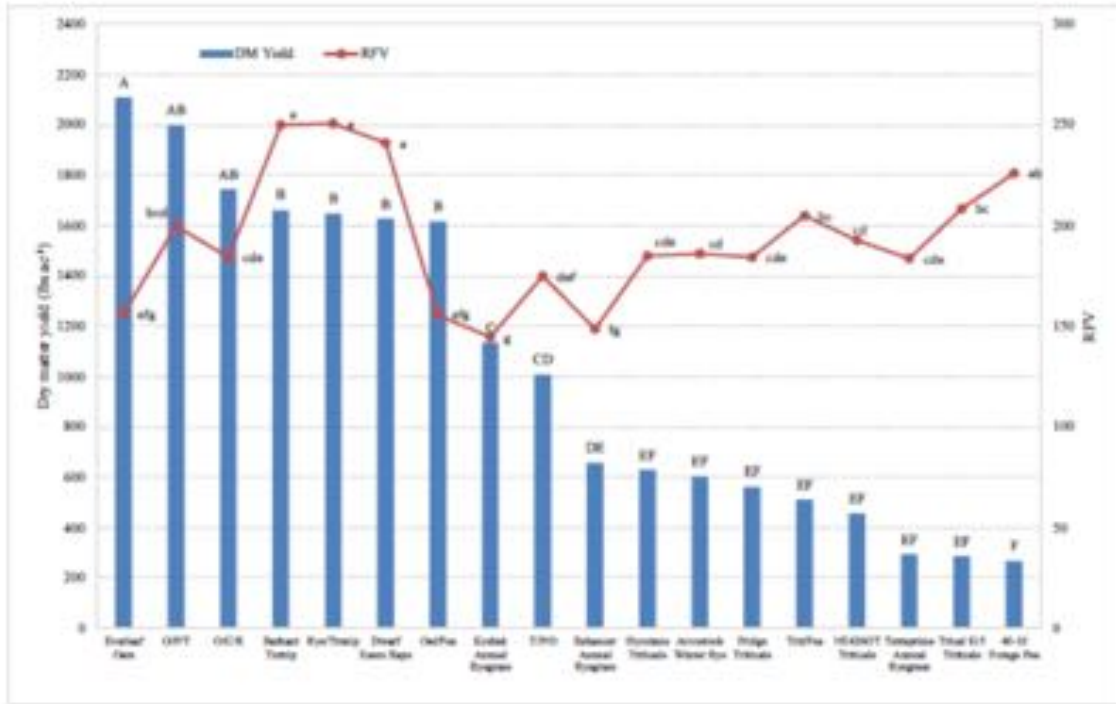
<h3>Pasture Comparison -</h3>	
Perennial Pasture	Oats & Peas
• CP = 16.4%	• CP = 38%
• NDF = 53%	• NDF = 35%
• dNDF = 59.7%	• dNDF = 70.3%
• NEL = 0.64 Mcal	• NEL = 0.74 Mcal
• TDN = 61.6%	• TDN = 68.7%

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Forage quality of annual forages can be very high. In the table to the left, a typical perennial pasture is compared with an oats and peas mixture. All 5 forage quality parameters are better in the oats and peas analysis than with the perennial pasture analysis. However, the crude protein is really much higher than it has to be for livestock nutritional needs. A bit of roughage in the diet should dilute that some. Good place for grazing corn stover left from grain corn harvest if available on the farm.

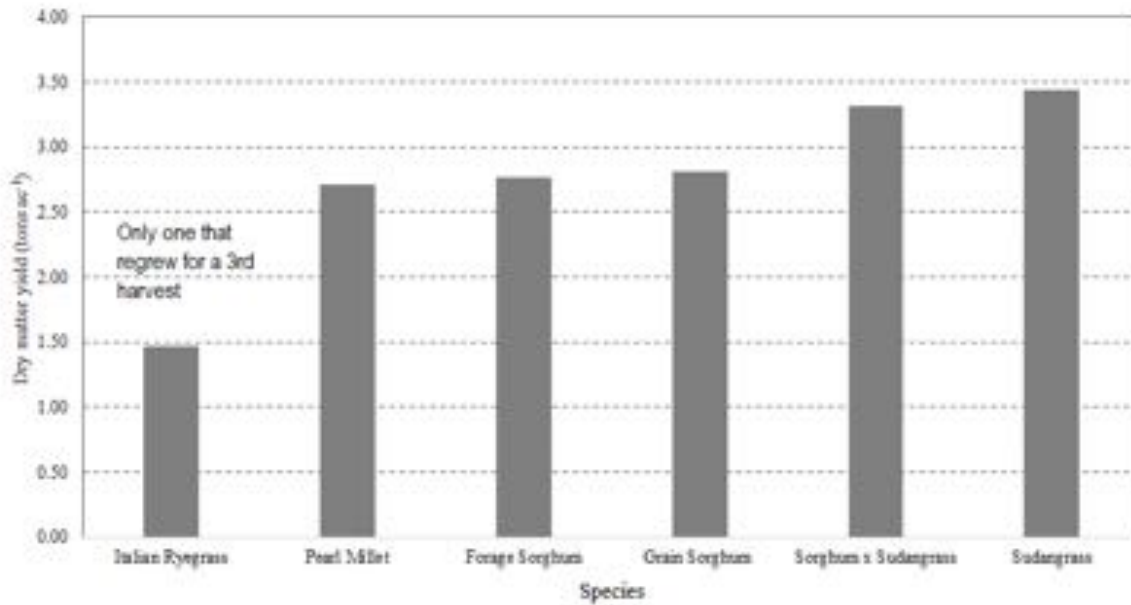
Eighteen annual forage species and mixtures were evaluated in 2018 for fall yield and relative feed value (RFV). Oats yield was the highest in the fall and in mixtures with peas or with peas and triticale or with clover and ryegrass provided excellent quality and yield. Winter grains (triticale, winter rye) produce low fall yields compared to spring grains, such as oats. Rape and turnips produced over 1600 pounds of DM per acre in the fall and had the highest RFV's (240-250). Three annual ryegrasses differed considerably in their DM yield. Kodiak, a Westerwold annual ryegrass had the highest fall yield, just over 1100 pounds per acre. Then, it was Enhancer annual ryegrass, a diploid Italian annual ryegrass, coming in at 650 pounds per acre. Tetraprime, a tetraploid Italian annual ryegrass came in a distant third at 300 pounds per acre. Kodiak is a diploid annual ryegrass developed by DLF forage Seeds that is used for grazing, silage, and cover crop and has improved cold tolerance. It has a medium-early maturity. It is said to excel in plant vigor, tiller density and forage yield. In this trial, the hype was proved to be correct. Tetraprime lived up to its claim of being a high quality forage with RFV of 170 while the other two annual ryegrass varieties were slightly under 150. The chart below displays all eighteen species and mixtures showing their fall yields (left Y-axis) and RFV values (right Y-axis). After oats are two mixtures with oats in them. To the immediate right of oats is oats, peas, & triticale (O/P/T); the second one is oats, clover, & ryegrass (O/C/R). Further to the right is a triticale, peas, & oats mixture (T/P/O).

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Dry matter yield and relative feed value of 18 annual forage mixtures/species, 2018.

Treatments that share a letter performed statistically similarly to one another.



Spring and Fall Annuals

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Sudangrass and a sorghum-sudangrass cross were the highest yielding of the spring and fall annuals, 3.4 and 3.3 tons per acre, respectively. Pearl millet, forage sorghum, and grain sorghum were intermediate in yield ranging between 2.6 and 2.8 tons per acre. The Italian ryegrass was the lowest yielding even though it regrew for a third harvest. It yielded slightly under 1.5 tons per acre.

Grazed Triticale had these statistics below (spring grazing):

Triticale	Forage Quality Characteristics					
	DM	DM Yield	CP	NDF	dNDF	NEL
	%	lbs./acre	%	%	%	Mcal
Grazed	21.8	1350	19.4	48.5	70.6	0.71

A winter cereal pasture yields more grazable DM than a cool season perennial pasture at first grazing. In one study it provided over 240 pounds per acre more forage at first graze. It does this by beginning spring growth at cooler temperatures than the pasture. If allowed to grow for silage/hay, yield at boot stage can be over 7,000 pounds of DM per acre, and if harvested at soft dough stage, it can yield over 11,000 pounds per acre of DM.

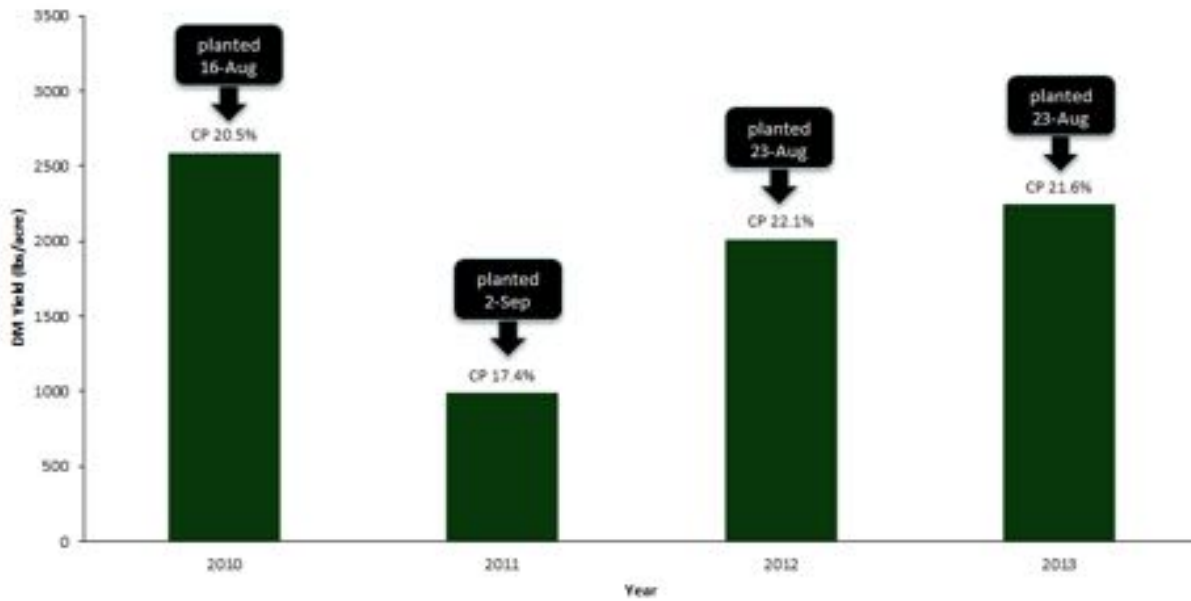
Fall crop Brassicas are exceptional in their yield and forage quality. Guidelines for growing them are:

- Seed no later than mid- August for best yield
- 5 - 10 lbs. per acre seeding rate
- By mid-September 10 inches in height
- Harvest in mid-October
- Potential for multiple harvest times depending on species if crowns are left intact, and
- Harvest when 2 to 3 feet in height.

Brassicas can provide grazing at any time during the summer and fall depending on the seeding date. They are very suitable for late fall grazing. These crops maintain their forage quality, if not headed, well into the fall even after freezing temperatures and may be grazed in the Northeast well into December. Turnips can be grazed twice or more to permit utilization of top growth and roots. Brassicas produce high-quality forage but must be strip grazed or harvested before heading. Livestock will eat the stems, leaves, and roots of turnips, radishes, and swedes. Only the foliage of kale and rape is eaten. They can be grazed more than twice, weather permitting.

Below is a bar chart that compares yield of forage brassicas depending on the date that they were planted. Planting seed on August 16 gave the highest yield, September 2 the lowest yield and August 23, just a week later than August 16 averaged about 500 pounds less DM yield per acre.

Forage Brassicas Average Yields



Brassica varieties: They vary primarily by the size and shape of the root, from a narrow taproot to a garden type turnip root.

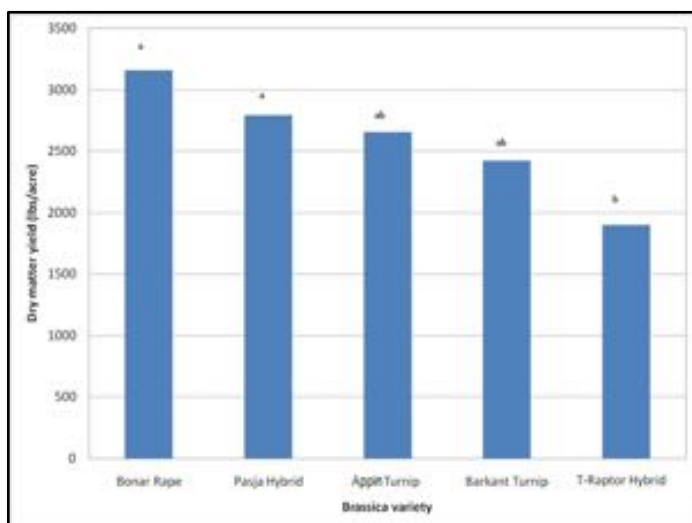
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T-Raptor, shown in the picture above, is an early maturing hybrid brassica, a cross between a forage turnip and a forage rape, with 50-70 day crop duration. T-Raptor exhibits a leafy growth habit (higher leaf-to-bulb ratio) and is well-suited to grazing. Pasja is also an early maturing hybrid forage brassica, a cross between a forage turnip and a forage rape. Both can be used as a fall cover crop for soil health purposes, as well as extend the livestock grazing season.

Bonar forage rape, also shown above, is a late maturing rape with short stems and large paddle leaves. It produces very high quality forage yields with the crop ready for grazing in approximately 13-15 weeks after sowing. It can be seeded alone or in seed mixes of clover, turnips, and other brassicas. After a hard frost, the leaves become very sweet and palatable making for great late fall to mid-winter grazing.

Barkant is a very vigorous diploid turnip variety with a large purple cylindrical root (50 percent of the bulb is on top of ground). Barkant has high bulb yield with good top growth. It also has high sugar content which provides winter-hardiness and increased palatability. Barkant has good tolerance to bolting/heading and under a correct grazing management system can provide multiple harvests with up to 4-6 tons/acre of dry matter production in 60-90 days.

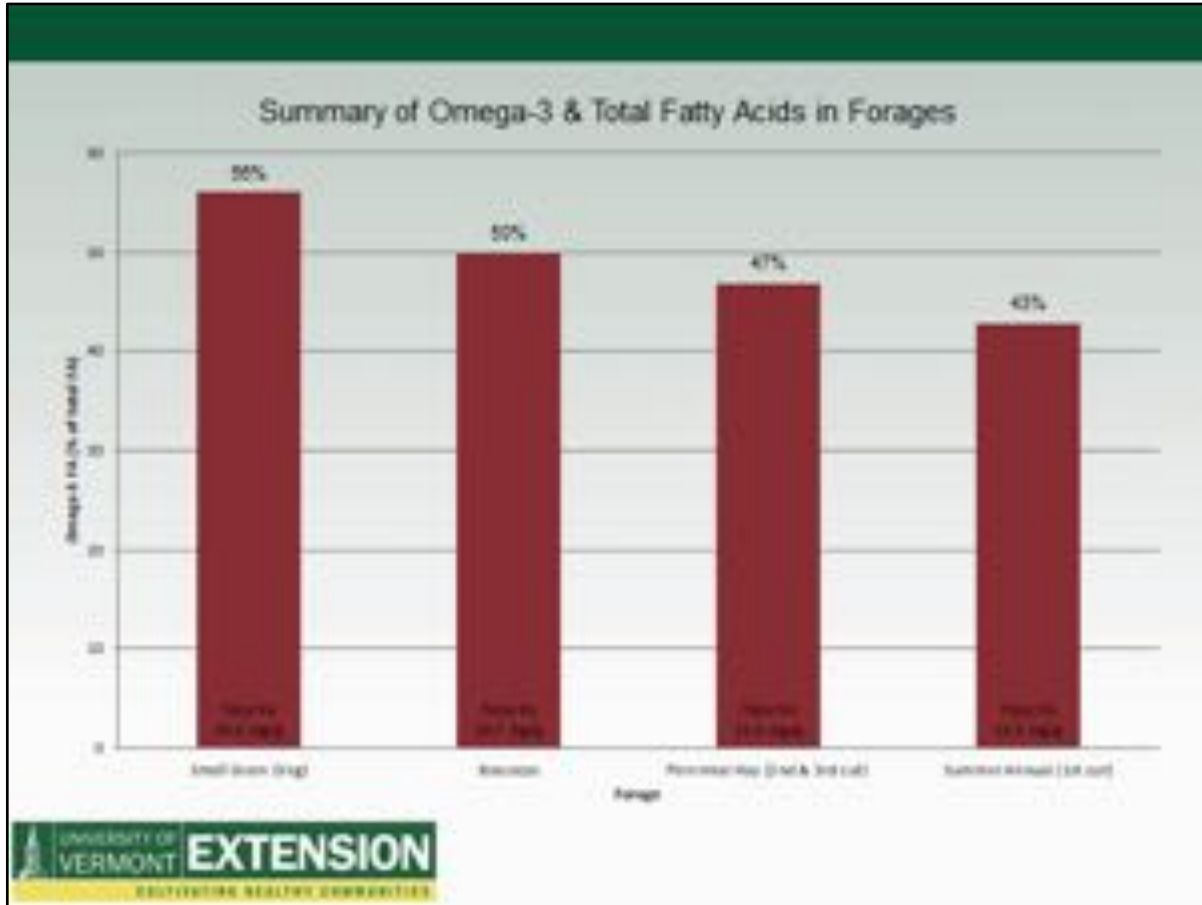
Appin forage turnip is bred for fast, vigorous establishment and quick maturity (60-100 days). It is firmly anchored in the ground for minimum wastage. Appin has a significantly higher proportion of leaf yield to bulb compared to other turnips. Unlike traditional turnips, the Appin bulb has 6 to 10 growing points on top of the bulb allowing for more leaves and better regrowth, and therefore, multiple grazings. It can be grown with oats, annual or Italian ryegrass, sorghum-sudan grass, cereal rye, and other grasses. The high leaf-to-bulb ratio results in a very leafy crop with high digestibility. It can be used to supplement or extend the grazing season when cool season pastures go to dormant. It can also be used as a smother crop to weaken or eliminate an old sod in order to convert older pastures to different species and newer varieties. The leaves on it look like mustard leaves, hence, the alternative name, field mustard.



This bar graph displays how these different brassicas stack up in DM yield in the fall. Bonar rape yields the most while the T-Raptor turnip X rape hybrid produces less than a ton per acre. The leafier brassicas produce the most DM. The bulb type brassicas produce less DM, except for Appin which is leafier due to having more growing points at the top of the bulb. Appin is the middle of the pack for DM yield in the bar graph with a yield of 2600 lbs. per acre.

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The last topic Heather shared with us was the amount of omega-3 fatty acid in supplemental forages fed to livestock when cool-season perennial pastures go dormant or are stressed by heat and lack of soil moisture in mid-summer.



In the bar graph above, vegetative small grains, such as oats, have the most omega-3 in them at 11.2 mg/g of plant tissue (multiplying 20 mg/g of total fatty acids (FA) by 0.56). The brassicas and 2nd & 3rd cut hay are equal in omega-3 at approximately 10.3 mg/g. Summer annuals are lower in omega-3 as percent of total FA and much lower in total FA so they provide only 5.5 mg/g of omega-3, half the value of vegetative small grain forage. Although due to rumen fermentation and fat synthesis, having a high amount of omega-3 in the forage does not translate into a big uptick numerically in omega-3 in meat and dairy products, it does bring down the omega-6 to omega-3 ratio to below 4.0 in those products. Current human health guidelines say a ratio ≤ 4.0 is best for cardiovascular health.