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Nutritional Values & Grazing Tips for Forage Brassica Crops

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Forage brassicas can be grown both as a cover crop and/or as a forage crop that is high in nutritive value. They are an annual crop and since they are cold-hardy, they will continue to grow during the fall and into early winter. They can be used to supplement or extend the grazing season when cool season pastures slow down. They are highly productive and typically produce a high yield of leaf biomass and retain their feed value during the cold weather into winter. Growing brassicas as forages can extend the grazing season in the northeast up to three extra months and can be used for stockpiling in some areas.

Establishment

Brassicas require good soil drainage and a soil pH between 5.3 and 6.8. Seeds should be planted in a firm, moist, seedbed drilled in 6 to 8 inch rows. Fertility requirements are similar to wheat. Don't plant deeper than ½ inch or this may suppress germination. Seeding rates of 4 to 5 lbs per acre are recommended. If planting after corn, sow in fields that had one pound or less of Atrazine applied in the spring.

T-Raptor Hybrid is ready in **42 to 56** days. (Turnip like hybrid with no bulb, very good for multiple grazings.)

Pasja Hybrid is ready in **50 to 70** days. (Turnip like hybrid with no bulb, very good for multiple grazings.)

Hunter Forage Brassica is ready to graze in about **45 to 60** days.

Appin Forage Turnip is typically ready to graze in **50 to 80** days. (Multiple growing points, cold tolerant)

Barkant Forage Turnip is ready in about **60 to 90** days. (High growing leaf, tankard bulb shape)

Rangiori Forage Rape ready to graze maximum yield in about **90 to 100** days. (livestock and wildlife feeding applications)

Bonar Forage Rape is late maturing, graze this in **91 to 105** days (look for purpling of leaf margins and tips before grazing).Medium-tall growing, re- grows well for multiple grazings.

Winfred Forage Brassica can be grazed in one large **180 day** harvest or after **60 days** and then in **30 day** intervals after that.

Nutrition

Included below on page 3 is a table (Data from Dairy One Forage Testing Lab).

This is a table with forage analysis values compiled for various brassica forage crops. Brassicas are very high in their dry matter digestibility which can lead to increased rate gains. Since they are primarily leaf material and not stems they have very high energy and low fiber levels, and they do not lignify as other forages do when they mature, therefore their dry matter digestibility does not decrease significantly with maturity. As forage for grazing they should be looked at as a very nutritious concentrate and ruminant diets should not contain more than 70 to 75% of these brassica forages. Dry hay should be added to the ration in the barn to balance for the lack of fiber content in the brassicas consumed while grazing.

Brassicas are high in levels of crude protein and protein content is determined mostly by nitrogen fertility. If high nitrogen fertility soil levels are known then nitrate testing is advised. Brassica leaves typically contain 16 to 32% crude protein, while the root of turnip and swede contains about 10% crude protein. The various brassicas listed in the following tables averaged 91.4% moisture levels. With IVTD (In Vitro True Digestibility) levels ranging from 82 to 93%. Soluble Protein levels averaged 54.4%; ranging from 45 to 62% on a dry mater basis.

Grazing Tips

Avoid abrupt changes to a brassica diet. Start by grazing only 1 to 2 hours per day. Slowly increase to a maximum intake over a period of 7 to 10 days to allow the rumen to adjust to this high protein forage.

Initially the cows may not graze the brassicas readily if they have never been exposed to them as a grazing option before. It has been my personal experience, that it may take several days for the cows to become interested in the brassicas and then they learn how to graze them. They need to try them and get exposed to the taste, then after that they will eat them readily.

Feed dry hay in the barn to provide the extra fiber needed for maintenance of proper rumen activity and also allow access to grass pasture. Two to three pounds of hay or straw should be fed to each animal per day. Cattle should have a good fill of dry roughage before initial exposure to brassicas.

Alternatively allow free access to a dry grass pasture or crop stalks adjacent to the brassica field. A small grain can be planted with brassicas to encourage a more diverse diet for cattle grazing. For summer grazing brassicas can be planted with Sorghum-Sudan grass, Sudangrass or with Millet.

Graze the brassicas in strips or small areas to control grazing and manage efficient utilization. Strip grazing with a break wire in front and back fencing is recommended for best results to control grazing consumption and prevent wastage, moving the animals along and limiting grazing damage to the root portion.

For multiple grazings do not graze turnips and radishes below 3 to 4” and only remove the tops. Do not graze the root top, this is where re-growth is initiated; for rape keep approximately 6 to 10” of stubble to provide a more rapid re-growth. Usually the cows will consume the top leafy portion of the plant and move to other tops before progressing to the root portion of the plant.

These can be grazed again in about 4 to 5 weeks, the final grazing can be managed to take the plants down lower and let the cows eat the tops of turnips and radishes.

Forage analysis samples of various brassica forage crops, data from Dairy One Forage Testing Lab

Compiled by Dave Wilson, Research Agronomist, King's Agriseeds Inc.

Variety Name - Species	% Moisture	% Dry Matter (DM)	Crude Protein % of DM	Soluble Protein % of DM	ADF Acid Detergent Fiber % of DM	NDF Neutral Detergent Fiber % of DM	IVTD In Vitro True Digestibility 24 hr, % of DM	NDFD Neutral Detergent Fiber Digestibility 24 hr, % of NDF	TDN Total Digestible Nutrients
DAIKON RADISH	90.5	9.5	19.6	45	32	43.8	82	59	64
NEW YORK TURNIPS	92.4	7.6	26.7	60	20.7	21.3	92	61	74
BARKANT TURNIPS	92.6	7.4	17.6	54	23.4	26.3	91	67	72
GRAZA RADISH	92.9	7.1	29.9	60	21.4	22.7	93	67	74
DOUBLET FODDER RADISH W/FLOWERING STEMS	91.1	8.9	25.6	54	25.1	28.5	90	64	72
DOUBLET FODDER RADISH LEAVES ONLY NO STEMS	90.7	9.3	25.7	51	19.5	19.6	93	64	75
TERRANOVA FODDER RADISH	92.5	7.5	19	54	27.7	32.1	86	56	70
HUNTER BRASSICA	89.7	10.3	32.4	62	21	22	93	67	75
PASJA HYBRID BRASSICA	90.0	10	16.8	50	19.3	22.1	92	63	73
Average	91.4	8.6	23.7	54.4	23.3	26.5	90.2	63.1	72.1

Variety Name - Species	% Calcium DM basis	% Phosphorous DM basis	% Magnesium DM basis	% Potassium DM basis	% Sulfur DM basis
DAIKON RADISH	1.07	0.39	0.31	3.35	0.23
NEW YORK TURNIPS	1.59	0.67	0.26	5.27	0.73
BARKANT TURNIPS	2.7	0.57	0.38	5.27	0.77
GRAZA RADISH	1.61	0.66	0.31	5.09	1.03
DOUBLET FODDER RADISH W/FLOWERING STEMS	1.63	0.59	0.27	3.84	1.14
DOUBLET FODDER RADISH LEAVES ONLY NO STEMS	2.67	0.53	0.4	3.69	0.98
TERRANOVA FODDER RADISH	1.67	0.46	0.29	5.36	0.84
HUNTER BRASSICA	2.48	0.46	0.4	3.5	1.11
PASJA HYBRID BRASSICA	2.57	0.45	0.35	4.22	0.82
Average	2.0	0.5	0.3	4.4	0.9

Forage Analysis Terminology

Moisture – the percent water in a sample.

Dry matter – equals (100% - Moisture) and represents everything in the sample other than water including protein, fiber, fat, minerals, etc.

Crude Protein (CP) – the total protein in the sample including true protein and non-protein nitrogen. Proteins are organic compounds composed of amino acids. They are a major component of vital organs, tissue, muscle, hair, skin, milk and enzymes. Protein is required on a daily basis for maintenance, lactation, growth and reproduction.

Soluble Protein (SP) – proteins and non-protein nitrogen that are rapidly broken down in the rumen. They are used to synthesize microbial protein in the rumen.

Acid Detergent Fiber (ADF) – a measure of cellulose and lignin. Cellulose varies in digestibility and is negatively influenced by the lignin content. As lignin content increases, digestibility of the cellulose decreases. ADF is negatively correlated with overall digestibility.

Neutral Detergent Fiber (NDF) – a measure of hemicellulose, cellulose and lignin representing the fibrous bulk of the forage. These three components are classified as cell wall or structural carbohydrates. They give the plant rigidity enabling it to support itself as it grows, much like the skeleton in animals. Hemicellulose and cellulose can be broken down by microbes in the rumen to provide energy to the animal. NDF is negatively correlated with intake.

In Vitro True Digestibility (IVTD) – an anaerobic fermentation performed in the laboratory to simulate digestion as it occurs in the rumen. Rumen fluid is collected from ruminally cannulated high producing dairy cows consuming a typical total mixed ration (TMR). Forage samples are incubated in rumen fluid and buffer for a specified time period at 39oC (body temperature). During this time, the microbial population in the rumen fluid digests the sample as would occur in the rumen. Upon completion, the samples are extracted in neutral detergent solution to leave behind the undigested fibrous residue. The result is a measure of digestibility that can be used to estimate energy.

Neutral Detergent Fiber Digestibility (NDFD) – The proportion of NDF potentially available as determined by an in vitro incubation. NDFD is expressed as a percentage of the NDF. The NDFD can be used to rank forages on potential fiber digestibility and in energy calculations.

Total Digestible Nutrients (TDN) – denotes the sum of the digestible protein, digestible NSC, digestible NDF and 2.25X the digestible fat.

Calcium (Ca) – bone and teeth formation, blood clotting, muscle contractions, milk component, transmission of nerve impulses, cardiac regulation, activation and stabilization of enzymes.

Phosphorus (P) – bone and teeth formation, key component of energy metabolism, milk component, body fluid buffer systems.

Magnesium (Mg) – enzyme activator, found in skeletal tissue and bone, neuromuscular transmissions.

Potassium (K) – osmotic pressure regulation and water balance, electrolyte balance, acid-base balance, enzyme activator, muscle contraction, nerve impulse conductor.

Sulfur (S) – needed for microbial protein synthesis, especially when non-protein nitrogen (NPN) is fed.