



FORAGES FOR ALL SEASONS

Brassicas for fall grazing

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Introduction

A major goal in livestock production is to reduce the cost of production by utilizing locally grown forages. Pasture is generally the least expensive forage, but the grazing season in northern climates is relatively short. The brassicas provide an opportunity to add value to livestock before marketing, especially when grown on the 150,000 acres of irrigated land left fallow after cereal grain harvest in Wyoming each year. They show promise for extending the grazing season and reducing the cost of livestock production.

Brassica Species

The brassica family consists of short-season species such as turnip (*Brassica campestris*, formerly *B. rapa*), rape (*B. napus*), and Tyfon (*B. campestris* x *B. pekinensis*). Full-season brassicas include kale (*B. oleracea*) and swede or rutabaga (*B. napus*).

Brassica Characteristics

Although most forage brassicas are biennials, they usually do not overwinter in the northern areas of the United States. Seedlings have limited frost tolerance, but mature plants are frost-tolerant and maintain high nutrient concentration into the fall and early winter. All species of brassicas produce succulent top growth, and turnip and swede produce significant root growth, which can also be utilized by grazing animals. Rape has fibrous roots, unlike the fleshy roots of turnip, and should be used in lieu of, or mixed with, turnip on soils subject to erosion. Because of their high water content, harvesting and storing brassicas is not recommended.

Nutritional Characteristics

Brassica species contain high nutrient concentrations, even after maturing. Nutrient levels and palatability are maintained through the cool fall period.

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This variety is 'Purple top.' Note that the turnip roots are still ungrazed and about one-third of the roots grow above ground.

At the Powell Research and Extension Center, turnip top growth averaged 14.6 percent crude protein in early October and 10.2 percent in late November. During the same period, fleshy roots declined from 11.3 to 9.1 percent crude protein. Brassicas are relatively low in fiber, readily digested, and provide good concentrations of energy for ruminant animals. *In vitro* dry matter digestibility is generally 80 to 90 percent or higher. Although water content is often 90 percent or higher, animals seem to consume adequate amounts of forage to meet their energy needs. Because brassica pasture is lush and has a high nutrient concentration, it has been used instead of grain for flushing ewes.

Brassicas to Supplement Other Forages

Depending upon the farm enterprise, brassicas might be used:

(1) as a second crop, following small grains. This method is economical when one of the short-season brassicas (turnip, rape, or Tyfon) is seeded early enough for adequate growth before heavy frost. If small grains are harvested as silage or hay, the brassicas could be planted earlier. There is substantial decline in potential production for the brassicas with each day the planting date is delayed.

(2) as a break crop, following plow down of alfalfa or sod crop. The brassicas use residual nitrogen from alfalfa effectively, and by the following spring, the seedbed will be easily prepared for seeding perennial forage or other crops.

(3) as a no-till seeding into permanent pasture or meadow. Many pastures and meadows produce very little regrowth; therefore, seeding brassicas after hay harvest or early-season grazing sacrifices very little seasonal production. Chemical control of sod and a specialized no-till seeder are required. The sod will recover the following spring. If pasture or meadow improvement is planned, soil conditions for seeding productive perennial forage species will be more desirable than with the original sod.

(4) as a summer-grazed crop on land that might otherwise be idle or diverted from another crop. This system might work best if late summer feed is expected to be short and/or if animals are flushed in late summer.

In the first three instances, short-season brassicas should be seeded in July or the first half of August to provide fall pasture. In the fourth instance, brassicas should be seeded in May or early June.

Production Practices

Soil

The range of adaptation of the brassicas is not known. Brassicas are not tolerant of saline or alkaline soils, and do best on soils with a pH greater than 6.0. Droughty soils should be avoided. Soils that are too wet for spring seedings can be seeded successfully in mid-summer.

Water Requirement

Brassicas generally have small root systems and high plant water contents, so they have little drought tolerance. Adequate moisture is critical for establishment; frequent light irrigations should be provided, if necessary. For maximum production, mid-summer plantings should receive a minimum of 12 inches of water (rainfall and irrigation). May or June plantings should receive at least 16 inches of water.

Seed and Varieties

Although many varieties are imported, seed is readily available in Wyoming. As new varieties are released and tested, recommended varieties will change. Contact your University Extension Educator for the latest information on varieties.

Seeding Method

Brassica seed is relatively small and requires a fine, firm seedbed that is free of weeds. In no-till situations, the sod should be close (2 to 3 inches or less) and suppressed with herbicide before seeding. A no-till drill should be used. Avoid seeding into sods with accumulation of dead or matted vegetation on the surface. If seeded without tillage following small grains, the loose straw should be removed before planting brassicas. Oat or other small grain can be seeded with brassicas, and mixed seedings have improved animal performance over straight brassicas.

Seeding Rate

With good seedbed conditions, 1½ to 4 pounds per acre of seed are required. The higher seeding rate



The tops of turnip are preferred by lambs, but roots are also relished.

will result in a higher proportion of leaves to roots in turnips and Tyfon. If seeded aerially, a minimum of 5 to 6 pounds of seed per acre is needed.

Seeding Date

Short-season varieties should be seeded from mid to late May until 80 days before frequent hard freezes. The latest date for maximum yield will range from mid to late July. At Powell, brassicas planted July 20 through 25 produced 1¾ to 2 tons of dry matter per acre, while plantings in mid-August produced only half as much forage. Kale and swede require a full season and must be planted in May or early June.

Fertilization

Depending upon the results of soil tests, 50 to 100 pounds per acre of nitrogen should be applied at seeding, unless the seeding follows the harvest of an alfalfa crop, in which case, nitrogen is unnecessary. At Powell, brassicas planted July 20 through 25 produced 1¾ to 2 tons of dry matter per acre, while plantings in mid-August produced only half as much forage. If a full season crop is to be grown, or if regrazing is intended, an initial 50 pounds of nitrogen should be used, with 30 to 50 pounds of nitrogen applied after each grazing. Although nitrate poisoning has not been reported, nitrogen should be applied immediately after animals have been removed, and brassica plants should be 12 to 15 inches high before animals are reintroduced. The brassicas require high levels of phosphorus and potassium, but the amount of fertilizer applied should be based on soil tests.

Pasture Utilization

Animals should be adjusted to green forage before grazing brassicas. Tyfon, rape, and turnip seedings should not be grazed for a minimum 60 days following seeding, and kale and swede should not be grazed for at least 90 days. If the brassicas are grazed during the summer, allow at least 60 days

for regrowth. In late fall, regrowth time is not an issue, and the brassicas should be grazed until the crop has been completely utilized.

Yearlings and large lambs (weighing 90 pounds or more) will make more effective use of grazed brassicas because they have adequately developed ruminant stomachs. If residue from the previous crop is not available, animals should have access to dry feed from an adjacent field or free choice hay. Low-quality hay or forage is sufficient. Lamb gains diminish when the crop is utilized past about 80 percent, but ewes and mature cows can be used to clean up the crop because their nutrient needs are lower than those of growing animals. Only about one-third of the turnip roots are utilized unless they are shanked out of the ground.

Grazing can continue until heavy snow cover or until low temperatures kill the crop (10° Fahrenheit or lower). Early snow cover may protect turnip roots, allowing them to be utilized after the snow melts. Animals will consume frozen brassicas with no apparent adverse effects; however, once the roots thaw, they deteriorate rapidly.

Since they have high energy concentrations, the brassicas can be treated as concentrate feeds. Animals can be limited to two or three hours grazing each day on pure stands.

Stocking rates vary with brassica species, time of planting, method of planting, and growing conditions. Prepared seedbeds generally produce greater amounts of forage than brassicas that have been no-till seeded into sod. An acre of turnip planted in July in Powell provided 30 lambs with an average weight of 80 pounds with forage for 30 days. Near

Pine Bluffs, cattle producer Bill Gross reported stocking 10 yearlings per acre of turnip for 40 days.

As with all forages, there is an advantage to rotational grazing during the summer and early fall. For maximum production, animals should graze an area for one week, and be returned to the area in 60 days. In the fall there is less advantage to rotational grazing, as regrowth is minimal.

Based on 10 years of fall grazing of second-crop turnip at Powell, the average daily gain of lambs was 0.40 pound per day and the average lamb gain per acre was 275 pounds. Turnip, tyfon, and radish did not differ in production or lamb performance when planted on the same date. Lambs in drylot gained less per day than turnip-grazed lambs until the former were on full feed (11 to 15 days). After 35 to 40 days, the rate of gain on turnip decreased while gains in drylot increased. Bill Gross's yearlings gained between 1.6 and 1.8 pounds per day at Pine Bluffs, producing between 600 and 700 pounds of beef per acre.

Lambs grazing turnip and radish without concentrate produced acceptable market size and carcass grade, but they required more time than feedlot lambs to reach a similar weight. The estimated cost of growing and grazing turnip and other brassicas is 90 to 100 dollars per acre, resulting in \$0.35 to \$0.36 per pound of lamb gain. The cost of growing and grazing brassicas has not been determined for yearlings.

Reference

Koch, D.W., C. Kercher and R. Jones. 2002. "Fall and winter grazing of brassicas, a value-added opportunity for lamb producers." *Journal of Sheep and Goat Research*, Vol. 17:1-13.

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