



Virginia's Horse Pastures: Forage Species for Horse Pastures

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Virginia is located in the transition area between the cool temperate and subtropical zones of the United States. Thus, Virginia can produce a wide range of pasture plants, but varying temperatures and soil conditions require that different pasture species be grown in various parts of the state. Total moisture availability and temperatures are favorable to productive pasture, but short-term drought combined with high temperatures often limits forage growth during the summer months. Choosing the correct forage species is the first step in successful pasture management. Forages used in Virginia's horse pastures should be:

- Adapted to the region where they will be used.
- Adapted to the soils on which they will be grown.
- Tolerant of environmental stresses, such as high temperatures and drought.
- Tolerant of close and frequent grazing.
- Productive when pasture is needed.
- Free of antiquity factors that may restrict use by horses.
- Easily managed in horse pastures and matched to the management level of the horse owner.
- Matched to the animal's nutritional requirements.

Horses can be susceptible to health problems when allowed to overgraze lush pastures, particularly when high volumes of clover are available. The consumption of excessive soluble and rapidly fermentable carbohydrates may lead to colic and laminitis. It is best to limit grazing during the transition from dry feed onto pasture. This can be accomplished by allowing horses to graze for short periods and gradually increase the length of grazing time over a two- to three-week period. Allowing horses access to dry hay during this transition period will also help to limit nutritional problems.

Cool-season Perennial Pastures

Cool-season perennial grasses and legumes do not need to be seeded each year and have highest production in the early spring and fall, with significantly reduced growth during the summer months. Cool-season perennials common to Virginia include

grasses such as Kentucky bluegrass, orchardgrass, timothy, and tall fescue. Perennial legumes such as white clover, ladino clover, and red clover compliment these cool-season grasses in Virginia horse pastures.

Grasses

Kentucky bluegrass forms a dense sod, tolerates close grazing, and is one of the more palatable grasses for horses. It is low-growing, up to a height of about 12 to 20 inches, having narrow leaves with tips shaped like the bow of a boat. Kentucky bluegrass does best on medium- to highly-productive soil with medium drainage. It has underground rhizomes that enable it to help cover areas where turf becomes torn. It will persist under low fertility, but grows best at a medium to high fertility level with a pH of 5.8 to 6.5. It is not tolerant of drought and high temperatures and commonly goes dormant during the summer months. Although bluegrass is well adapted for pastures in the Northern Piedmont and areas west of the Blue Ridge Mountains, it is not a suitable choice for Southside and southeastern Virginia. It has seasonal production from April to October, with limited production in July and August. When compared to orchardgrass and tall fescue, bluegrass produces less total forage.

Orchardgrass is a tall bunchgrass that grows in clumps, rather than forming a smooth sod. Its leaves are light dull green, folded at the base and may grow to a height of 40 inches. Orchardgrass is commonly used for hay and pasture. However, it does not persist under close and continuous grazing and requires a higher level of management than some of the other cool-season forages. It grows best on medium- to well-drained soils and does not tolerate wet soils, drought, or heavy trampling. Unless very closely seeded, horses will be likely to dig it up when the ground is wet. It has seasonal production from March to November, with limited growth in July and August. Orchardgrass is best adapted to medium- to high-fertility soils with a pH of 5.5 to 7.0. Although widely adapted in Virginia, orchardgrass does not persist as well as other grasses in eastern and southern Virginia, so it should be considered a semi-permanent pasture in these areas. To maintain orchardgrass pastures it is essential to rest pastures three to four weeks between grazings and to never graze closer than 3 to 4 inches.

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Timothy is a tall, relatively short-lived bunchgrass that has dense, spike-like seed heads. The leaves are flat, erect, light green and taper to a point while twisting slightly. It has seasonal production from April to November, with lower production during the summer months. Timothy is most often used as hay since it does not withstand close and frequent grazing. Regrowth of timothy is variable and is especially low if temperatures are high and soil moisture is limiting. Timothy is technically a perennial, but since it is not very durable, it usually needs to be replanted each year or two in the mid-Atlantic region. The timothy root system is relatively shallow, making it very susceptible to drought stress. Timothy is commonly used for horse hay, but its production and persistence is significantly less than that of tall fescue and orchardgrass.

Tall fescue may grow to a height of 40 inches. It is the most widely grown cool-season grass in the southeastern United States. It forms a dense, long-lasting sod and withstands close grazing and trampling better than other grasses, making it useful in heavily traveled areas. Its leaves are dark shiny green, coarse textured, deeply veined, and rolled as they emerge from the sheath. It tolerates acidic and poorly drained soils and is fairly drought tolerant. It has seasonal production from March to November with a decreased rate of growth during July and August. A strong attribute of tall fescue is its ability to be stockpiled for deferred grazing. After frost, fescue becomes very palatable due to significant increases in sugars and digestible carbohydrates.

Most tall fescue plants harbor an endophyte, a fungus that grows within the plant that confers hardiness to the plant but produces a toxin that causes reproductive problems in broodmares. Documented symptoms of endophyte-related reproductive problems include prolonged gestation; inadequate physical readiness of the mare for birth; dystocia; large, weak, or stillborn foals; thickened and retained placentas; and failure to produce milk. Broodmare managers can effectively avoid these problems by removing endophyte-infected fescue from the mare's diet for 60 to 90 days before foaling. Endophyte-free fescue can be used in place of endophyte-infected fescue. However, it is more difficult to establish and does not persist well under horse grazing.

A recent advance in tall fescue is development of cultivars that contain a non-toxic endophyte that confers plant hardiness without producing the toxins associated with reproductive problems in broodmares. Research from Mississippi showed that broodmares grazing tall fescue infected with the Max-Q non-toxic endophyte showed no signs of "fescue toxicosis." Broodmares grazing tall fescue infected with the toxic endophyte exhibited traditional signs of "fescue toxicosis" including abortion, prolonged gestation, low milk production, dystocia, and retained placenta. This research indicates that there are no health risks to grazing pregnant mares on tall fescue infected with the non-toxic endophyte. *However, since limited research is available on the persistence of tall fescue infected with the nontoxic Max-Q endophyte under horse grazing, Virginia Cooperative Extension is not recommending its use in the last 60 days of gestation, unless pastures have been tested to ensure that only the non-toxic endophyte is present.*

Legumes

Legumes fix nitrogen from the air into a plant-available form that is shared with grasses. When a pasture consists of more than 25 percent legume, no nitrogen fertilization is needed. As a general rule, legumes should not make up more than one-third of the sward on a dry-matter basis. High levels of legumes can result in nutritional disorders such as colic and laminitis. Many Virginia pastures naturally contain large amounts of white clover when soil moisture is adequate, so in some cases clover seed may not be required in horse pasture mixes.

Common (dutch) white clover is a low-growing legume found in all areas of Virginia. The leaves consist of three heart-shaped leaflets and the petioles attach to stolons, or runners, that form shallow roots. Its white flowers are clustered into small heads. It does best on fertile soils with good moisture-holding capacity and has seasonal production from April to October. It tolerates close grazing and does well when planted with Kentucky bluegrass or with other cool-season perennial grasses. White clover is not drought tolerant and is often lost from pastures during dry periods. However, hard seed persists for long periods in the soil, and when moisture conditions become favorable for clover growth, white clover reappears.

Ladino clover is a large, taller-growing variety of white clover that is higher yielding. It is usually planted with taller, cool-season perennial grasses, such as orchardgrass and tall fescue. Ladino clover does best on fertile soils with good moisture holding capacity and is found in all areas of Virginia. It does not grow well in shallow, dry soil and usually lasts only three to four years without replanting.

Red clover is a tall, short-lived, legume. It can grow to a height of more than 30 inches. Its leafy stems are usually hairy, and its violet-pink flowers are clustered into large heads. Its root system is a taproot with many side branches. It has seasonal production from April to October. Red clover is fairly drought tolerant but usually does not persist due to disease. Therefore, red clover must be reseeded every two to three years. This can be accomplished by broadcasting red clover seed onto a closely grazed pasture in late winter. Red clover is usually planted with taller, cool-season perennial grasses, such as orchardgrass, timothy, and tall fescue. Red clover has frequently been associated with slobbering in horses. The slobbering is caused by a chemical compound produced by a clover disease known as black patch. Black patch most commonly affects red clover, but also sometimes white and ladino clover. Most often the slobbering is merely a nuisance, but severe cases may lead to dehydration.

Warm-season Perennial Pastures

Warm-season perennials begin to grow after the soil warms in late spring. Warm-season plants are high in productivity during hot, dry summer months but become dormant and unproductive after frost. Since cool-season plants lag in growth during the summer but flourish in the spring and fall, utilizing both cool-season and warm-season plants in separate paddocks can provide year-round grazing. Of the warm-season perennial species, bermudagrass is the best adapted for horse pastures in Virginia.

Bermudagrass is best adapted to well-drained, fertile loam soils, but will make excellent growth on deep sands when fertility and moisture are adequate. It does not tolerate wet soils and

is sensitive to frost. It has seasonal production from late May until September. It is most productive between 80° to 90°F. In order to extend the grazing season, bermudagrass sods can be interseeded with a cool-season annual grass in the early fall. Bermudagrass is relatively tolerant of trampling and overgrazing. To maintain forage quality and palatability, it should be closely grazed or clipped down to a height of one to two inches, then allowed to recover to four to eight inches. Several ecotypes of common bermudagrass grow wild on farms throughout the Southern Piedmont and Coastal Plain regions of Virginia. In some cases, improved management of these bermudagrass ecotypes may be more efficient than trying to establish improved varieties. In the past, bermudagrass had to be established vegetatively, but recently developed varieties can be seeded. For the most up-to-date information on bermudagrass varieties, contact your local Virginia Cooperative Extension office.

Summer perennials NOT recommended for grazing by horses include Johnsongrass, big bluestem and switchgrass. Johnsongrass may accumulate hydrocyanic acid, leading to cyanide poisoning, cystitis, incoordination, and sometimes fatal kidney disease. The concentration of hydrocyanic acid is highest after frost and lessened by proper curing and storage of hay. Big bluestem and switchgrass have not been shown to be toxic but are not palatable to horses. They also do not survive well under close and frequent grazing.

Warm-season Annual Pastures

Warm-season annuals provide rapidly growing, high-yielding, drought-resistant pasture during the summer months when cool-season plants slow in growth. Warm-season annuals are killed by frost and must be reseeded each spring. Although the plants are highly responsive to nitrogen fertilization, care should be taken to avoid nitrate poisoning. Nitrates can accumulate in slow-growing, drought-stressed plants that have been heavily fertilized. *Therefore, drought-stressed plants that have been fertilized with significant nitrogen should not be grazed.* Of the warm-season annual plants, dwarf pearl millet and crabgrass are the most commonly occurring species in Virginia.

Dwarf pearl millet may grow to a height of three to eight feet. It is leafy and tolerant of drought and acidic soils. It is seasonally productive from June to August. Pearl millet is tolerant of grazing with excellent recovery growth afterwards. Its thick stems make it difficult to cure for hay. For best quality, it should be periodically grazed to a height of five to seven inches then allowed to regrow to 18 inches. The regrowth is made primarily from stubble rather than the base of the plant so close grazing should be avoided. Grazing or clipping closer than five to seven inches will significantly reduce regrowth.

Crabgrass is often discounted as a weed, but could provide high-quality summer grazing for horses. It has nutritive value superior to most warm-season perennial grasses. It has seasonal production from June to September and grows 12 to 24 inches tall. It responds well to nitrogen fertilization and the small quantities of rainfall provided by intermittent summer thundershowers. In Virginia, crabgrass is best adapted to the Southern Piedmont and Coastal Plains regions. Naturally occurring ecotypes can be managed for forage, but production is variable. "Red River" is the only improved variety commercially available. Crabgrass is best adapted to a slightly

acidic pH and well drained soils that do not crust or crack extensively.

Summer annuals NOT recommended for grazing by horses include sudangrass, sorghum, sorghum-sudangrass hybrids, and foxtail millet. Sudangrass, sorghum, and sorghum-sudangrass hybrids can accumulate prussic acid, especially after frost. When drought-stressed plants are grazed, they may cause cyanide poisoning, cystitis, incoordination, and sometimes fatal kidney disease. Since prussic acid volatilizes during curing, properly made and stored hay produced from these grasses may be safely fed to horses. Foxtail or German millet has been reported to have a diuretic effect in horses that may lead to kidney and joint problems. The coarse, fuzzy heads may also lodge in the tissues of the mouth and gums and create sores.

Cool-season Annual Pastures

Cool-season annual plants include small grains, such as rye, wheat, barley, and oats, and annual ryegrass. These plants are not primary horse-pasture species, but may furnish grazing in the late fall, early winter and early spring to complete a 12-month grazing program when other plants are not actively growing. *Grazing small grains may increase the risk of colic, laminitis, and founder, so horses' exposure to cool-season annual pastures should be limited and monitored closely.* It is important to remember that cool- and warm-season annuals must be replanted each year.

Small grains are adapted in all areas of Virginia and do well on soils with moderate drainage, fertility, and pH. They may be grazed continuously in the fall, early winter, and spring; however, they do not form a tight sod, so horses should be removed from these pastures when the soil is wet. **Rye** is the small grain most commonly used for grazing animals because of its ability to provide fall and early-spring growth. **Wheat, barley, and oats** may also be grazed. Of the small grains for pasture, oats are more palatable but generally more sensitive to cold than other grains and may be killed in the winter. The seedheads of rye, along with other small grains, and some perennial grasses can become infected by an ergot fungus, which can cause equine ergotism. Ergotism has neurological effects including tremors and incoordination, and it may cause dry gangrene and abortions. Since the seedhead is required for the ergot fungus to infect the plant, simply not allowing seedheads to be produced in horse pastures will prevent ergotism.

Annual ryegrass is adapted to soils with moderate drainage, fertility and pH. It has shiny, dark green, smooth leaves and may grow two to three feet tall. Annual ryegrass is both highly digestible and extremely palatable, making it a desirable species to include in forage systems. In addition, annual ryegrass has high seedling vigor, making it well adapted to either conventional or no-till establishment. Under good growing conditions, annual ryegrass can produce grazable forage in as little as 45 to 60 days after planting. In Virginia, annual ryegrass is best adapted to the Southern Piedmont and Coastal Plains regions. Most annual ryegrass is sodseeded into permanently established warm-season grasses in order to extend the useful period of this land area. A disorder called ryegrass staggers, caused by a fungal endophyte that proliferates in perennial ryegrass, can be a problem for horses. *However, this problem occurs only in perennial ryegrass, not annual ryegrass.*

Forage Species at a Glance

- Choose forage species that are adapted to the region and soil conditions present in the pasture.
- **Kentucky bluegrass** tolerates close and frequent grazing and is best adapted west of Blue Ridge Mountains.
- **Orchardgrass** forms an open sod and does not tolerate close and frequent grazing.
- **Tall fescue** that is infected with the toxic endophyte fungus forms a dense sod that is tolerant of grazing and other environmental stresses, but can cause reproductive problems in late-term broodmares.
- **White clover** tolerates close and frequent grazing and mixes well with most grasses.
- **Red clover** is a tall, short-lived, legume that mixes well with pasture grasses, but must be reseeded every two to three years.
- **Bermudagrass** is a warm-season perennial grass that forms a dense sod that is highly tolerant of close and frequent grazing.
- **Crabgrass** is a warm-season annual grass that occurs naturally and can provide high-quality grazing during the summer months.

Table 1. Characteristics of forage species commonly used in Virginia's horse pastures.

Species	Life Cycle ¹	Productive Season	Seedling Vigor ²	Tolerance to ³			
				Acid Soil	Poor Drainage	Drought	Grazing
KY Bluegrass	PN	Spring & Fall	P	F	F	P	E
Orchardgrass	PN	Spring & Fall	G	F	F	F	G
Tall Fescue (EI) ⁴	PN	Spring & Fall	G	G	G	G	E
Tall Fescue (EF) ⁵	PN	Spring & Fall	F/G	G	G	F	G
Tall Fescue (NT) ⁶	PN	Spring & Fall	G	G	G	G	E
Timothy	PN	Spring & Fall	G	F	F	F	F
Red Clover	PN	Spring & Fall	E	F	F	F	G
White Clover	PN	Spring & Fall	F	F	G	P	E
Bermudagrass	PN	Summer	F	E	P	E	E
Annual Ryegrass	AN	Late Fall & Spring	E	G	E	F	E
Rye	AN	Late Fall & Spring	E	E	F	F	G
Wheat	AN	Late Fall & Spring	E	P	P	F	G
Oats	AN	Late Fall & Spring	E	F	F	F	G
Pearl Millet	AN	Summer	E	E	P	E	F
Crabgrass	AN	Summer	G	G	P	G	F/G

¹PN=Perennial, AN=Annual

²E=Excellent, G=Good, F=Fair, P=Poor

³E=Excellent, G=Good, F=Fair, P=Poor

⁴EI, infected with the toxic endophyte

⁵EF, not infected with an endophyte

⁶NT, infected with the non-toxic endophyte

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