Forage Production

Keeping livestock well fed during the winter months can be one of the largest costs associated with livestock operations. Forage can provide much needed nutrients, so it is critical in keeping livestock productive and healthy. This unit explores forage production.

Objective:

Describe the types of forage and the plants used for forage.

Key Terms:

- blades
- boot stage
- bunching grasses
- culms
- ensile
- forage
- forbs
- grasses
- hay
- haylage
- heading
- jointing
- pastures
- perennials
- ranges
- rhizome
- silage
- silos
- sod grasses
- stolon
- tillering

Forage Crops

Forage is vegetation fed to livestock. Forages are crops that are efficiently used by ruminant animals and may be fresh, dried, or ensiled. Fresh forages include grasses and legumes grown in pastures. Ensile plant materials refer to silage and haylage.

Types of Forages

Forage types vary depending on the needs of animals and the wants of producers. The four forage types are pasture, hay, silage, and haylage.
**Pasture**

*Pastures* are improved or unimproved plant materials on land areas where animals graze. Pastures are composed mostly of grasses and legumes and are often fenced in to reduce the intrusion of native plants. Land areas covered with forage plants and native plants are considered *ranges*—large, open areas of land. Pastures may be permanent or temporary.

Permanent pastures are usually planted with perennial grasses and legumes. *Perennials* are plants with life cycles of more than two years. Common perennial pasture plants include fescue, Bermudagrass, and white clover.

Temporary pastures are usually planted with annual grasses and legumes. Common annual pasture plants include millet, sorghum, and ryegrass.

**Hay**

Dried forms of forage include hay and other plant materials. *Hay* is green plant material that has been cut and dried for use as livestock feed. Hay can be made from a number of grasses and legumes. The cutting and drying of hay is important in maintaining the hay’s nutrients. For example, hay that has been rained on is of lower quality because excessive moisture can cause the hay to rot. Handling hay can be made easier by baling the hay in square or round bales. The size and shape of the bales depends on the equipment available and the producer’s needs.

**Silage and Haylage**

Ensiled plant materials refer to silage and haylage. *Silage* is chopped plant material that has been fermented, and *haylage* is silage that contains less than 50 percent moisture. Silage and haylage are more nutritional than hay because they are not dried.

Silage contains most of the above-ground plant parts, including the leaves, stems, and heads. Most silage is made from green
crops (e.g., corn, grass, and sorghum) and usually contains 60 to 70 percent moisture. High moisture levels lead to fermentation during storage; this produces acids that prevent spoilage in silos (upright or horizontal facilities that maintain the silage quality).

The production of haylage is similar to that of silage. However, it is harvested later than silage and less moisture is added.

**FORAGE GRASSES**

Grasses are plants that typically have leaves with parallel veins and stems that are hollow or solid. Grasses normally have herbaceous stems, except bamboo which has woody stems. Height, color, life cycle, and seasonal preferences differ with grass varieties. Grasses are members of the Gramineae family, and more than 1,400 different species have been identified in the United States.

Grass plants are composed of roots, culms, blades, flowers, and fruit or seeds. Culms are the stems, and blades are the leaves.

**Grass Plant Growth**

Many grass plants reproduce using stolons or rhizomes. Stolons are above-ground creeping stems, and rhizomes are underground structures that send up shoots.

Grasses grow horizontally and vertically in a variety of ways. Horizontal growth includes bunching and sodding. During horizontal growth, some grasses bunch while others sod. Bunching grasses often grow in circular patterns that appear as clumps, but sod grasses are more aggressive. Sod grasses use stolons and rhizomes to reproduce and form a thick mat of stems, leaves, and roots. Vertical growth includes short and tall grasses. Short growing grasses are more tolerant of grazing than taller grasses. Height differs with grass varieties.

Grasses have shallow, fibrous root systems. These roots store little or no food and do not grow into the moistest layers of the soil.

Grasses are annuals or perennials. Annuals are planted each year and are commonly used in temporary pastures. However, most grass is established for long-term use; therefore, perennial grasses are used because they grow back each year.

Perennial grasses have three phases of growth, including tillering, jointing, and heading. Tillering is the growth of buds (tiller buds) from dormant shoots. This is the first growth of the year. Jointing is the growth phase in which the internodes begin to elongate, and vertical growth is rapid during this stage. As a result, this is not a good time to cut forages. The end of stem elongation is the boot stage, and heading is the phase in which seed heads form on the plant. During this phase, shoots begin to grow from the plant’s base. This is a good time to cut forage grasses because they have basal buds ready to repeat the growth process.

**Types of Forage Grasses**

Perennial grasses can produce high-quality forage grass. All perennial grasses produce good yields provided good stands are established and fertilized adequately. Common forage grasses are smooth bromegrass, tall fescue, perennial ryegrass, timothy, reed canarygrass, and orchardgrass.
Smooth bromegrass is a cool-season perennial used for pasture, hay, haylage, or silage. It can be used in a three-cut system when a legume is included. Smooth bromegrass has very high palatability, good winter hardiness, and good drought tolerance. It has a rhizomatous growth habit and reaches 20 to 40 inches in height. It does well in somewhat poorly drained, highly fertile soils with a pH range of 5.8 to 6.5. Smooth bromegrass produces more regrowth than timothy, making it a better selection when one or more harvests can be pastured.

Tall fescue is a cool-season perennial used for pasture and hay. It has medium palatability, fair winter hardiness, and fair drought tolerance. The growth habit is that of a bunchgrass. This high-yielding grass grows 24 to 48 inches in height and grows well in somewhat poorly drained soil with medium fertility and a pH range of 5.4 to 6.2. It is long-lived.

Perennial ryegrass is a cool-season perennial used for pasture and hay and is finer stemmed than most other forage grasses, making the palatability very high. It has poor winter hardiness and poor drought tolerance. In addition, it may be damaged by cold weather and may cease growing during dry periods. Perennial ryegrass has a bunchgrass growth habit and reaches 12 to 24 inches in height. It performs well in somewhat poorly drained soil with medium to high fertility and a pH between 5.6 and 6.2. It may be seeded alone or with legumes.

Timothy is a cool-season perennial used for pasture and hay. It can be used in a three-cut system when a legume is included and is commonly mixed with alfalfa, red clover, and trefoil to provide coverage when legumes die. Timothy inhibits weed growth and has high palatability, good winter hardiness, and poor drought tolerance. It is a bunchgrass type and reaches 20 to 40 inches in height. It grows in somewhat poorly drained, medium fertile soils with a pH between 5.4 and 6.2.

Reed canarygrass is a cool-season perennial used for pasture, hay, and haylage. Reed canarygrass is a fast-recovering grass, making it well suited for intensive pasture programs. It
has low palatability, good winter hardiness, and good drought tolerance. Reed canarygrass is a rhizomatous grass that grows 24 to 72 inches high in poorly drained soil with medium high fertility and a pH between 5.8 and 8.2.

Orchardgrass is a cool-season perennial for pasture and hay. It can be used in a four-cut system with alfalfa. Orchardgrass varieties benefit from early cutting and can be seeded in early spring, late summer, or as a frost seeding in late winter. Orchardgrass has medium to high palatability, fair winter hardiness, and fair drought tolerance. It has a bunchgrass growth habit and reaches 24 to 48 inches in height. It grows well in somewhat poorly drained soils with medium fertility and pH between 5.5 and 8.2. Orchardgrass is vigorous and produces more summer regrowth than timothy or bromegrass. It heads very early and works well when planted with alfalfa designed for early harvest or summer grazing.

Selecting Forage Grasses

Two primary factors to consider when selecting perennial forage grass species and varieties are persistence and the heading date. Persistence refers to tolerance of pH and moisture extremes, and the heading date is the time at which seed heads form on grasses.

Species can be ranked according to their adaptability to poorly drained soil, tolerance of excessively drained soil conditions, and tolerance of low soil pH. The most adaptable to poorly drained soil is reed canarygrass followed by timothy, tall fescue, smooth bromegrass, perennial ryegrass, and orchardgrass. Rankings, beginning with the most tolerant of excessively drained soil, are reed canarygrass, tall fescue, orchardgrass, smooth bromegrass, timothy, and perennial ryegrass. Tall fescue is the most tolerant of low soil pH, followed by reed canarygrass, timothy, orchardgrass, perennial ryegrass, and smooth bromegrass.

The heading date is the single most important factor controlling forage grass quality. By choosing several species and/or varieties, the spring heading date and the spring harvest window can be expanded. Grass species have different heading dates. Ranked from earliest to latest heading dates are orchardgrass, perennial ryegrass, reed canarygrass, smooth bromegrass, tall fescue, and timothy.

FORAGE LEGUMES

Legumes are plants that fix nitrogen from the air in the soil. Legumes used as forage plants are known as forbs, which are flowering, broad-leaf plants with soft stems. Forage legumes grow much like other legume crops, such as soybeans.
Types of Forage Legumes

Common forage legumes include alfalfa, alsike clover, lespedeza, ladino clover, red clover, and birdsfoot trefoil.

Alfalfa is a cool-season perennial forb grown for hay, silage, pasture, and green manure. It has very high palatability, good winter hardiness, and drought tolerance. It grows 15 to 36 inches in height and does best in fertile, well drained soils with a pH between 6.6 and 7.2.

Alsike clover is a cool-season perennial used for pasture and hay. It has high palatability, good winter hardiness, and fair drought tolerance. It is well suited to poorly drained sites. Alsike clover grows 12 to 36 inches tall and does well in poorly drained, medium fertile soil with a pH range of 6.0 to 6.5.

Lespedeza is a highly palatable warm-season summer annual for late summer pasture or hay. It has fair drought tolerance. Lespedeza grows 2 to 34 inches tall. It does well on somewhat poorly drained sites with low fertility, and the preferred pH is 5.5 to 6.2.

Ladino clover is a cool-season perennial for pastures. It is highly palatable, has fair winter hardiness, and has poor drought tolerance. It grows 12 to 14 inches tall and does well in poorly drained, fertile soils with a pH between 6.0 and 6.5.

Red clover is a cool-season perennial. It is an excellent pasture renovation crop and short-term hay crop. It has high palatability, good winter hardiness, and fair drought tolerance. Red clover grows to a height of 12 to 36 inches. It does well in somewhat poorly drained, medium fertile soils with a pH from 6.2 to 6.8.

Birdsfoot trefoil is a cool-season perennial used for pasture and hay. It has very high palatability, good winter hardiness, and fair drought tolerance. It reaches 15 to 44 inches in height and does well in somewhat poorly drained, medium fertile soils with a pH from 6.0 to 6.8.

Summary:

Forage is vegetation fed to livestock. Forage types include pasture, hay, silage, and haylage. A pasture is improved or unimproved plant material on land areas where animals graze. Hay is green plant material that has been cut and dried for use as livestock feed. Silage is chopped plant material that has been fermented, and haylage is silage that contains less than 50 percent moisture.
All grasses are annuals or perennials. Perennial grasses have three phases of growth: tillering, jointing, and heading.

Two primary factors to consider when selecting perennial grass forages species and varieties are persistence and the heading date. Common forage grasses are smooth bromegrass, tall fescue, perennial ryegrass, timothy, reed canarygrass, and orchardgrass.

Legumes are plants that fix nitrogen from the air in the soil. Legumes used as forage plants are forbs. Common forage legumes are alfalfa, alsike clover, lespedeza, ladino clover, red clover, and birdsfoot trefoil.

**Checking Your Knowledge:**

1. What are the types of forage?
2. What are the stages of perennial grass growth?
3. What are common forage grass plants?
4. What are two primary factors in selecting forage grass species?
5. What are common forage legume species?

**Expanding Your Knowledge:**

Learn to identify different forage species by asking a specialist explain what plant features to use for positive identification. Collect and press specimens, and then use a dichotomous key to identify them.

**Web Links:**

- Forage Legumes
  [http://134.84.92.126/distribution/cropsystems/DC5963.html](http://134.84.92.126/distribution/cropsystems/DC5963.html)

- Forage Grasses and Legumes

- Selecting the “Right” Legume
  [http://www.agry.purdue.edu/Ext/forages/publications/ay211.htm](http://www.agry.purdue.edu/Ext/forages/publications/ay211.htm)

- Agricultural Career Profiles
  [http://www.mycaert.com/career-profiles](http://www.mycaert.com/career-profiles)