Cattle have a wide range of nutrient requirements depending on maturity, weight, growth potential, pregnancy, milk production, desired daily production, and other factors. The total digestible nutrient (TDN) and crude protein (CP) requirements of several cattle classes are shown in Table 1. For maximum production it is essential that forage (or other feed) contain TDN and CP levels at least as high as shown in the table below.

Table 1. Total digestible nutrients (TDN) and crude protein (CP) requirements of selected animal classes.

<table>
<thead>
<tr>
<th>Animal class</th>
<th>TDN, %</th>
<th>CP, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Growing beef steer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>450 lb (1.5 lb/day gain)</td>
<td>65</td>
<td>11-13</td>
</tr>
<tr>
<td>650 lb (1.7 lb/day gain)</td>
<td>68</td>
<td>10-11</td>
</tr>
<tr>
<td>Beef cow</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lactating</td>
<td>60</td>
<td>10-12</td>
</tr>
<tr>
<td>Dry, pregnant</td>
<td>50</td>
<td>7-8</td>
</tr>
</tbody>
</table>

Source: M.A. McCann, Virginia Tech University.

**Definition of Forage Digestibility**

Digestibility is the most useful measure of pasture quality. It refers to the proportion of a given forage that an animal can use for growth and maintenance. If the digestibility of a pasture is 70%, then approximately 70% of the pasture material consumed will be used for the animal’s nutritive requirements, while 30% leaves the animal as manure (Figure 1). Remember that cattle intake is 2 to 3% of their body weight (on a dry matter basis) depending on their nutrient requirements. For example, a dry cow may only need to consume 2% of their body weight in average quality forage, while a beef cow in heavy milk production or a growing steer needs to consume approximately 3% of their body weight in high quality forage and/or supplements.

**Digestibility** is a useful measure of pasture quality for the following reasons: 1) It is directly and positively related to the energy content of the pasture; 2) It is positively related to protein content. In other words, when digestibility is high, protein content will also be high. There are exceptions: clovers are generally higher in protein...
than grasses at a similar stage of growth, also when grazing standing mature corn energy will be relatively high and protein will be low; and 3) It relates directly to the speed of digestion and therefore the movement of feed through the animal. In general, pastures with higher levels of digestibility will be digested more rapidly, allowing for higher intake and consequently higher levels of animal production.

**Figure 1.** Forage dry matter consumed and utilized based on percent digestibility (Bell, 2003).

![Diagram of cow with 10 kg eaten, 7 kg used, and 3 kg dung]

Note: 1kg = 2.2 lbs, therefore 10 kg = 22 lbs.

**Forage Species/Maturity and Digestibility**

Forage species can differ markedly in TDN and CP, but within the species commonly found in cool season pastures in Kentucky, the most important factor in controlling quality is maturity (Figure 2). In other words, maintaining pastures in an actively growing vegetative state is the best way to maximize quality.
Figure 2. A guide to digestibility decline as cool season pastures mature (Bell, 2003).

Combining Pasture Species/Maturity with Animal Requirements

Figure 3 provides an overview of the combined concepts of livestock requirement in comparison to forage species and maturity. This figure shows that average cool season perennial grasses range in digestibility from a low of 50% to a high of 72% or higher. In the early spring or late fall these grasses can easily have even higher digestibility. The upper end of the range occurs during the vegetative or leafy growth stage of the plant. Figure 3 also indicates that legumes (e.g., clovers or alfalfa) range in digestibility from a low of 58% to a high close to 80%. Pasture legumes like white clover maintain digestibility in the upper end of this range, because the forage available for grazing is mostly leaves and petioles.

Figure 3 shows that a 450 lb steer, with a projected average daily gain of 1.5 lb, requires forage with a digestibility of 70%. When managed for vegetative growth several forage types will supply the needs of a 450 lb steer.
Figure 3. Forage digestibility ranges and their suitability for different classes of livestock (Ball et al., 2002).

Goal of Pasture Management

The goal of any livestock enterprise is to maximize profits and to minimize the risk for economic loss. With cattle the best way to accomplish this goal is to produce and utilize high quality pasture. The best way to maintain a stand of high quality pasture is to maintain the stand in a vegetative or leafy state.

Establishing a rotational grazing system allows control over pasture plant growth. As the figures and table above show, cool season pastures will produce forage quality high enough to forego or limit the need for supplementation for almost any class of cattle.

Mature cows can be maintained on pasture that is lower quality, but rarely is it a disadvantage to have pasture quality higher than animal needs. The extra nutrients will simply be recycled back onto the pasture. If mature animals are over conditioned then limit feeding or feeding supplemental low quality hay is an option. One option in a cow/calf operation is to use a creep feed system where the calves are able to enter a new pasture first and remove the top growth and then the cows follow to graze the lower quality basal material.

For more information refer to a number of excellent publications on developing and maintaining a rotational grazing system including the UK publication “Rotational Grazing” ID-143 (http://www.ca.uky.edu/agc/pubs/id/id143/id143.pdf).
References: