1-20 How do pastures grow?

Pastures are mainly made up of grass and clover plants. The plants use energy from the sun to grow, through a process called photosynthesis.

In pasture, there are always two processes taking place. New leaves are being produced by plants (growth) and old leaves are dying and rotting away (decay). The difference between the rates of growth and decay is what we measure as the pasture growth rate.

Grazing management is the use of stock to manage growth and decay, to influence pasture growth rate and pasture quality.

Ryegrass Plants

Ryegrass plants are made up of several parts called **tillers**, each of which have a growing point from which new leaves are produced (*Figure 1*). The growing point is found at the base of the tiller, very close to the soil surface (*Figure 2*). Because of this it is rarely damaged during grazing, which allows the tiller to keep growing after grazing. Each tiller will have 3 live leaves and 1 or more dying leaves at any one time.

White Clover Plants

White Clover plants are made up of a series of stems called **stolons** that grow along the soil surface. These have nodes from which leaves, roots and buds develop (*Figure 3*). Growing points are found at the end of stolons, which are usually very close to the soil surface, and thus are protected from damage during grazing.

*Figure 1 - A grass plant with 4 tillers*  
*Figure 2 - A grass tiller and growing plant*
Pasture growth

Net pasture growth rate is the rate at which new leaves appear, less the rate of decay of old leaves. Grass leaves appear most quickly in spring (every 7 days), and most slowly in winter (every 30 days). Rates of leaf appearance and death keep pace with each other. Tillers always have only three live leaves, so leaves die after about 21 days in spring, and 90 days in winter.

Dying leaves accumulate in the bottom of the pasture. Warm, moist conditions encourage the rapid decay of dead leaves. Cold or dry conditions slow down the rate of decay, leading to a build-up of dead leaves in the base of the pasture (Figure 4).

Figure 4. The relationship between pasture height and leaf growth, leaf decay and net pasture growth rate

Grazing animals prefer to avoid eating dead matter - it is less palatable and of poorer quality than live leaves. One aim of grazing management is to minimise the build-up of dead material in the base of the pasture.
Flowering - Seed head production
The normal pattern of leaf appearance and death in a grass plant is interrupted when a seed head is produced. In early spring growing points turn reproductive, and produce a seed head which will appear during the spring. As seed heads grow, three effects are seen:
- Pasture growth rates increase - the stems contain a lot of dry matter.
- Growing points stop producing new leaves, but existing leaves live longer.
- The quality of the pasture falls - stems are less digestible than leaves.

As seed heads are removed through grazing or mowing, grass plants are encouraged to produce more tillers, and start growing more leaves again?

The development of flowers is similar in clover. The emergence of clover flowers normally occurs later in the season than grasses, and is spread over a longer period of time.

Factors affecting pasture growth
- Pasture cover - pasture growth rates are low at very low and very high pasture covers (Figure 4).
- Temperature - very cool or very hot soil temperatures (measured at 10cm) will limit pasture growth. Ryegrass grows best in the range 5º -18º C, while clovers grow best in the range 8º-23ºC.
- Moisture - a lack of plant available soil water will reduce pasture growth rate.
- Nutrients - pasture growth will be less than maximum if there is a deficiency of major nutrients in the soil - particularly N, P, K, and S.
- Plant damage - damaged plants will not grow as well as healthy plants. Damage is commonly caused by insect pests, or overgrazing.