Principles of ryegrass growth

Establishing New Pastures

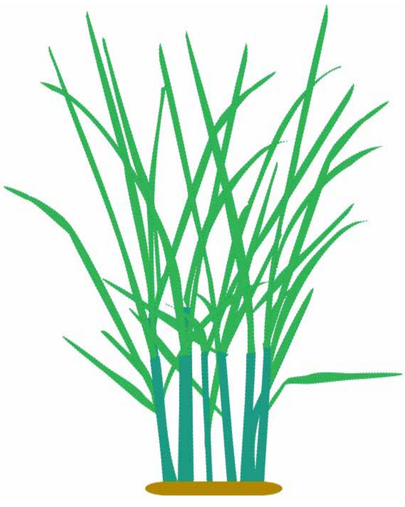
Grow & Utilise

Keep pasture cover within the optimal range to achieve high growth rates, high utilisation, and high pasture quality.

The correct time to graze ryegrass is when there are 2.5-3 leaves per tiller. For rapid regrowth after grazing, keep post-grazing residuals above 5 cm or 1500 kg DM/ha for dairy or cattle systems, and 3 cm or 1200 kg DM/ha for sheep systems.

Ryegrass plant

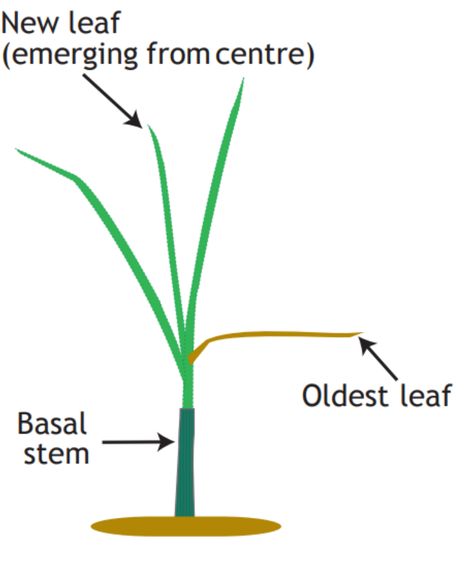
Perennial ryegrass pasture is made up of many ryegrass tillers. Tillers are found grouped together in clumps, each clump forming a ryegrass plant.



Dairy pastures typically contain 3000-5000 tillers per square metre while sheep pastures contain 8000 or more.

New tillers (also called daughter tillers) are produced year-round with peak production usually from October to December. This is why mid - late spring management strongly influences persistence.

Ryegrass tiller



A tiller has a single basal stem, a leaf sheath and a number of leaves. Ryegrass can have only three live, green growing leaves at any time.

When the tiller has three leaves it doesn't stop growing. A fourth (new) leaf is produced, and the first (oldest) leaf starts to die.

Then a fifth leaf is produced, the second leaf dies, and so on. If pasture isn't grazed, dead old leaves (of little feed value) build up in the base of the pasture.

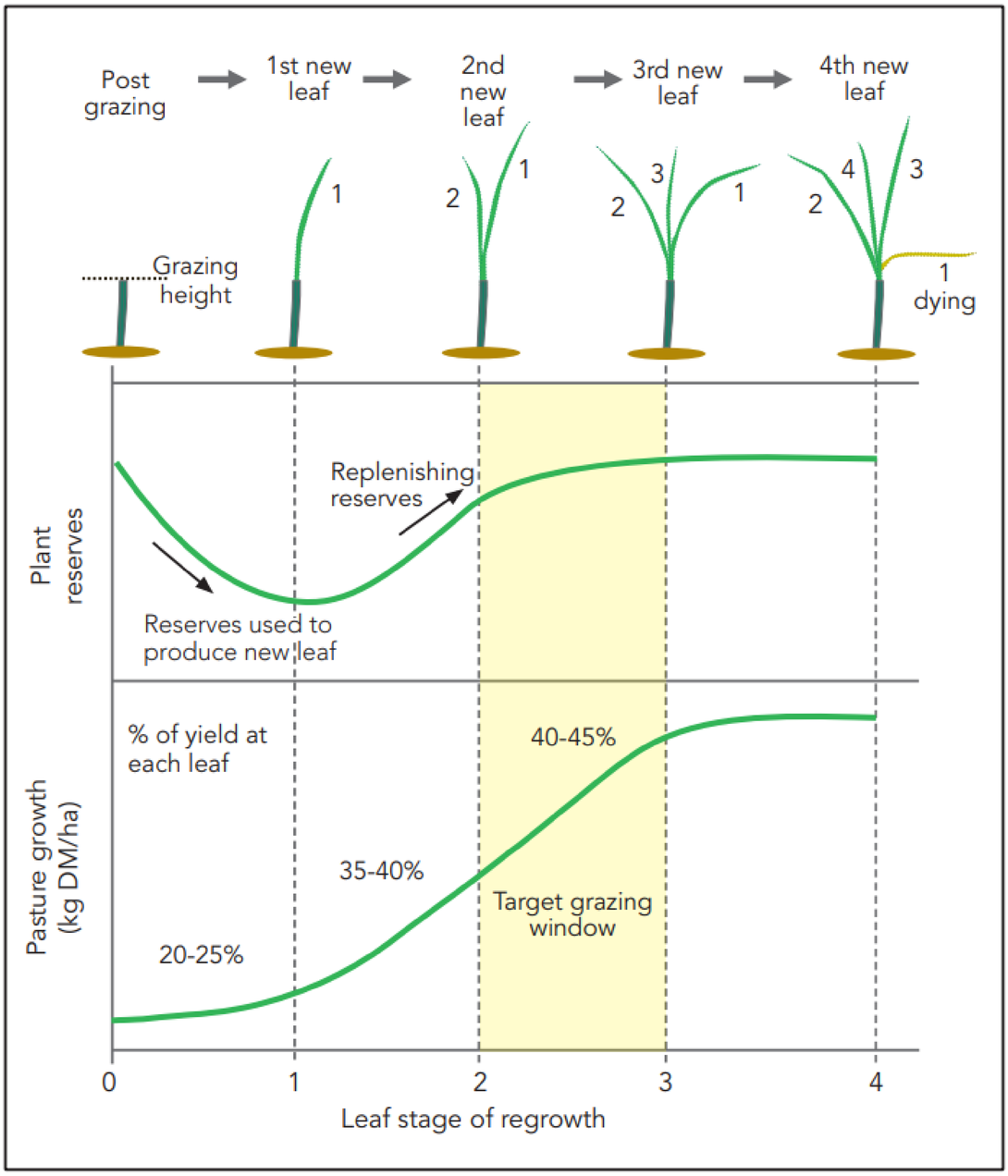
How quickly do leaves grow?

The time it takes for a tiller to produce a new leaf varies, and depends largely on temperature (in winter) or moisture (in summer). In mid-spring, perennial ryegrass may produce a new leaf every 8 days while in mid-winter it may be every 20+ days.

Tiller growth & yield

As a tiller regrows the initial growth rate is slow, and the first new leaf makes up only 20-25% of your potential pasture yield. Growth accelerates with the second leaf, and speeds up again with the third leaf. Simply put, the tiller is moving from one 'solar panel' or leaf to three. Grazing at 2.5 - 3 leaves per tiller captures most of this growth, with the third leaf producing 40-45% of potential yield.

Regrowth, energy reserves & yield per leaf



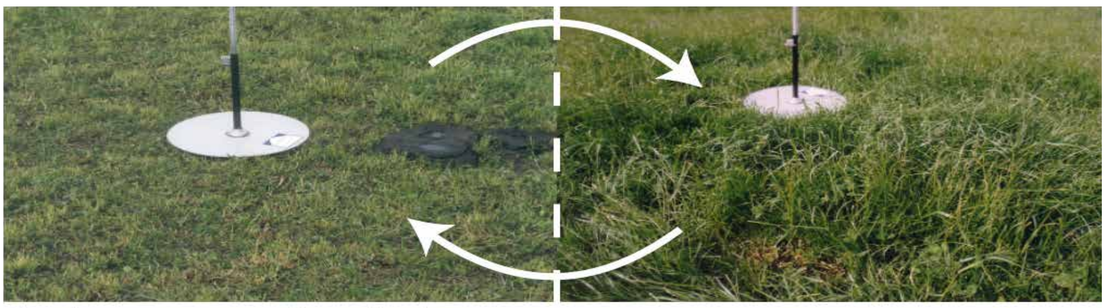
Regrowth & energy reserves

Mostly we sow diploid ryegrass-based pastures and graze them earlier than ideal at the 2 - 2.5 leaf stage because this is the easiest way to maintain good residuals. Tetraploid ryegrass-based pastures can change this, because they remain palatable at higher covers. At the Lincoln University Dairy Farm grazing 0.5 leaves/tiller later (at 3500-3600 kg DM/ha) grew around +1.2 t DM/ha/year.

The regrowth cycle initially relies on the energy reserves plants store as carbohydrate in the basal stems. Immediately after grazing plants use these to provide energy for regrowth until the first new leaf is produced. With the first new leaf, photosynthesis then becomes the main source of energy to grow subsequent leaves and replenish carbohydrate reserves.

Grazing

Ryegrass does best under a consistent grazing cycle of grazing, as summarised below. Get these in balance and management falls into place.



Good post grazing with no dead matter in the base (in good weather).

Graze at the right time with no dead matter in the base.

When to graze

The optimal time to graze for both high growth rates and high pasture quality is when tillers show an average of 2.5-3 leaves. To assess this, check several tillers in a pasture, as they vary. Find tillers with a grazed leaf (i.e. severed), then count the number of new leaves that have grown since. At the correct stage, tillers will have a third new leaf, varying from half to fully developed.

Grazing too early

Grazing before or at 2 leaves per tiller reduces both yield and regrowth as it does not allow plant reserves to be fully restored. This is particularly important after extended summer dry periods, when plants are under stress. Nipping off the first leaf growth after rain, before tillers have 2.5-3 new leaves, can kill plants.

Grazing too late

If pasture is left to grow too long (>3500 kg DM/ha), it keeps producing new leaves, but older leaves die off. Dying leaves accumulate in the base of the pasture. These reduce pasture quality, lower utilisation and can cause disease. Long or dying pasture creates a great environment for pests, diseases and fungal spores (e.g. rust, facial eczema). High covers (>3500 kg DM/ha) also compromise your clover growth and daughter tillers, because too little light reaches the base of the pasture.

Grazing too late usually happens in periods of rapid growth, when multiple paddocks are ready to graze simultaneously. Monitor growth; if necessary, remove paddocks from grazing to cut for supplementary feed, or pre-/post-graze mow.

Grazing too low

Grazing below normal residual height can significantly reduce regrowth and animal performance, as you are grazing into the plant energy reserves. Graze to the same height each time.

Consistency

The secret to good grazing management is keeping pastures in the right ‘grazing window’ - maintaining consistent post-grazing residuals, and grazing at the right time.