A ryegrass tiller maintains a maximum of 3 live leaves and as each new leaf emerges after this 3 leaf stage, the oldest leaf dies.

4. Grazing management

The productivity of ryegrass depends on factors such as nutrition and grazing management. Specific grazing management is essential in order to get optimum performance from ryegrass pastures. A good understanding of ryegrass agronomy will enable a better insight into how to successfully manage grazing to maximise production, persistence, utilisation and quality.

Ryegrass agronomy

In its simplest form, ryegrass is a production of tillers. Each tiller has its own leaves and roots, but is connected to other tillers at the base of the plant so it can share water, nutrients and carbohydrates[17]. Newly germinated ryegrass plants consist of one tiller until it reaches the 3 leaf stage. If there is a low tiller density, then light penetrating the base of the sward will stimulate the production of daughter tillers[18]. Daughter tillers grow from buds in the leaf axil and first appear as small one leaf tillers growing inside an older leaf at the base of the plant. This older leaf soon dies and disappears. The new tiller continues to put out leaves and soon becomes a separate tiller with its own root system. Each new leaf emerges on the opposite side of the tiller to the previous leaf (Figure 4.1).

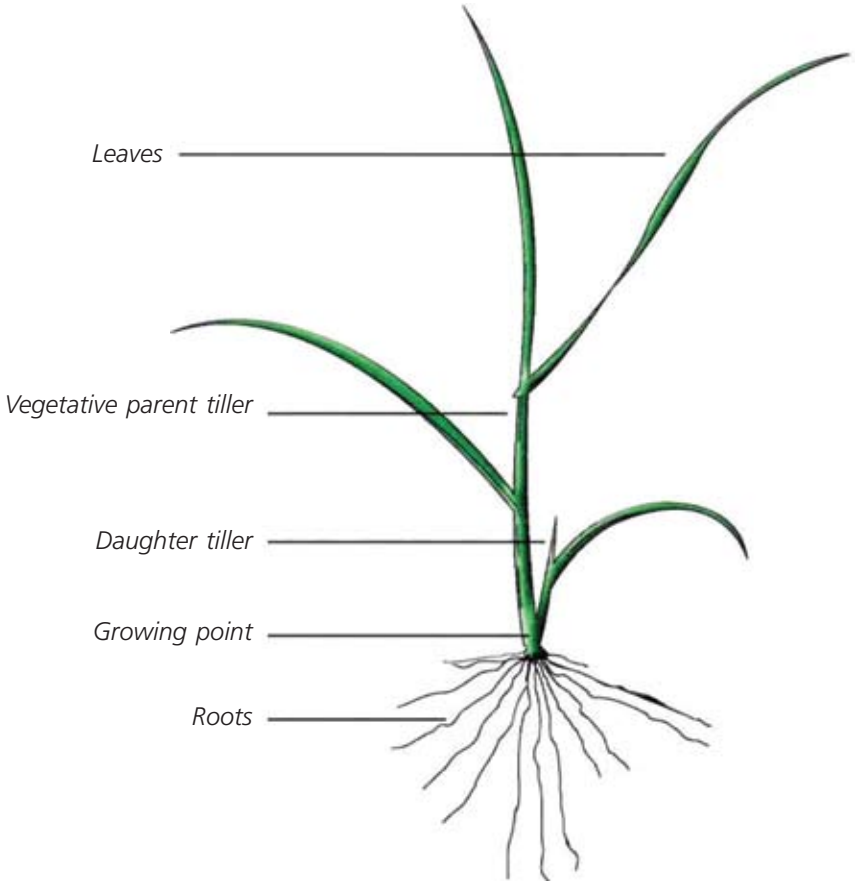
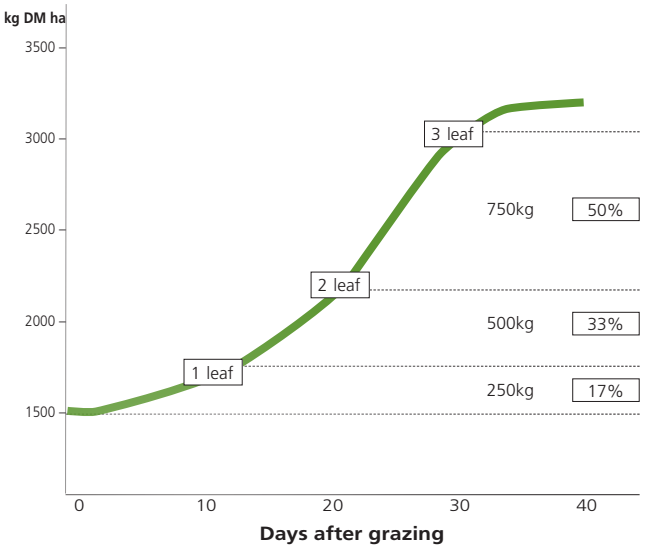


Figure 4.1: A vegetative ryegrass tiller with daughter tiller[17].

A ryegrass tiller maintains a maximum of 3 live leaves and as each new leaf emerges after this 3 leaf stage, the oldest leaf dies[17]. Maximum ryegrass yield is achieved by allowing the tillers to grow to 3 leaves as each subsequent leaf is bigger than the previous leaf. The 1st leaf contributes 15–20% of total pasture biomass, the 2nd

leaf 30–35% and the 3rd leaf 45–50% with little difference in metabolisable energy content between the 1st and 3rd leaf[19] (Figure 4.2). The time taken to grow two leaves is controlled mainly by temperature. Ryegrass will usually grow a new leaf every 6–7 days in the warm, sunny days of mid April, but could take 10–13 days or more in the colder, shorter days of mid to late May[16].

Figure 4.2: Nett pasture growth curve[21]



From the process of photosynthesis, tillers form glucose and then other water soluble carbohydrates (WSC) in the leaves[17]. These WSC are used to provide energy for ongoing growth and respiration. There is substantial evidence that the availability of WSC in ryegrass tillers has a marked effect on the plant's regrowth potential and ability to persist after grazing[17]. When the fourth leaf emerges and the oldest leaf dies, there is no further build up of plant WSC levels (Figure 4.3). Grazing management that takes into consideration this relationship will promote improved utilisation and production, potentially leading to maximum profit.

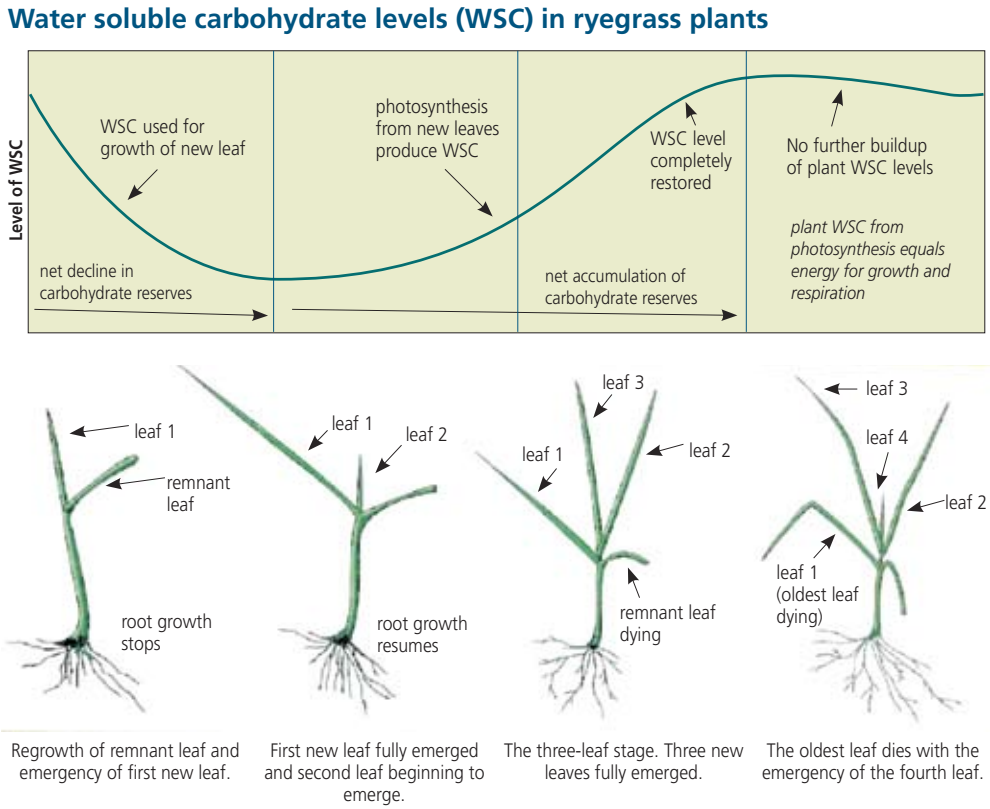


Figure 4.3: Leaf stage and the water soluble carbohydrate level (WSC) relationship in ryegrass plants[22].

Studies have shown that it is best to use leaf appearance intervals to decide when to graze and not pasture height.

Grazing tactics

Grazing management is critical to ryegrass production, quality, utilisation and persistence to generate maximum profit. If ryegrass is not managed properly, an increasing amount is wasted and the productive life of the pasture is reduced. There are 3 factors that should be considered when developing your grazing strategy; grazing interval (when to graze), grazing intensity (how hard to graze) and grazing duration (how long to graze).

Grazing interval

Ryegrass can be set stocked however it responds better to rotational grazing. Studies have shown that it is best to use leaf appearance intervals to decide when to graze and not pasture height[17]. The optimal time to graze ryegrass is from 2 ½ leaves to 3 ½ leaves as most plant nutrients are at the optimum for stock at this stage. As mentioned previously, as the 4th leaf emerges, the oldest leaf begins to die, so that the tiller maintains 3 live leaves[20]. When the oldest leaf begins to die, pasture quality begins to decline and increasing amounts of pasture are wasted[17].

Grazing according to leaf emergence will lead to a greater production of both leaf and root dry matter[17]. In addition there is a greater survival of both individual ryegrass tillers, less incursion of weeds and greater initiation of daughter tillers[22]. Also for perennial ryegrass, pasture persistence increases as the plant builds up carbohydrate reserves to allow it to cope better with summer stress[22]. Tillers only have a limited lifespan so management that maximises tiller survival and replacement will ensure maximum pasture production and persistence.

To determine rotation speed you need to be aware of how quickly a leaf grows. As mentioned previously, it takes 6–7 days to grow a leaf in the warmer days of April so to grow 3 leaves before you can graze it again, would be between 18–21 day rotation. The time taken to grow a leaf will change as the season changes, so pastures need to be monitored to determine if the rotation speed is correct. Typically in spring the pasture growth rate is at its peak and will often exceed demand. Paddocks may have to be dropped out of the rotation so the correct stocking rate can be achieved. The paddocks that are dropped out can be locked up and used for silage or hay.

Sheep grazing ryegrass at 3 leaf stage. *Ryegrass grazed down to 5cm.*

Grazing intensity

The harder you graze the higher the utilisation at any one grazing. However if pasture is grazed too hard, below 5 cm stubble height, production and regrowth potential declines. This is because more of the plants' reserves are removed and less leaf remains to photosynthesise[17]. It is important to find the balance between grazing too hard and too laxly as each grazing pressure has associated consequences.

Consequences of grazing too hard

Grazing lower than 4 cm may initially stimulate tillering of ryegrass and increase other pasture species in the mix through increased light penetration. This may represent an immediate increase in utilisation, however these initial positive effects are more than countered by;

- Decreased animal productivity
- Decreased WSC plant reserves as a greater part of the WSC storage organ (tiller) is removed
- Decreased dry matter (DM) yield
- Decreased ryegrass plant survival and increased invasion of less desirable plant species
- Growth retardation and death of the root system
- Increased tiller death[17]

Consequences of grazing to laxly

A grazing residual of greater than 6 cm will usually result in faster regrowth, however under a normal grazing rotation, this leaf will be dead by the time the animals are back to regraze the pasture[22]. The leaves left behind will not be selected for by grazing animals as they are generally older, of a lower nutritive value[17] and less palatable. As a result poor quality bulk is accumulated after each grazing. This can have consequences on sward composition, for instance canopy closure will prevent light penetration which stimulates ryegrass tillering and clover production.

If rust is present, higher post-grazing residues allow it to build up and spread more rapidly to younger regrowing leaves[17]. The only benefit of having a slightly longer residual is for perennial ryegrass (up to 6 cm) during summer. A lower residual (3 to 4 cm) would increase soil temperature and speed up the drying out of the soil. The ideal grazing residue for ryegrass is 5 cm, depending on pasture density and composition.

The ideal grazing residue for ryegrass is 5cm, depending on pasture density and composition.

Grazing duration

After grazing, carbohydrate reserves in the stubble are moved to the youngest expanding leaf remaining. If this expanding leaf is regrazed there will be little carbohydrate reserves left to initiate regrowth and yield will be compromised. Smart[16] found that if they grazed for a day, rather than 3 days there was a yield gain of 4%, if it was 3 days instead of 7 days there was a 20% gain in yield.

Installing temporary fences with a Rappa Fence Systems™

Achieving the correct rotation speed, intensity and duration is difficult in a broad acre farming system. This is due to the difficulty in achieving optimum stocking rates in large paddocks. Many structural changes will need to be made in order for this system to be successful. This includes reducing the size of the paddocks, often halving them, putting in more laneways to ensure ease of moving stock and installing temporary water points.

A lot of ryegrass grazing management research has been focused around intensive stock operations, particularly the dairy industry. So certain guidelines need to be adjusted to fit into a broad acre mixed farming system. For instance, moving stock every day or 3 days might be too labour intensive for many broad acre farmers however, moving once a week might be more manageable. Although this might compromise yield slightly, the pasture will still be more productive than a set stocking system. It is important to monitor the condition of pasture in order to optimise productivity, profitability and persistence. Once correct grazing management has been achieved, pasture utilisation is optimized and greater pasture production is required, the addition of fertiliser in the system can aid in improving carrying capacity.