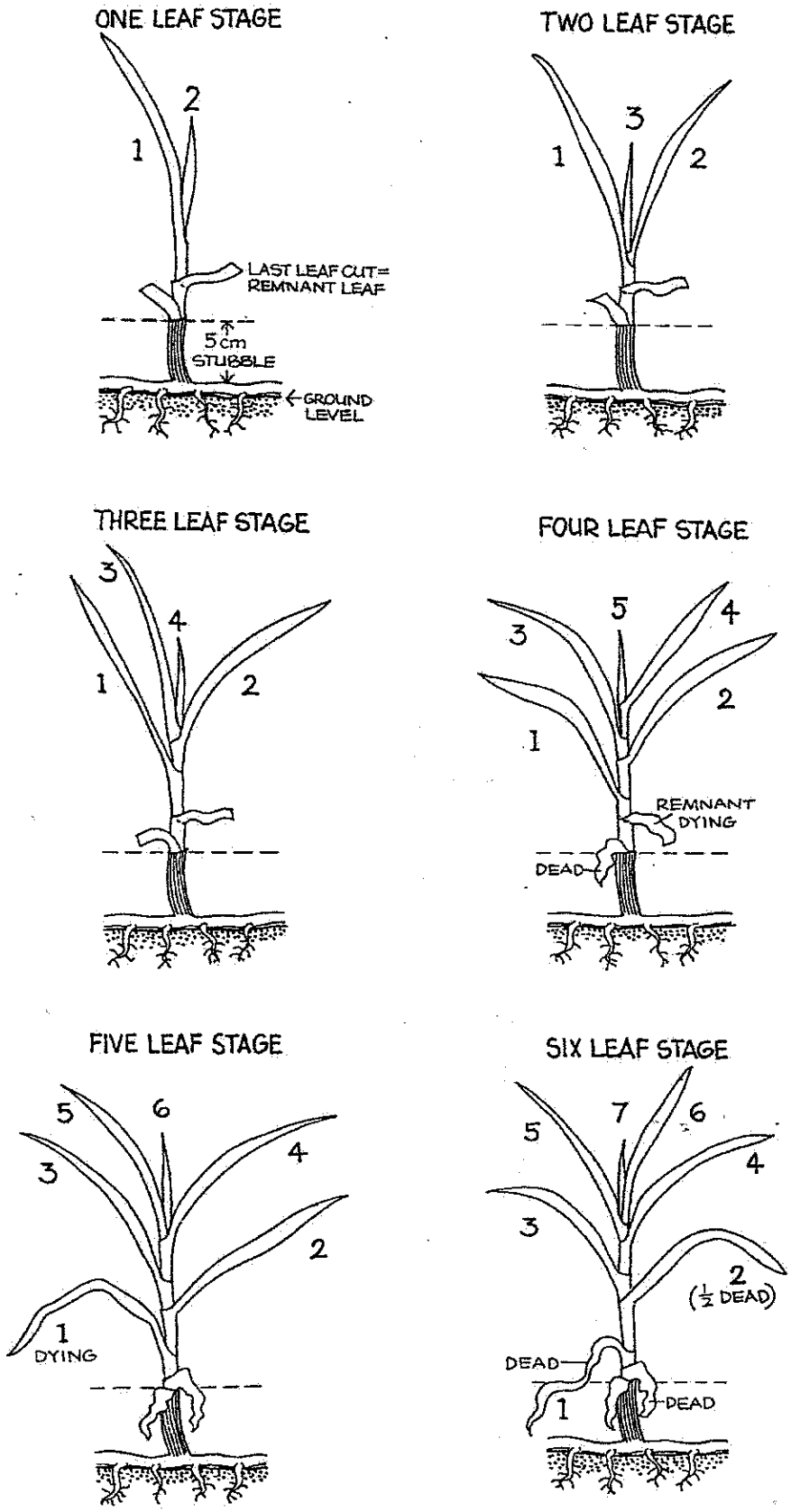
Clover/Kikuyu Observations

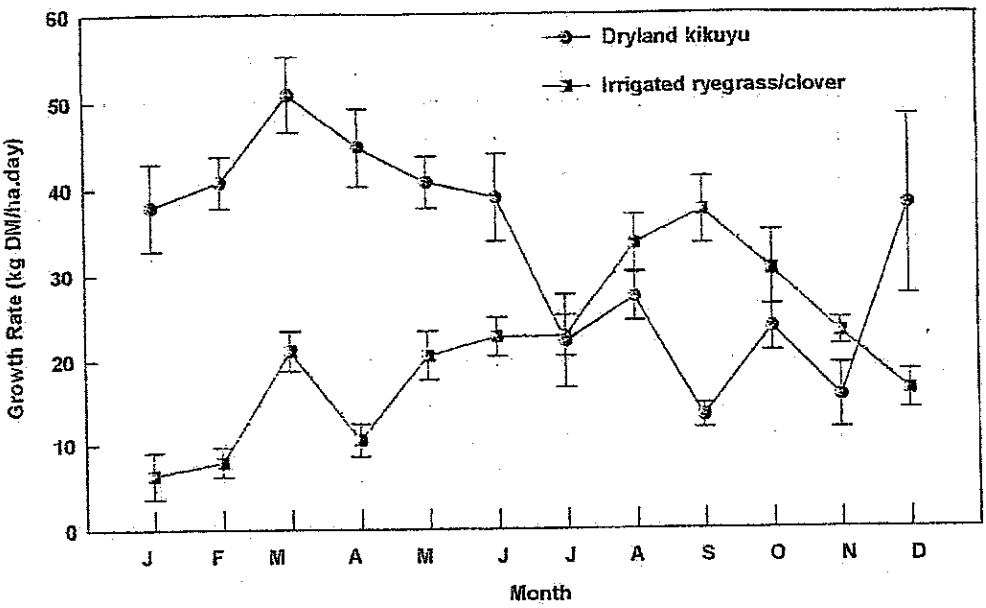
- Mature clover in flower is safer to graze than the less mature stages which may cause bloat.
- Clover and cows like well balanced fertile soils with adequate trace elements.
- Autumn oversewn Annual Rye grows well in a clover/kikuyu base and helps to fill the winter feed gap.
- Clover does not require nitrogen where nitrogen applied to fast growing kikuyu pastures can make them toxic to livestock. Apply nitrogen sparingly to oversewn winter rye grass.
- White Clover roots grown from initial seed set will penetrate to a depth of 1 meter where roots grown from stolons will not grow deeper than 25 cms.
- White Clover that is allowed to flower and set seed each grazing interval can survive and dominate a kikuyu/clover sward with 100mm evapotranspiration intervals between flood irrigation (+/- 2 weeks in WA's southwest irrigation area).
- Clover flowers will start to set viable seed 28 days after the last hard grazing and will be shed in dung by cows that eat them.
- Clover does not like to be waterlogged.
- Clover leaves re-appear as soon as three days after hard grazing and will be selectively grazed by cows on a kikuyu/clover pasture, damaging the plants recovery and chance of competing with the kikuyu over the next growing cycle.
- Kikuyu transforms stored carbohydrates in its roots into water soluble carbohydrates and pushes them up stems to grow new leaves after severe defoliation. Grazing these stems on the second day damages the kikuyu and gives the clover an advantage.
- Grazing intervals of more than 35 days forces kikuyu to tiller and shade its stolons forcing it to abandon its creeping habit. That's why we mow kikuyu lawn once a week but should only graze kikuyu pastures once every 5 weeks.
- In peak growing conditions kikuyu grows a new leaf every 7 days. The first two regrown leaves are high in nitrates and are toxic. The second two leaves are good quality. The last two leaves are high in fibre which is good feed in a clover dominant sward.
- AIM ALWAYS TO HELP THE CLOVER AND HURT THE KIKUYU

Figure 4.3 Illustrations of kikuyu plants at various stages of regrowth from 1 to 6 leaves per tiller.



Whittet varieties are likely to be most prevalent in dairy pastures of Australia.

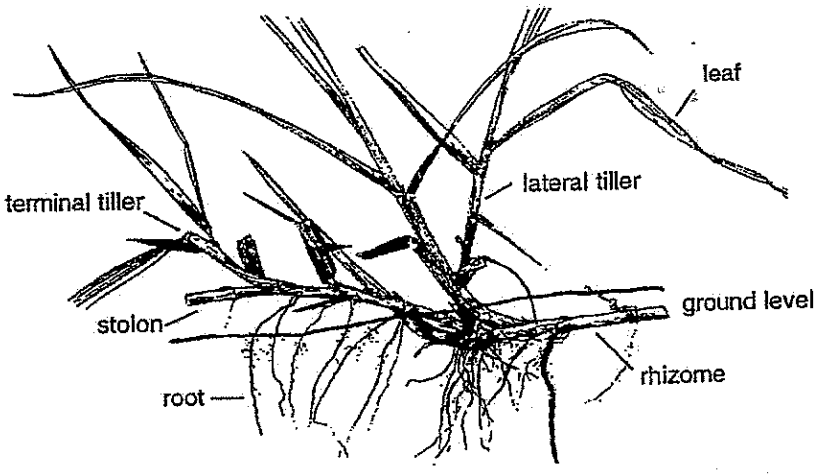
Figure 2.1 Mean monthly growth rates (kg DM/ha.day) of dryland kikuyu and irrigated ryegrass at Wollongbar Agricultural Institute (W. J. Fulkerson,) (standard error of mean (s.e.) bars are indicated as vertical lines).



2.3.1 Morphology

The kikuyu plant is highly stoloniferous and rhizomatous and roots strongly at the nodes (Figure 2.2), allowing it to spread rapidly throughout an area, often invading other pasture/cropping areas if unchecked.

Figure 2.2 The morphology of the kikuyu plant (source: O'Reilly 1981).

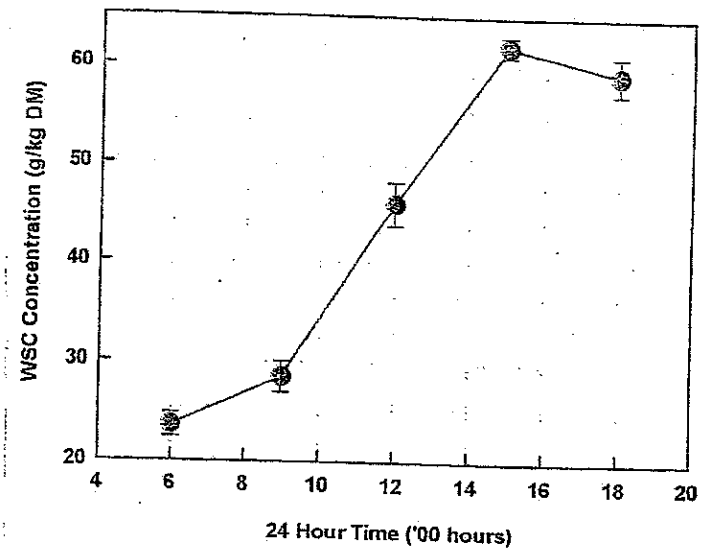


Kikuyu in the late season contained significantly higher (P<0.001) concentrations of nitrate (890 ± 188 (mean ± s.e.) ppm), than early and mid season (118 ± 28 and 190 ± 39 (mean ± s.e.) ppm, respectively). Nitrate concentrations in the early and late season declined significantly (P<0.05) with age of regrowth. The mean oxalate content of kikuyu was 6.78g/kg DM, and did not vary significantly with age of regrowth or season.

4.3.2 Study 3. Within-day Variation in WSC and N

No significant seasonal variation in the within-day pattern of WSC was observed and the data were subsequently combined (Figure 4.8).

Figure 4.8 The within-day variation of water soluble carbohydrate (WSC) content (g/kg DM) in kikuyu regrowth above 5 cm stubble height. Vertical bars represent standard errors.



WSC concentrations significantly increased (P<0.001) following the onset of daylight until a maximum concentration was reached by mid afternoon. Between 0900 and 1500 h, when the relationship was near linear, the rate of increase in WSC concentration was approximately 5 g/kg DM per h, although the N content did not vary throughout the day.

4.4 Discussion

The 4.5 leaves per tiller stage of regrowth appears to be the best time to graze kikuyu to

obtain optimal overall forage quality to meet the requirements of lactating cows. After this, the plant components, and consequently the quality, markedly change with a substantial decrease in the proportion of high quality leaf and increase in both stem, and in particular, dead material.

Despite a difference in the number of days taken to reach the 4.5-leaf stage of regrowth as a consequence of lower growth rates in the early, compared to mid season, component proportions above 5 cm stubble were similar. This highlights the benefit of relating the grazing readiness of the pasture to a plant-related factor like leaf number per tiller, rather than set-time grazing intervals.

At the 4.5 leaf stage of regrowth, the mineral concentration of mature leaves have reached concentrations more suited to the requirements of the lactating cow. Thus, the concentration of K in emerging leaves are well above cow requirements, but decline as the leaf ages. These concentrations are similar to, or below, those found in ryegrass at full elongation (W. J. Fulkerson, personal communication). High concentrations of K are undesirable as they adversely affect Mg absorption through the ruminal wall (Minson 1990). Conversely, Mg is often limiting for dairy cattle, therefore, grazing at this stage would be beneficial as Mg tends to accumulate in the maturing leaf. Supplementation of both P and Na would be essential to meet cow requirements (NRC 1989) as concentrations of Na remain very low through regrowth, whilst P concentrations tended to decline with plant maturity (see also Wilson and Sandland 1976).

The CP of N-fertilised kikuyu can reach high concentrations (as discussed in Chapter 2) even at the moderate rates of N applied in these studies. By grazing kikuyu at the 4.5 leaf stage, the CP content had declined due to a combination of leaf maturation and the emergence of leaves containing lower concentrations of CP. However, CP (in terms of RDP) concentrations may still exceed the requirements of the cow (NRC 1989), and result in increased concentrations of rumen NH_3, and reduced rumen microbe activity.

The WSC content in kikuyu rises during the day as the products of photosynthesis accumulate and then fall at night as they are used for respiration. This within-day

availability is further reduced due to oxalates. Supplementation would be required to meet the nutritional requirements of lactating cows grazing kikuyu throughout the season, with particular emphasis during the spring/summer.

The recommendation to graze kikuyu at the 4.5 leaf stage of regrowth, considers the overall quality of kikuyu *on offer* in relation to cow requirements. Since the nutritional indicators of quality change in different directions, and varying rates, with age of regrowth, it is difficult to achieve optimal levels of all nutrients, and a thus the 4.5 leaf stage of regrowth provides an appropriate balance of protein, OMD and minerals.

As yet, the effect of grazing kikuyu at the 4.5 leaf stage on plant regrowth, hence dry matter production, is unknown. However, it is difficult to compromise kikuyu quality by quantity, when the quality of kikuyu is already below the requirements of lactating cows.

4.5 Conclusion

The 4.5 leaves per tiller stage of regrowth appears to be the optimal time to graze kikuyu in terms of forage quality for lactating cows. After 4.5 leaves have expanded, there is a gradual increase in the proportion of stem, and a marked rise in dead material. In relation to requirements of the milking cow, concentrations of Ca and Mg rise, and K and CP fall to more appropriate concentrations, only the OMD and P concentrations deteriorate. The OMD tends to decline from early to late season. WSC concentrations are critically low in kikuyu but rise in the day under sunlight, and for this reason, kikuyu grazed in the afternoon may be of better quality than the that grazed in the morning.

Toxicity

Four nutritional problems are recognised in kikuyu – nitrate poisoning, bloat, oxalate poisoning, and kikuyu poisoning. Lush growth associated with excessive application of nitrogen can result in nitrate poisoning and even bloat, although the latter is rare. Hyperparathyroidism ('big head') in horses, and occasionally nephrosis or hypocalcaemia in ruminants, has been recorded due to high levels of oxalate (up to 1.1% DM). Kikuyu poisoning occurs sporadically in cattle, especially where rapid growth follows a protracted dry period. It occurs only in cattle, affecting all classes and ages. Serious toxicity occurs spasmodically after rainfall in excess of 20 mm, grass temperatures above 14°C and invasion of pasture by army-worms.

Disorders of kikuyu

Kikuyu Poisoning

Kikuyu pastures have been implicated in deaths of dairy cows since the 1950's. In the past thirty years significant incidents have been recorded in NSW coastal areas in 1983, 1987, 2003, 2006, and 2010. The condition is relatively rare and tends to be sporadic, but it can result in fatalities for a large percentage (10 to 30%) of the herd within 24 to 48 hours.

Poisoning typically occurs in nitrogen fertilised pastures when there has been rapid regrowth of the pasture after an extended dry period. This often occurs in autumn, after a drought while conditions are still warm (>14 °C). Although this coincides with an increase in nitrate levels, symptoms are not consistent with nitrate poisoning. Poisoning has also

been reported to be associated with recent army worm infestation, however this is not consistent in all cases.

The cause is unknown, although mycotoxins derived from a fungal association on the leaves have been suggested. The disease causes salivation, dehydration, depression, abdominal pain and death. Cows may exhibit sham drinking where they are standing at the drinking trough but not consuming water.

Controls

1. After the break of the drought ensure supplementary feeding of roughage continues until the dry matter content of the pasture increases.
2. Ensure kikuyu is not the only forage source when introducing cows to suspect pastures.

Black Spot

Black spot (Bipolaris sp) is a fungal disease which infests kikuyu. Effects are more pronounced if the kikuyu is nitrogen deficient or moisture stressed.

Typically the ends of the more mature leaves turn yellow and black spots can be seen on the leaf. Infection will reduce growth and leaves become unpalatable. There is no long term adverse effect of this disease on the kikuyu plant.

Controls

There are several options that can be used to reduce the impact of Black Spot.

1. Reduce grazing interval so that the leaves are younger when grazed.
2. If possible remove the stress factors such as the lack of nitrogen and moisture.
3. Allow cows to select the non infected grass and then mulch or slash the residue after grazing.

KiKuyu poisoning cattle

Fine Elsewhere
Weatherzone Addict

Registered: 02/09/2002
Posts: 1870
Loc: Albany.W.A.

Hi All, after a good easter rain on the south coast and warm growing conditions, the kyk has got away well, but a bit too well in some places where paddocks have been closed up, the fresh lush grass has become toxic and although the following ABC radio article says 40 cattle have died i heard last nite that its now thought to be over 100 head. one producer i spoke to said symptoms are salivation, thirst and bit like staggers - also like foot & mouth which was the first fear, except there are no mouth ulcers. i've never heard of this happening b4, as we think kikuyu is a wonderful pasture. vets say that cattle should be given a big feed of hay b4 going on the kyk. i don't have the problem becos i'm fairly short of feed and deer are keeping everything very short -only got one spare paddock shut up atm. anyway heres the story:-

"Kikuyu suspected in cattle deaths
By Owen Grieve Friday, 13/04/2007
Kikuyu pasture poisoning is suspected in 40 cattle deaths on at least nine properties on Western Australia's south coast.

Laboratory tests are underway to confirm the cause of death but veterinarians say the clinical signs are consistent with kikuyu poisoning.

Toxicity can be the result of rapid growth in drought-stressed kikuyu following rainfall, which has occurred on WA's south coast.

Dr Jeremy Allen is principal veterinary toxicologist with the Department of Agriculture and Food and says affected animals drool excessively, are lethargic and stop eating.

Farmers are advised to be cautious if grazing animals on lush, rapid growing kikuyu."

so if u haven't experienced this b4, add this to your memory bank of things that can go wrong just when u think its a good break to the season!
:wave: FE

Top

SIMILARITIES BETWEEN SO-CALLED KIKUYU POISONING OF CATTLE AND TWO EXPERIMENTAL MYCOTOXICOSES

Sir,—The occurrence of disease and death in cattle grazing kikuyu grass (*Pennisetum clandestinum*) during the autumn in northern New Zealand has been reported by Cordes *et al.* (1969). Further observations on the disease, commonly known in Northland as kikuyu poisoning, were made by Busch *et al.* (1969). The above authors reported the occurrence of depression, salivation, dehydration, depressed rumen movements, haemoconcentration, elevated abomasal pH values, and in some cases diarrhoea, polydipsia and suspected abdominal pain, in affected cattle. Cordes *et al.* (1969) expressed the opinion that the disease was probably a physiological disorder related to ruminal engorgement.

Clinical and laboratory findings similar to those referred to above were again noted in cases of so-called kikuyu poisoning in Northland in 1970 and one of us (D.M.) examined tissues from 14 affected cattle. These were of various ages and came from six widely separated farms. All developed kikuyu poisoning during warm humid weather in early and mid-April. Twelve died of the disease and most of these were necropsied by field veterinarians. In some cases, several hours elapsed between death and examination and no gross lesions of the mucosa of the alimentary tract were noted. Histological examination revealed rumenitis and/or omasitis in all animals. Although only one section of tissue was usually available from each of the organs, 10 of the 12 rumens and all of 7 omasums examined showed lesions. These lesions were characterized by necrosis and neutrophil infiltration of the epithelium and tended to be more severe in the omasums.

The other two affected animals were killed for examination by laboratory staff and necropsied immediately. No gross abnormalities of the mucosa of the alimentary tract were recognized in one but in the other the whole of the mucosa of the forestomachs was diffusely reddened. Rumenitis, reticulitis and omasitis were seen in histological preparations from both animals. These lesions were severe and extensive and in places extended to the basal layer of the epithelium.

Lesions in the mucosa of the forestomachs have not been described previously in kikuyu poisoning but it is now considered that they may well be an important pathological feature of the disease.

The fungus genus *Myrothecium* occurs in pasture of various composition in the North Island of New Zealand and is recovered principally in the summer and autumn (di Menna, 1971). In recent experiments at Ruakura Agricultural Research Centre, cultures of toxin-producing strains of *Myrothecium verrucaria* and *M. roridum* were dosed orally to cattle and sheep (Mortimer *et al.*, 1971; di Menna and Mortimer, 1971). Clinical signs of disease produced in animals dosed with toxic cultures were closely similar to those described in kikuyu poisoning. Haematocrit and haemoglobin values and the *pH* levels of abomasal contents also fitted the abnormally high ranges found in kikuyu poisoning. A consistent finding in the experimental animals was necrosis and inflammation of the mucosa of the forestomachs. In cattle given small amounts of cultures the histological lesions in the rumen, reticulum and omasum were indistinguishable from those found in kikuyu poisoning.

The similarities that are now apparent between the pathological changes in cattle dying from kikuyu poisoning and those dosed cultures of *Myrothecium* spp. are impressive and suggest the possibility that the kikuyu disease may be a mycotoxicosis. Certain differences that do exist between the field disease and the experimental disease merit discussion, for instance, inflammation and haemorrhage were often produced in the abomasum and intestines of animals dosed with *Myrothecium* cultures (Mortimer *et al.*, 1971), but similar lesions have not been seen in kikuyu poisoning. This difference may be explained partly in terms of dose rate of toxic material, for it has since been found that, as dose levels of *Myrothecium* were decreased, the incidence and severity of the abomasal and intestinal lesions were also decreased (Mortimer, unpubl.). Furthermore in the *Myrothecium* experiments, animals had continuous access to ryegrass-white clover postures, and when dosed, stomach fill was normal, whereas in the cases of kikuyu disease referred to by Cordes *et al.* (1969) there was frequently a history of hungry cattle being permitted access to large amounts of dense, succulent kikuyu pasture with consequent engorgement. It would appear that ruminal engorgement and ensuing ruminal stasis could be important in explaining why lesions in kikuyu poisoning are restricted to the forestomachs.

The sporadic occurrence of kikuyu poisoning, usually in warm, humid weather when fungal growth in pasture is at a maximum, provides epidemiological support for the suggestion that the disease is a myco-