

Smarter Grazing for Better Land

Regenerate Land with Grazing Livestock

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AIMS



Program outline

- The range of approaches to grazing management
- Managing animals in tune with natural cycles
- The effect of the number of paddocks
- The importance of residual herbage and utilisation
- Feed budgeting – matching stocking rate to carrying capacity
- Measurement of herbage mass and pasture growth
- Aspects of animal nutrition

The range of grazing strategies

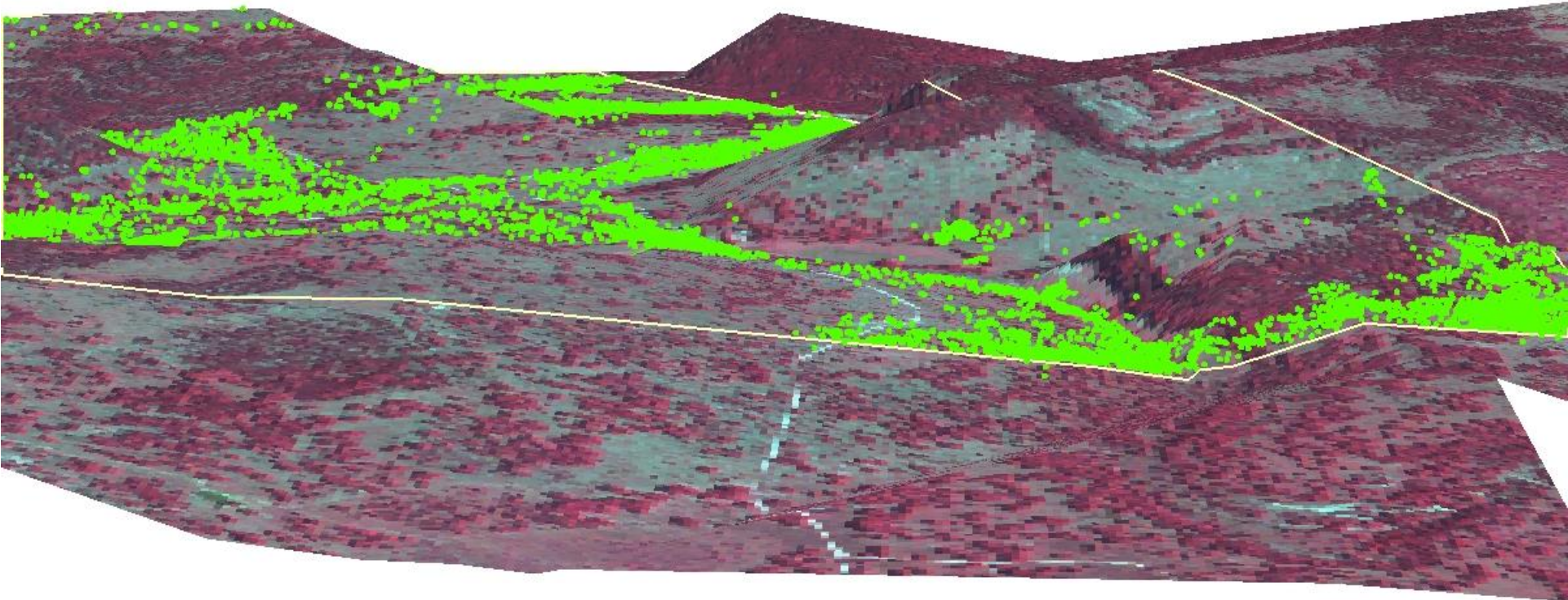
- Continuous grazing
 - Set stocking
 - Rotational grazing system
 - Strategic grazing
 - Tactical grazing
 - Techno grazing
 - Cell grazing
 - Planned holistic grazing
 - Forage based planned grazing
- 
- A photograph of a herd of cattle grazing in a field. The field is filled with tall, dry grass. In the background, there are several trees and a clear blue sky. The cattle are scattered across the field, some standing and some grazing.

Low numbers – large areas

- Low stocking rates
- No control of the grazing process
- Generally reactive management
- Damaging to ecosystem processes
 - Plants overgrazed
 - Soils compacted
 - Increase in undesirable species.....
- Most common form of management applied

Landscape impact of continuous grazing

1. 39% area used
2. 41% GPS points on 9% area
3. SR: 21 ac/cow
4. Effective SR: 9 ac/cow



Norton 1998; Norton et al. 2013; Jakoby et al. 2014





Photo: Christine Jones

An important feature of grasses to keep in mind.

Plant material above the ground is a reflection of root material present below the soil surface.

Grazers

- Selective
- One plant at a time
- Physical impact
- Conversion of nutrients
- Conversion of carbon
- Need to be managed



Selectivity

- animal designed pastures

- Animals are able to select from the pasture and graze 'palatable' plant parts and species.
- Selective grazing modifies competition between plants in favour of less palatable species.
- This allows unpalatable species to potentially better compete for water, nutrients and light.
- Aim to reduce the effects of selective grazing

Rotational grazing systems

- Generally time based
- 2-50+ paddocks
- Often rigid
- Allow some rest
- Does not factor in herbage mass
- Often fail



Tactical or Strategic Grazing

- Usually applicable to one or few paddocks.
- Includes decisions around lambing/calving, weaning, finishing stock for sale.
- Management of special purpose pastures, pasture crop multi species etc.
- Not a whole farm approach.



Strip grazing

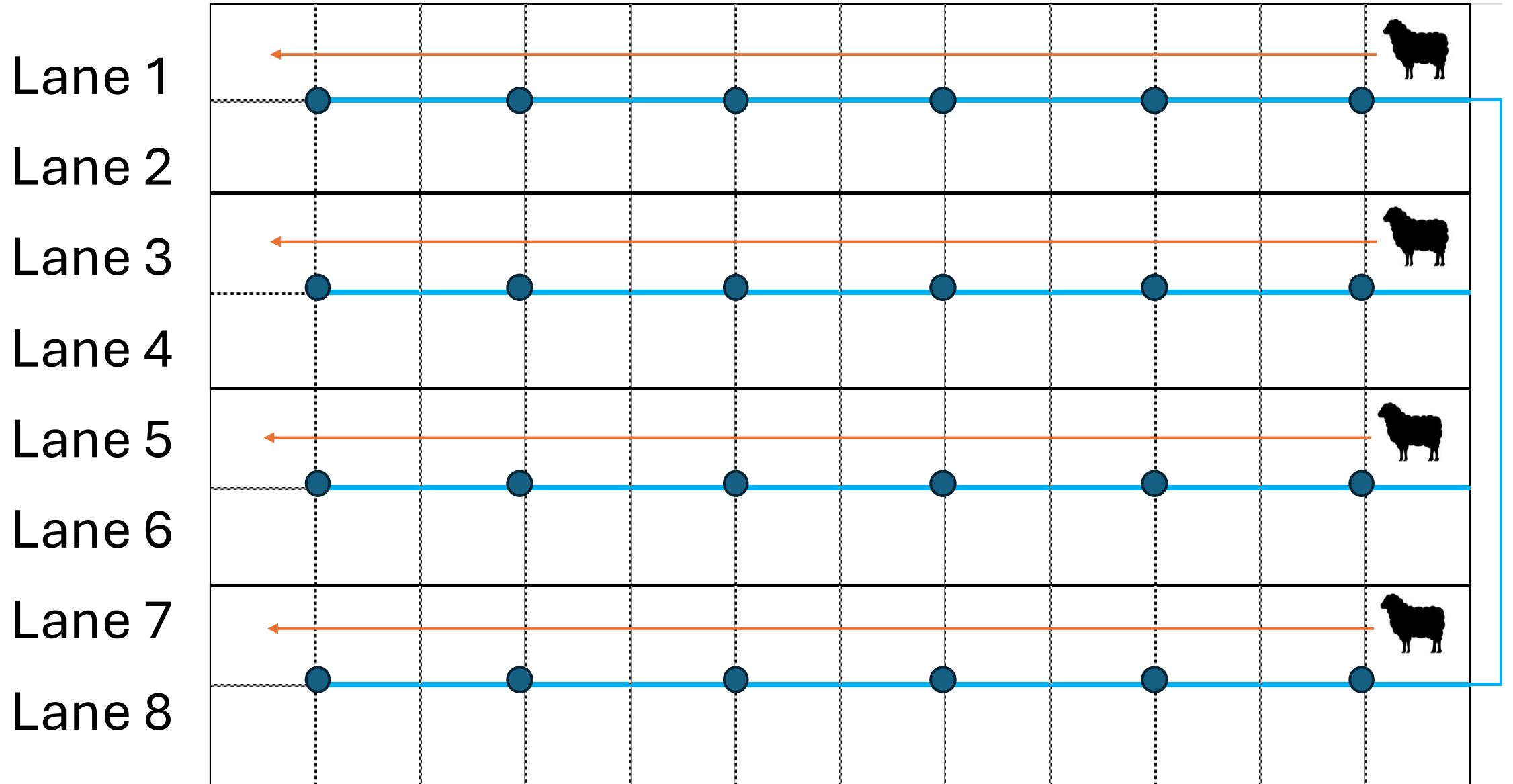
- Usually applied in paddocks which are relatively uniform in topography and vegetation.
- Often using temporary electric fencing.
- Can be included as part of another strategy.
- May or may not be evidence based.



Techno grazing

- Introduced in NZ for dairy bulls
- Essentially a fencing system
- Precision subdivision
- Allows for high density rotation of small areas, 0.1ha or less

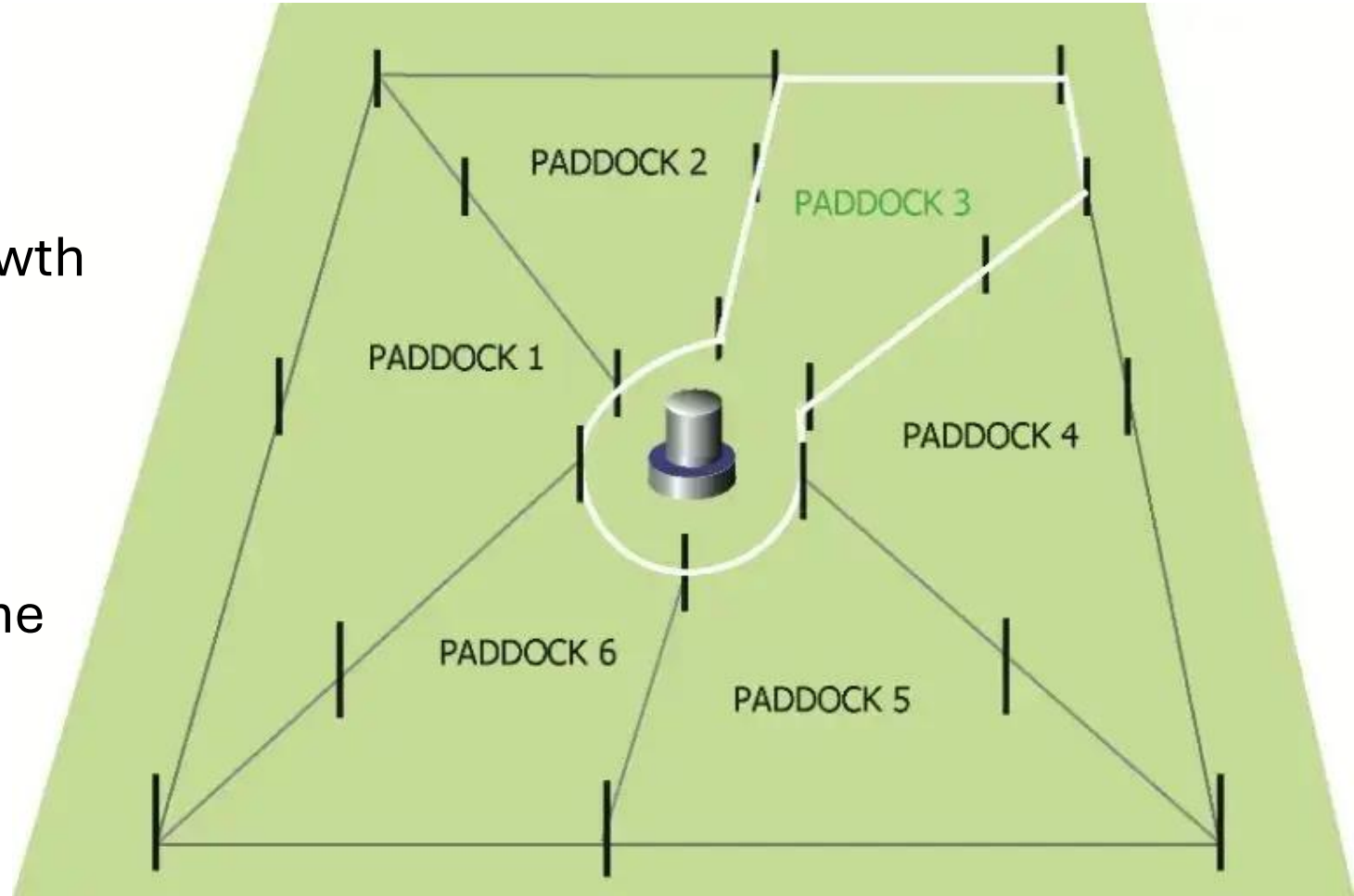




Potentially 96 individual subdivisions

Cell grazing

- Control rest to match pasture growth
- Match stocking rate to carrying capacity.
- Plan monitor and manage grazing
- Use short graze periods
- Use maximum stock density for the minimum time



Holistic planned grazing

- Get animals where you want when you want
- Open and closed plans for recovery in fast and slow growth periods
- Plan for drought with a time reserve
- Focus on enhancing ecosystem processes using livestock as the primary tool
- Applicable in any situation in any environment
- Toward your own individual goal/context



Forage based planned grazing

- Movements based on measurement of herbage mass
- Setting a desired residual
- Controlling grazing
- Controlling utilisation
- Enhancing animal production
- Enhancing ecosystem processes



Triggers – to change strategy

- Pasture growth rate changes
- Change of season
- Social factors
- Animal requirements
 - Joining
 - Calving or lambing
 - Weaning
 - Production



Influencing plant growth with management

4 key factors that are within your control

- Recovery period
 - Growing season
 - Non or slow growing season
- Graze period
- Residual herbage mass
- Stock numbers – stocking rate



Recovery period

- Critical considering the effect of defoliation on plants
- Will depend on pasture growth rate
- Distinction between rest and recovery
- Getting it 'right' is a challenge



Graze period

- Depends on available herbage mass and desired residual
- Will be influenced by the recovery period required
- Aim to avoid a second bite on growing plants
- When plants grow quickly graze period will be shorter and when growth is slow the graze period can be longer

Residual herbage mass

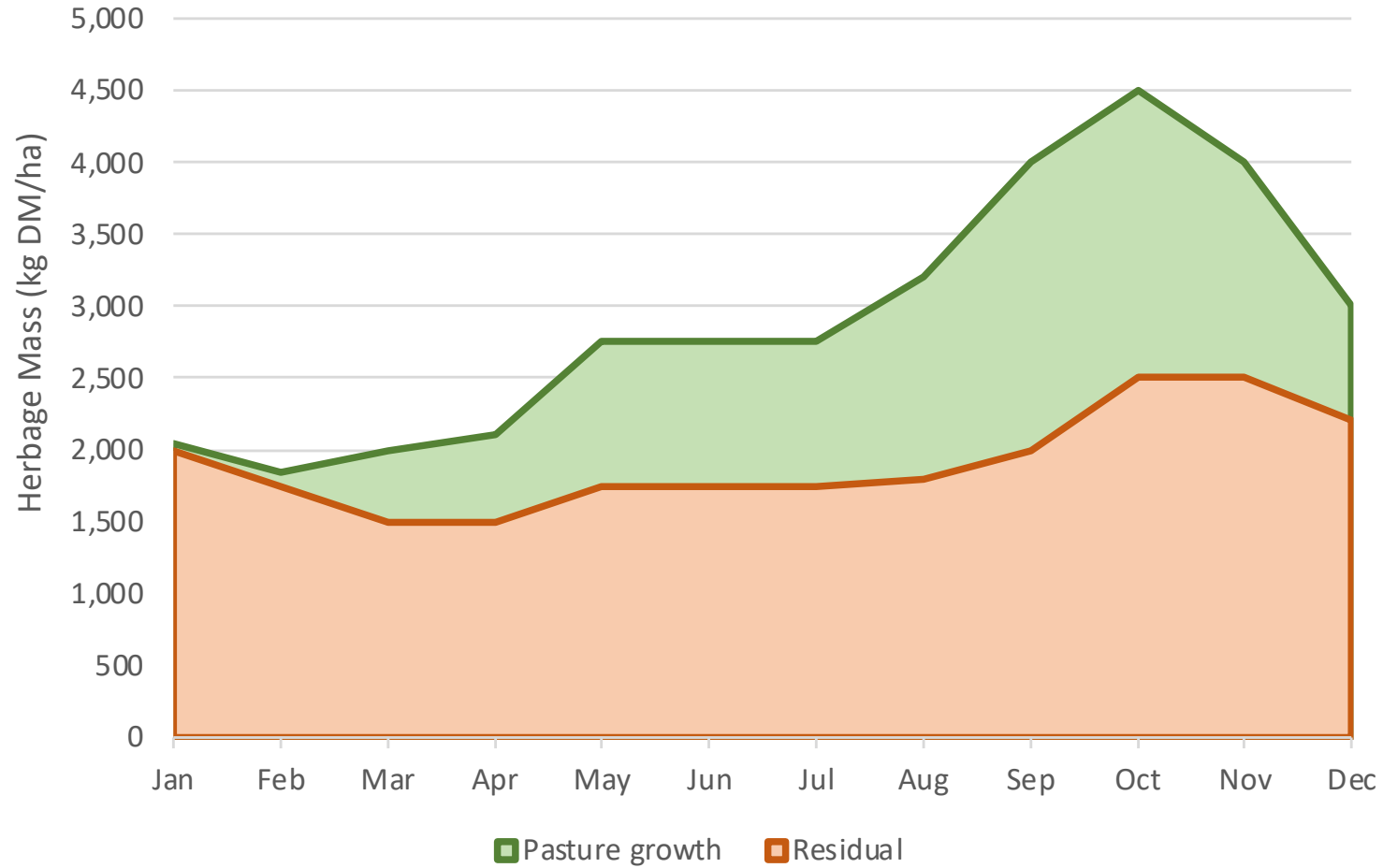


Grazing occurs one plant at a time

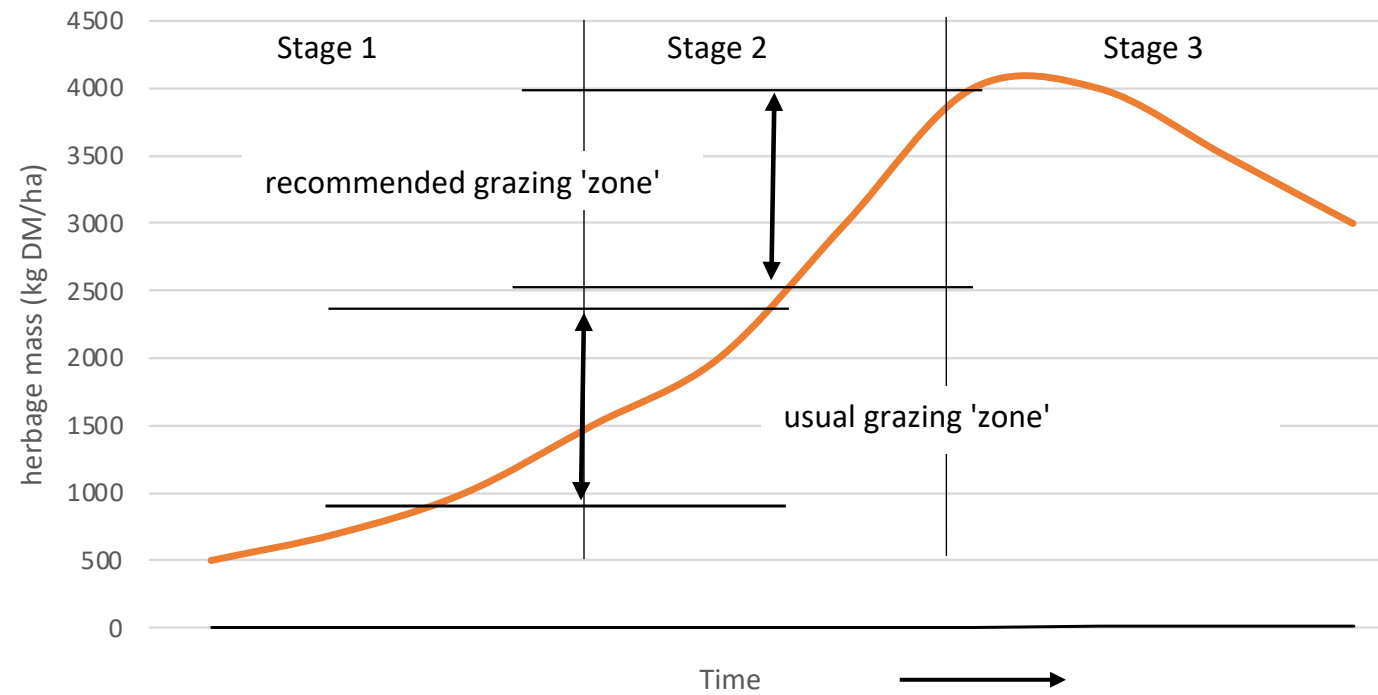
Residual leaf 5cm height

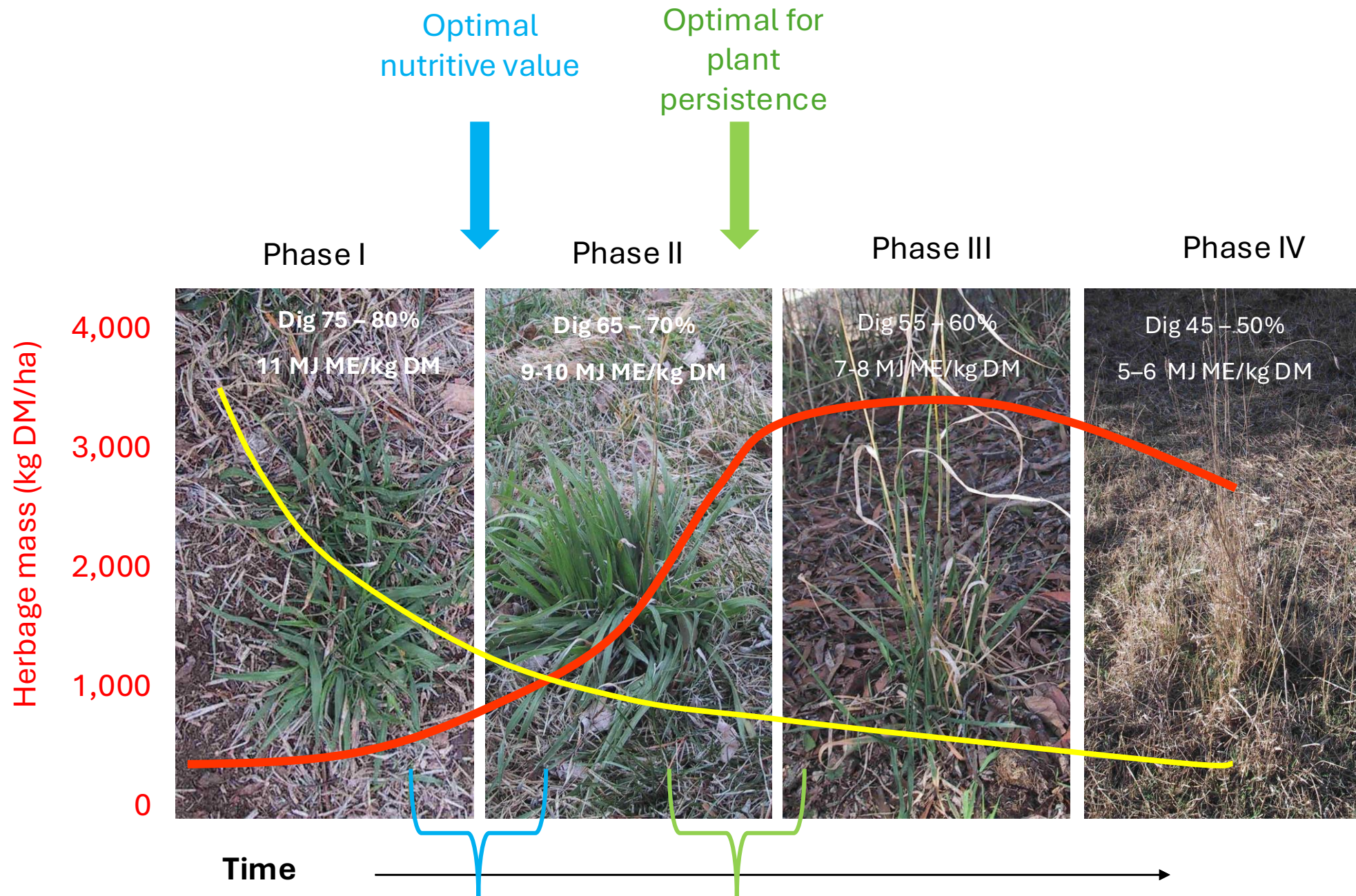


Residual herbage mass



Ideal grazing zone



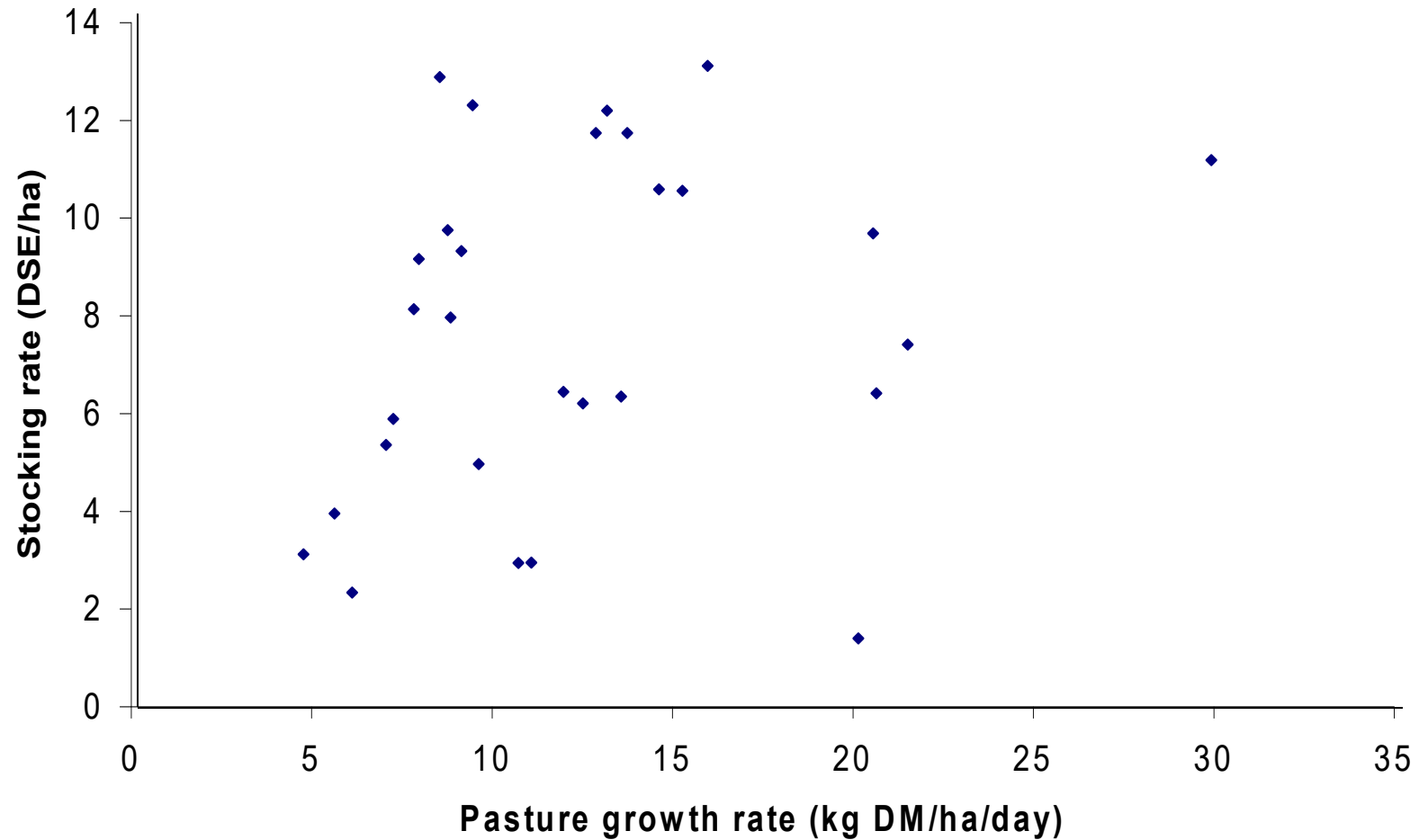




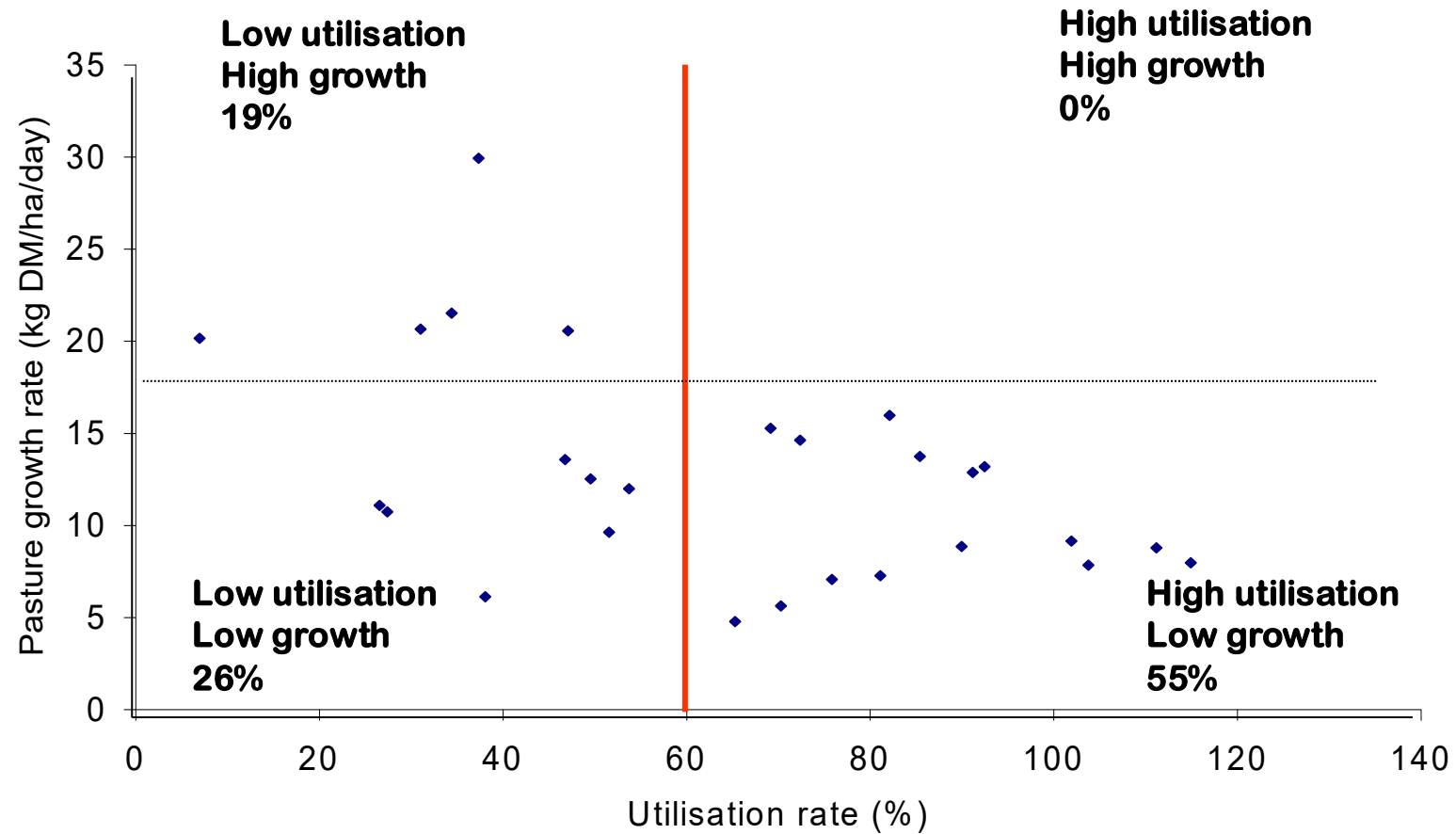
The number of animals – Stocking rate

- Is the number of animals carried (DSE/ha)
- Usually calculated over a 12 month period
- Should always be matched to carrying capacity
- A key driver of enterprise profitability ?

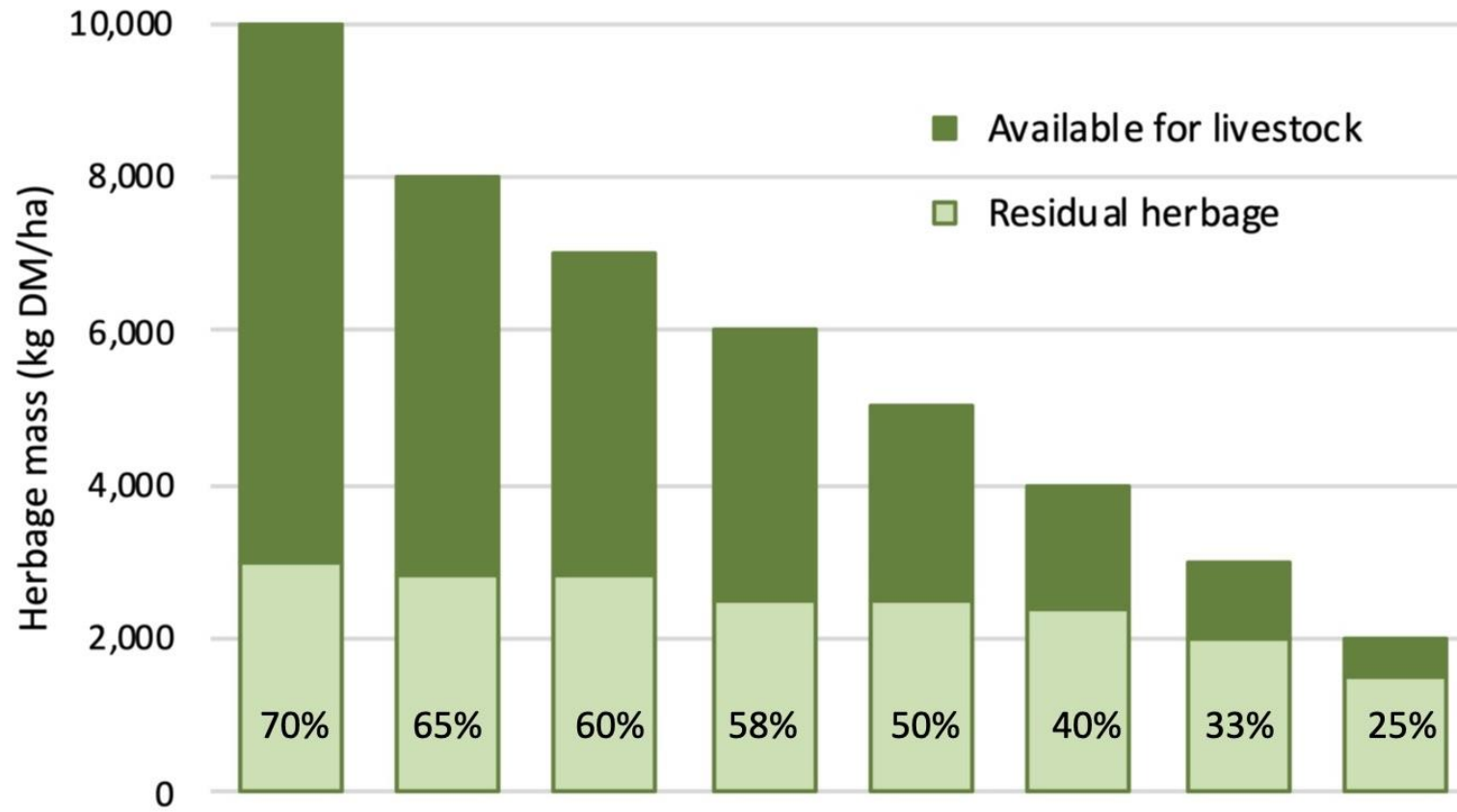
Stocking rate has a variable effect on pasture growth



Pasture growth influenced by utilisation rate



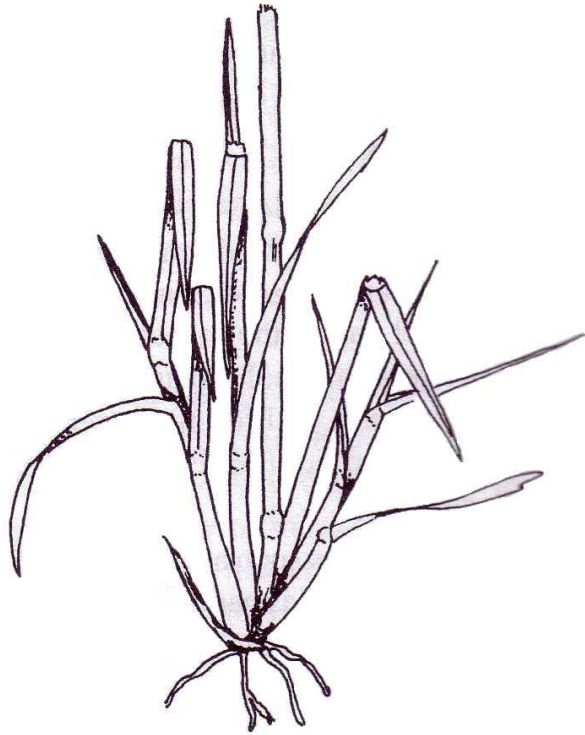
Grow more – leave more - use more



Why it matters is how grass grows.



Tussock grasses



Tussock grasses are made up of a number of independent but connected units or tillers.

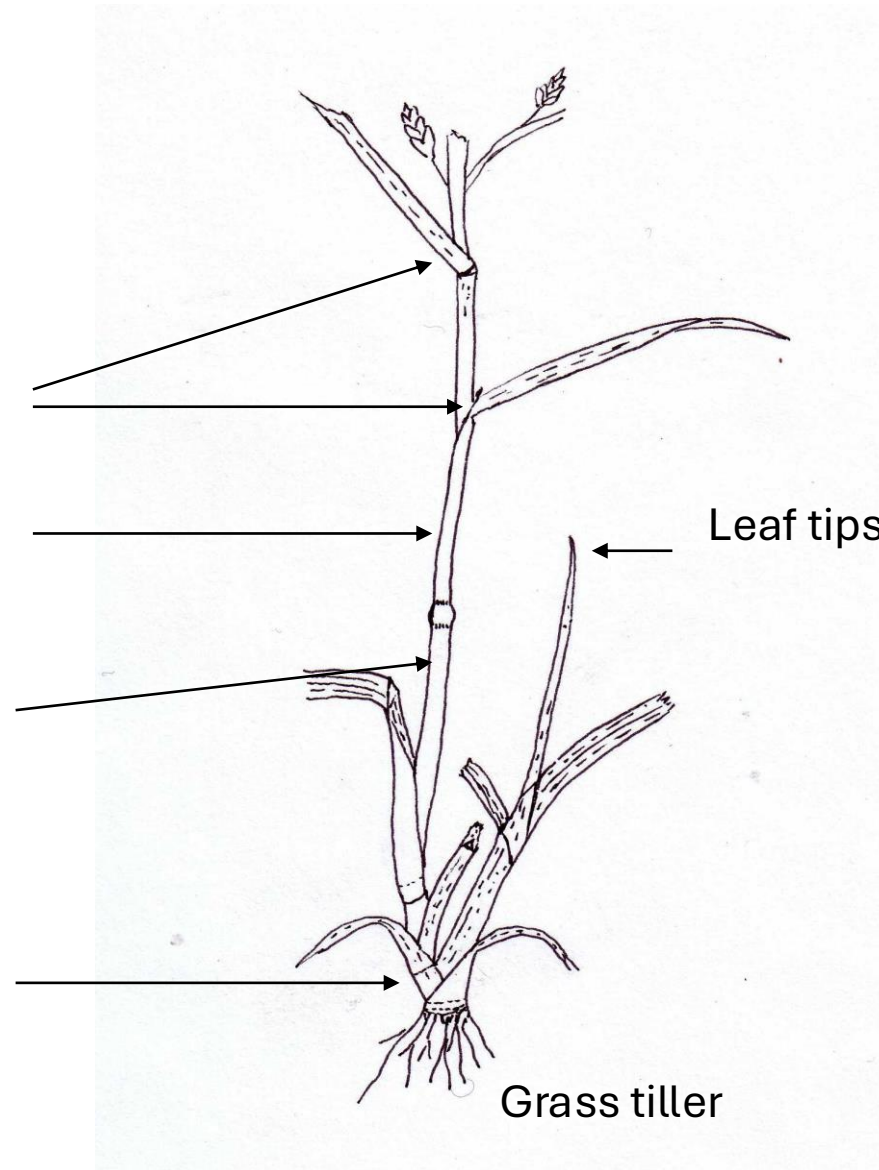
Growth points

Leaf junction

Leaf sheath

Internodes

Basal node



Senesced leaf



Axillary Bud



New tillers



New roots



Leaf removal and growth rates

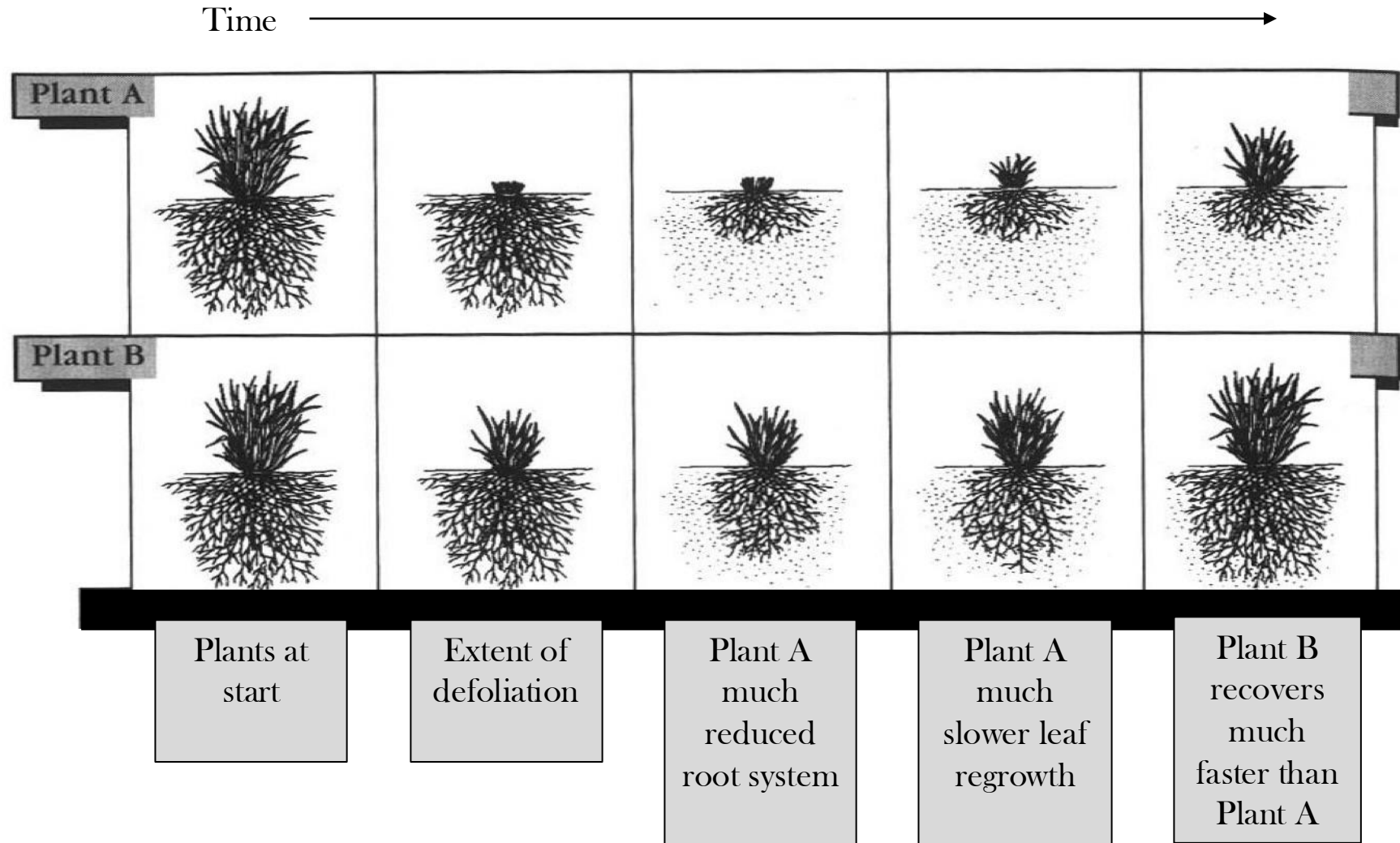
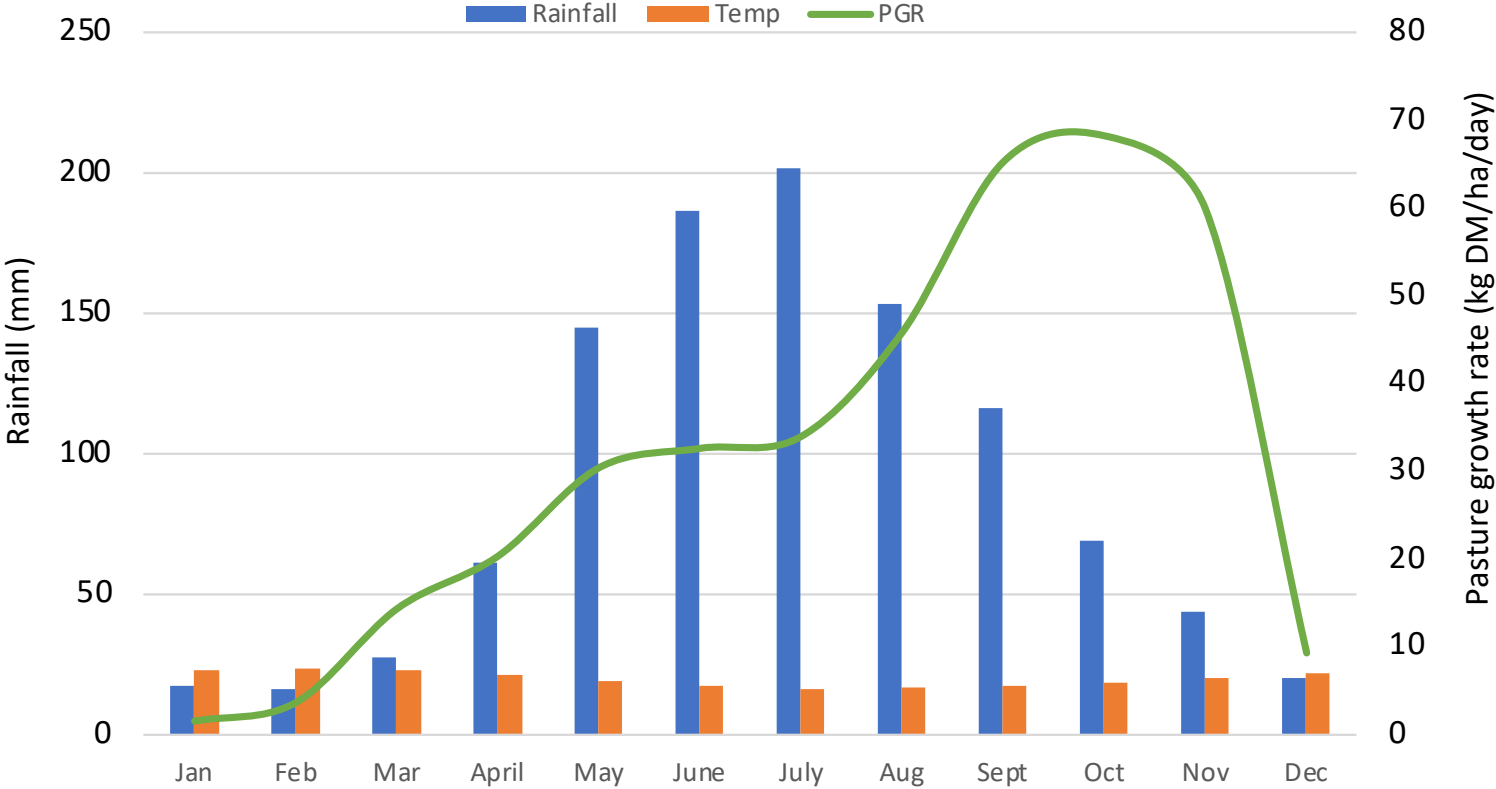




Photo: Christine Jones

Plant material
above the ground
is a reflection of
root material
present below the
ground

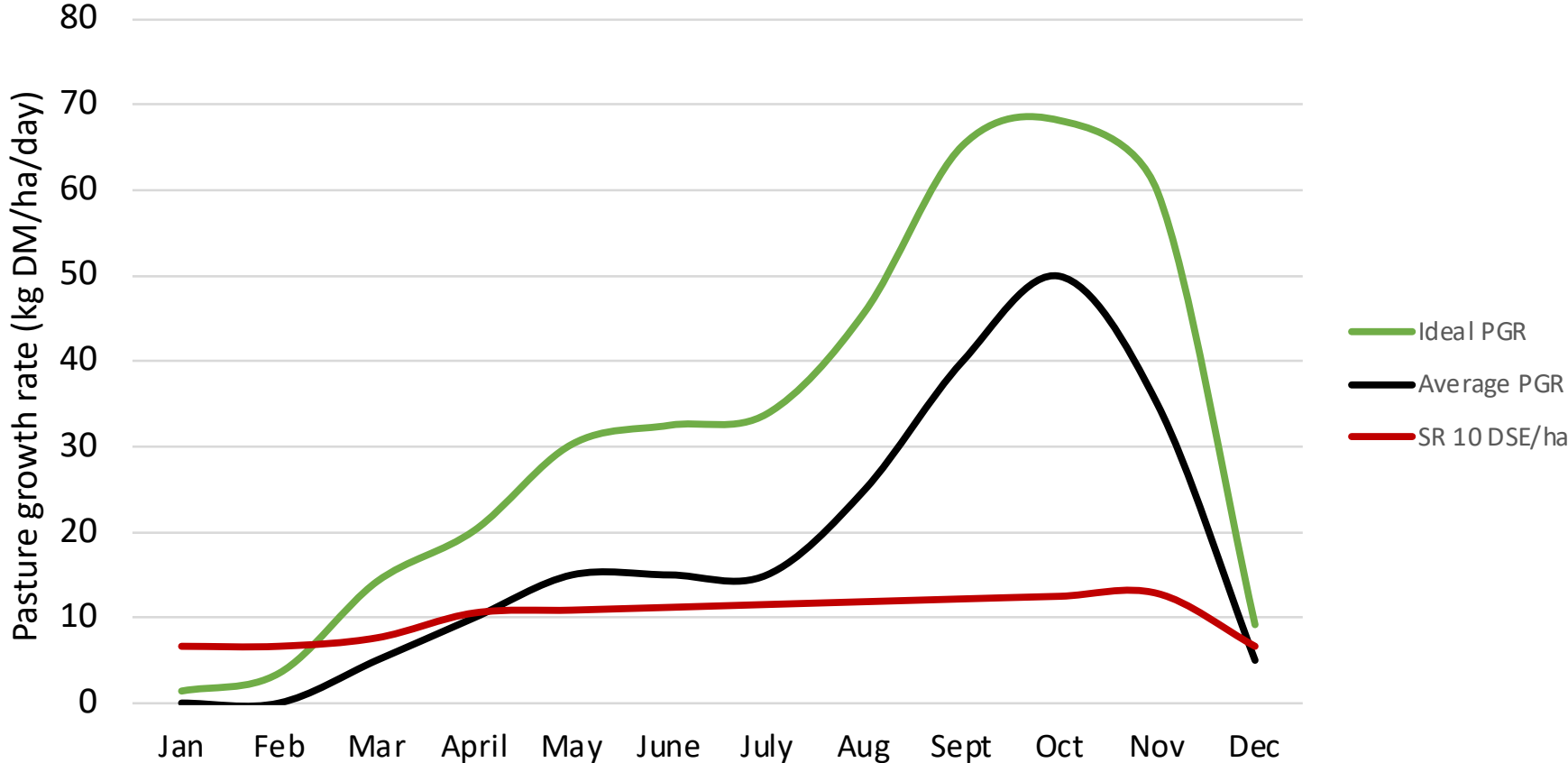
Environmental influences on plant growth



Factors that influence plant growth

| Environmental factors | Plant factors | Soil factors |
|---------------------------------|-----------------------|---------------------------|
| Rainfall: amount & distribution | Species | Cation exchange capacity |
| Temperature | Stage of growth | Fertility and pH |
| Sunlight: duration & intensity | Height or leaf area | Water holding capacity |
| Season | Time since grazed | Water infiltration rate |
| Soil type | Residual herbage mass | Compaction |
| Slope | Groundcover | Organic matter and soil C |
| Aspect | Presence of weeds | Biological activity |
| Proximity to water | Tree cover | Depth of topsoil |

Environmental *and* management influences on plant growth



Local Issues

Mediterranean environment – short defined growth period

Soil fertility

Low populations of perennial grasses

Low pasture species diversity

Absence of seed bank species diversity

High populations of undesirable species

Slow early season pasture growth rate

Lower than optimal pasture growth rate

Lower than optimal stocking rates

Need to feed hay or silage during summer

Low levels of residual herbage mass

Excessive rates of utilisation

Highest livestock demand at the most critical time for new season growth

Solutions

- **Introduce species diversity – multi species planting**
 - Perennial and annual
 - Different plant families
 - Different growth cycles
- **Planned grazing management**
 - Increase number of paddocks per mob
 - Use stock density
 - Plan recovery
 - Plan residual herbage mass
 - Control utilisation



Species selection

Your goals?

Production stability

Enhance ecosystem processes

Improve production

Increase soil carbon

Species selection

A photograph of a diverse green plant community, likely a meadow or pasture. The plants are densely packed and show a variety of leaf shapes and textures, including broadleaves and grasses. The overall color is a vibrant green, suggesting healthy, growing vegetation.

Perennial grass

Annual grass

Legume

Broadleaf



Water cycle

- Diversity of root architecture
- Diversity of root depth
- Improved soil structure
- Improved water holding capacity

Mineral cycle

- Biological activity
- Different species host a range of different microorganisms
- Aggregate stability

Multi species Advantages

Community dynamics

- More species, more resilience
- More even annual production
- Improved animal nutrition
- Plant species complementarity

Energy Flow

- Species differ in growth cycles
- Increased photosynthetic capacity
- Increased plant growth

Control of the grazing process

Planning the grazing allows you to control

- plant competition
- plant and pasture growth rates
- pasture utilisation
- pasture composition – species diversity



Control of the grazing process

Fewer & bigger mobs

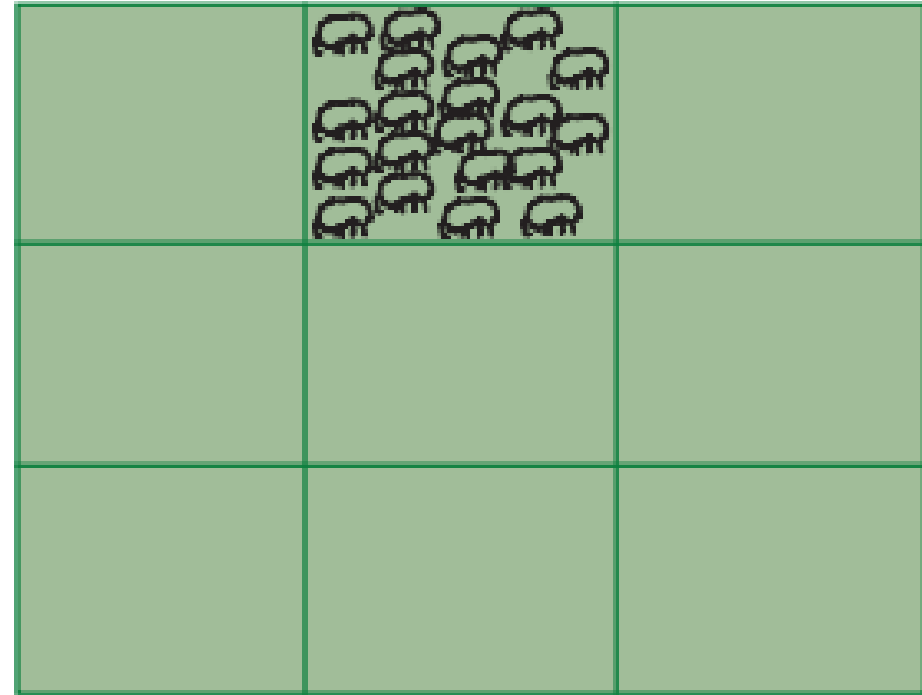
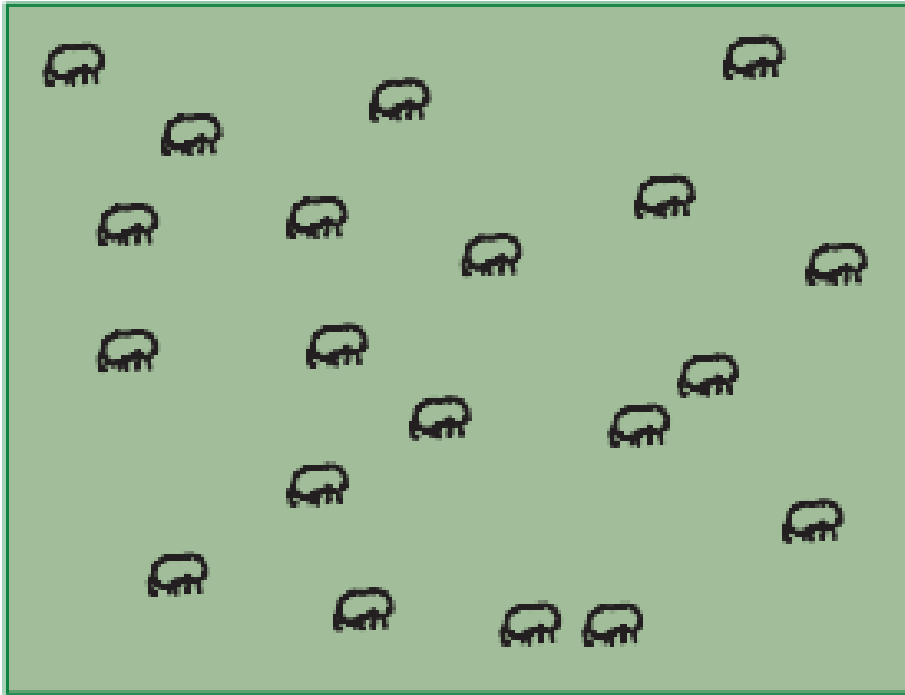
-> more paddocks per mob

- › Increases period between grazing events
- › Provides relative advantage to selectively grazed species
- › Provides potential to use stock density
- › Provides potential to increase feed utilisation, stocking rate & pasture growth



Stocking rate & stock density

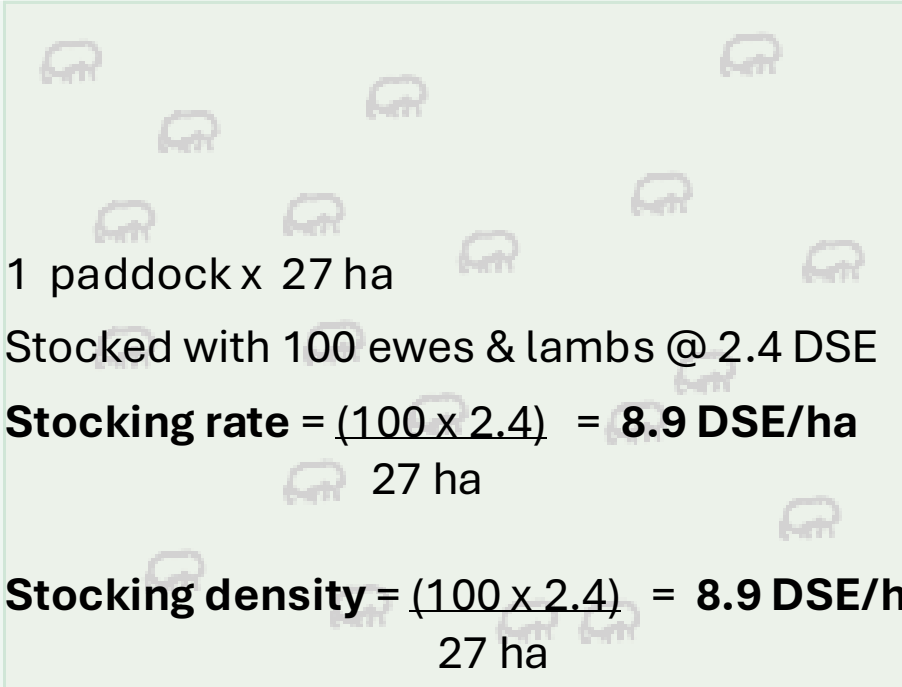
Uncontrolled grazing vs Controlled grazing



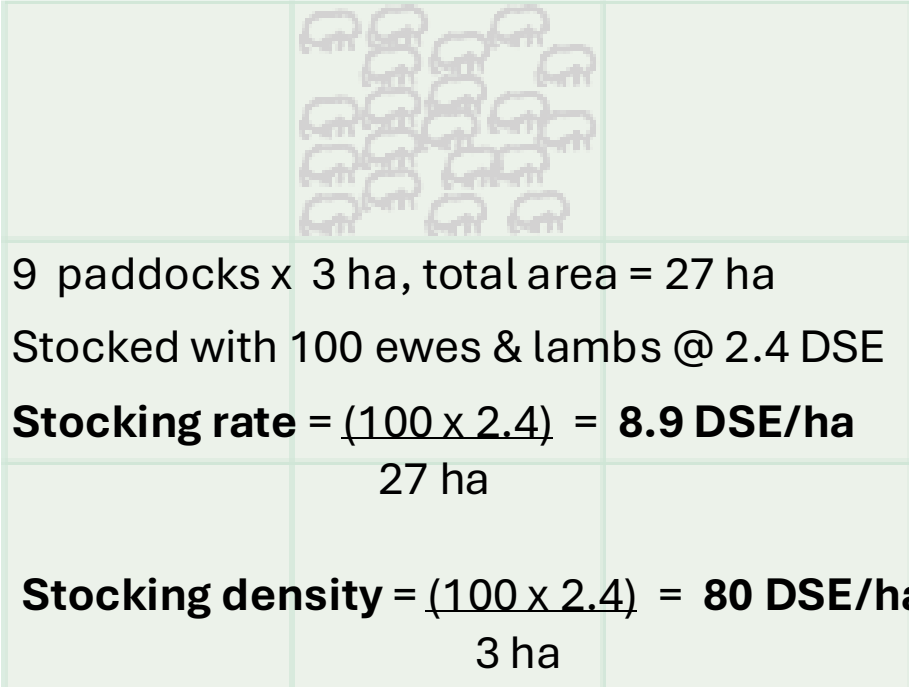
Same grazing area same number of stock

Stocking rate & stock density

Uncontrolled grazing vs Controlled grazing

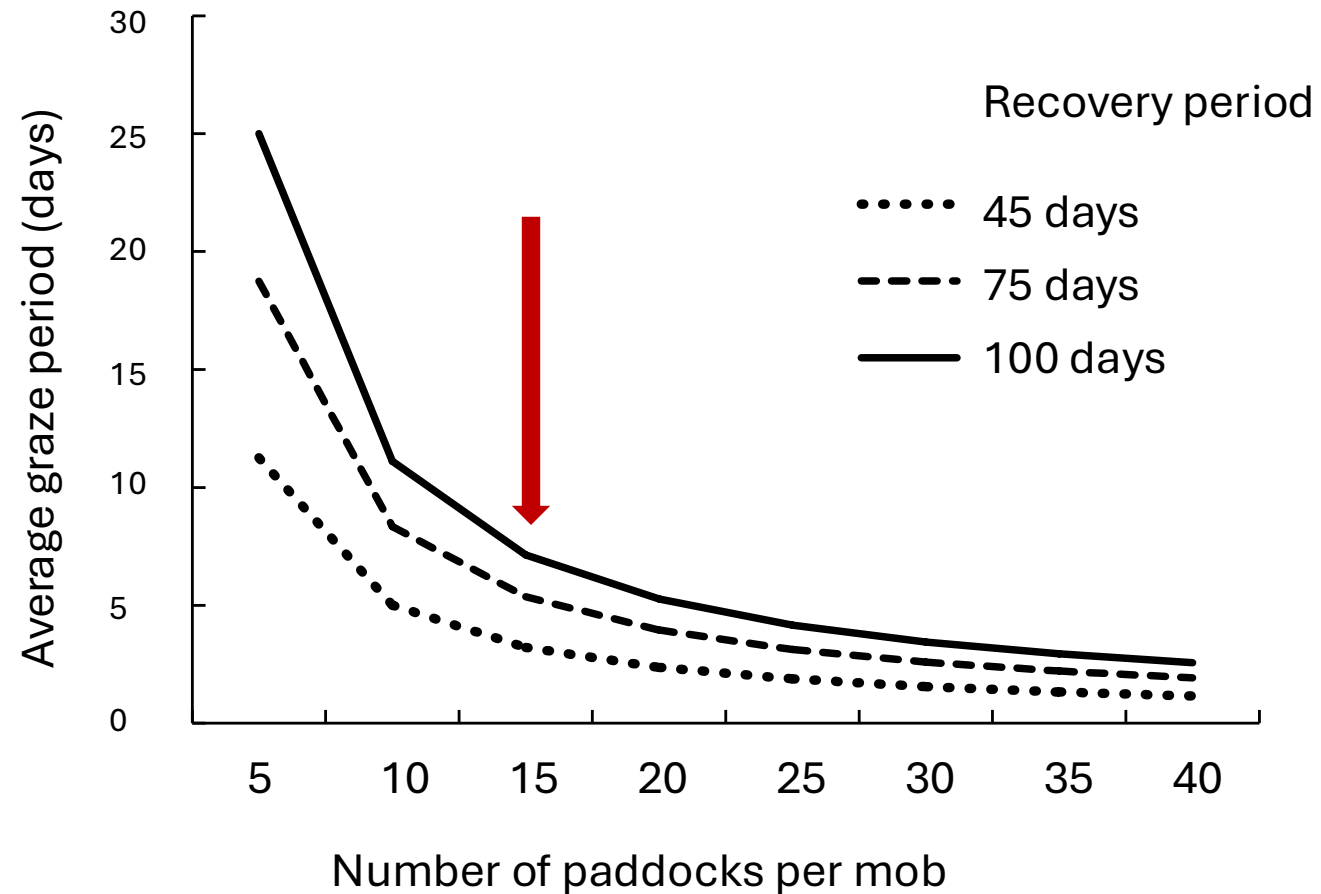


1 paddock x 27 ha
Stocked with 100 ewes & lambs @ 2.4 DSE
Stocking rate = $\frac{(100 \times 2.4)}{27 \text{ ha}} = 8.9 \text{ DSE/ha}$
Stocking density = $\frac{(100 \times 2.4)}{27 \text{ ha}} = 8.9 \text{ DSE/ha}$



9 paddocks x 3 ha, total area = 27 ha
Stocked with 100 ewes & lambs @ 2.4 DSE
Stocking rate = $\frac{(100 \times 2.4)}{27 \text{ ha}} = 8.9 \text{ DSE/ha}$
Stocking density = $\frac{(100 \times 2.4)}{3 \text{ ha}} = 80 \text{ DSE/ha}$

Effect of number of paddocks per mob on the average graze period



Effect of number of paddocks

Area 200 ha
Stock 100 steers @ 10 DSE
Total mob size 1000 DSE

| | | |
|-------------------------------|-----|-----|
| Number of paddocks | 1 | 4 |
| Average paddock size | 200 | 50 |
| Stocking rate (DSE/ha) | 5 | 5 |
| Stock density (DSE/ha) | 5 | 20 |
| Average days grazing per year | 365 | 91 |
| Average days rest per year | 0 | 274 |
| % of year resting | 0 | 75 |

Effect of number of paddocks

Area 200 ha

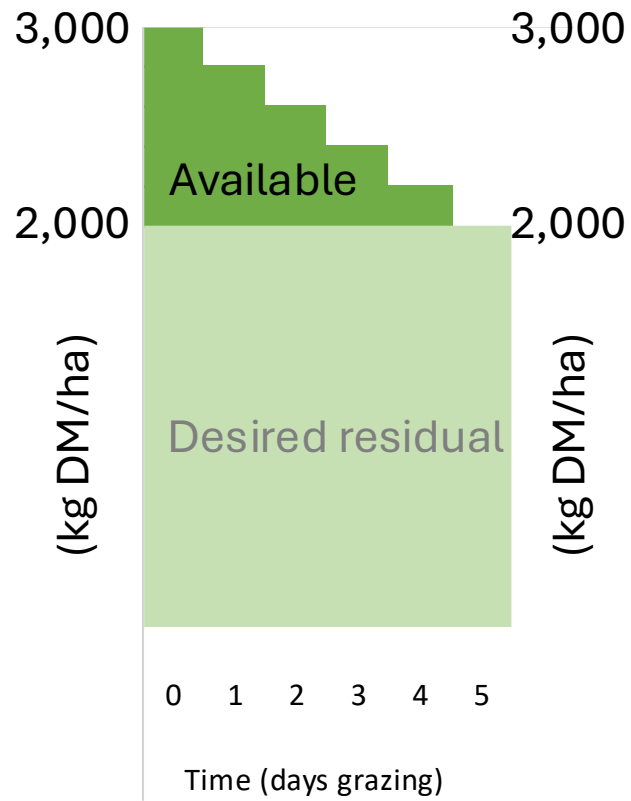
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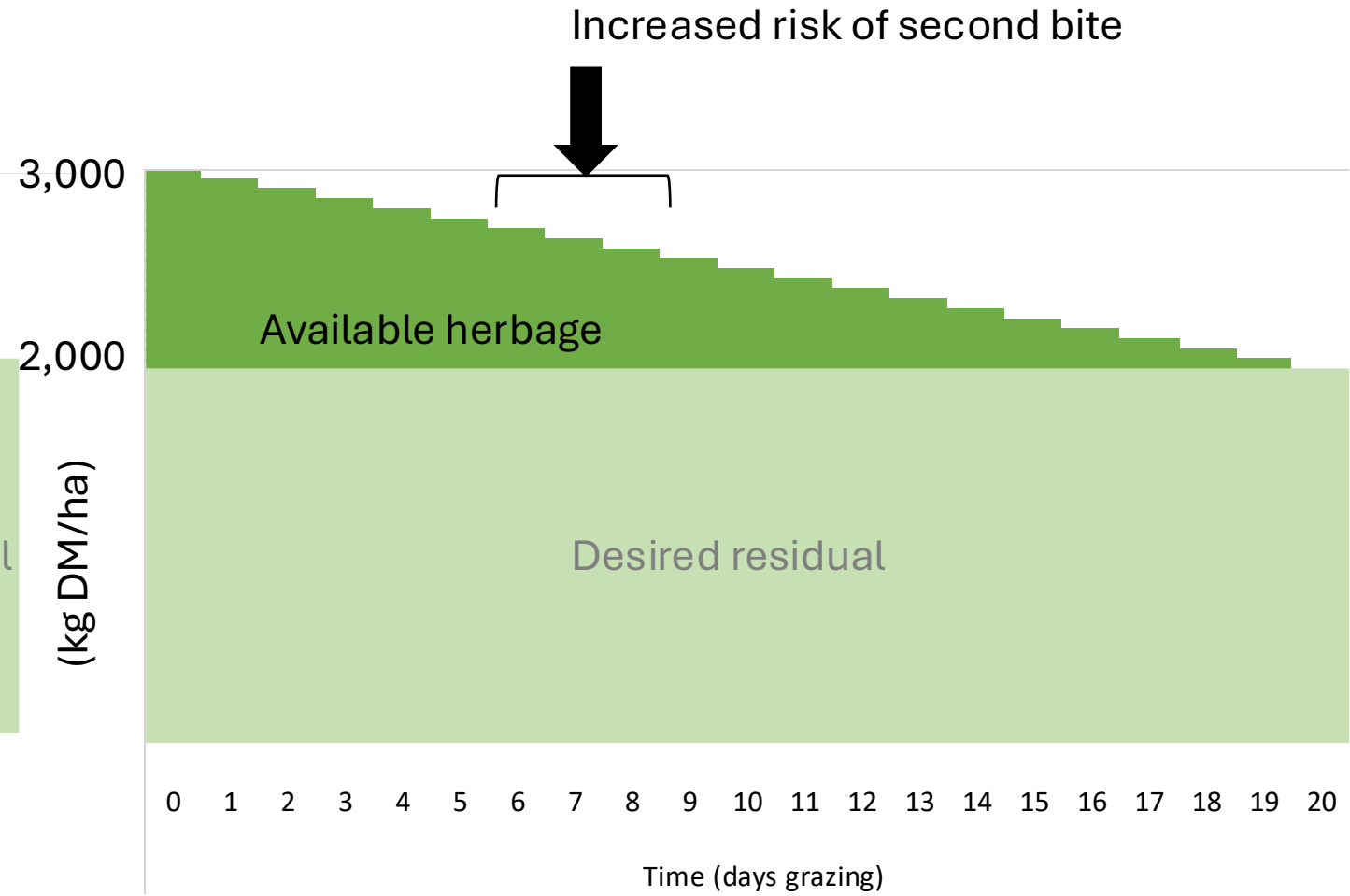
| | | | | |
|-------------------------------|-----|-----|-----|-----|
| Number of paddocks | 1 | 4 | 10 | 20 |
| Average paddock size | 200 | 50 | 20 | 10 |
| Stocking rate (DSE/ha) | 5 | 5 | 5 | 5 |
| Stock density (DSE/ha) | 5 | 20 | 50 | 100 |
| Average days grazing per year | 365 | 91 | 36 | 18 |
| Average days rest per year | 0 | 274 | 329 | 347 |
| % of year resting | 0 | 75 | 90 | 95 |

Stock density

@ 200 DSE/ha



@ 50 DSE/ha



Increasing paddocks per mob - advantages

- The capacity to use stock density to improve pastures and soil health
- More control over pasture utilisation
- More even pasture utilisation
- More plants impacted more evenly in any grazing event
- More even distribution of dung and nutrients
- More even plane of nutrition for grazing livestock
- Livestock move frequently onto fresh pasture
- Livestock become quiet to handle with frequent moves
- Regular inspection of stock to identify any health issues early

Realistic stocking rates in the Lower Blackwood region

| Annual herbage Mass (kg DM/ha) | Daily herbage growth (kg DM/ha/d) | Stocking Rate to Utilise 50% (DSE/ha) | Residual (kg DM/ha) |
|--------------------------------|-----------------------------------|---------------------------------------|---------------------|
| 3000 | 8.2 | 4.1 | 1500 |
| 5000 | 13.7 | 6.8 | 2500 |
| 8000 | 21.9 | 11.0 | 4000 |
| 10000 | 27.4 | 13.7 | 5000 |

| Annual herbage Mass (kg DM/ha) | Utilisation | Stocking Rate | Residual (kg DM/ha) |
|--------------------------------|-------------|---------------|---------------------|
| 8000 | 69 | 15.1 | 2500 |
| 10000 | 75 | 20.5 | 2500 |

Feed budgeting

- Process to determine how many stock can run on an area for a given time period
- Does not consider feed quality
- Is a process to guard against overgrazing

Tools -

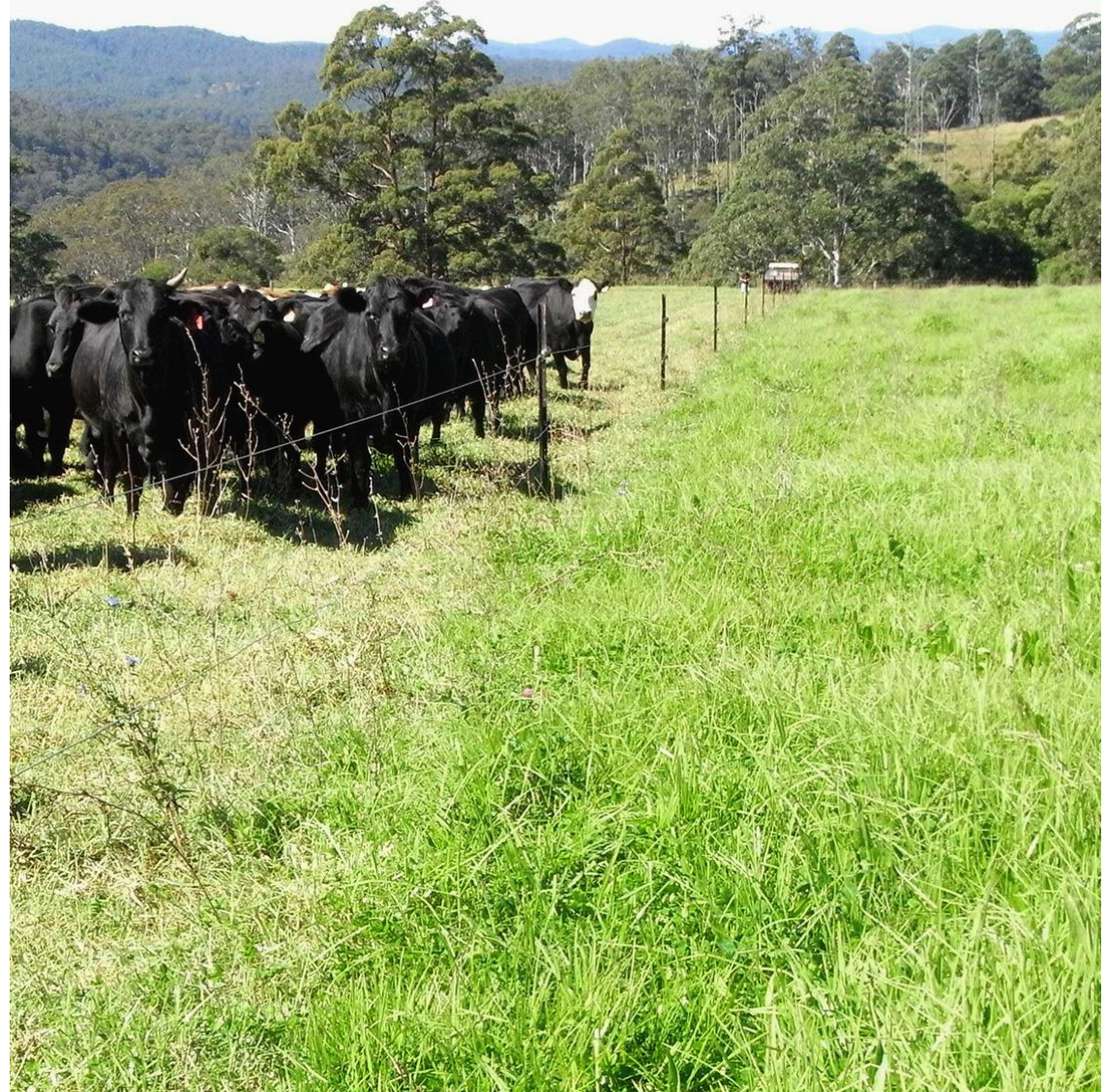
Pasture Checklist

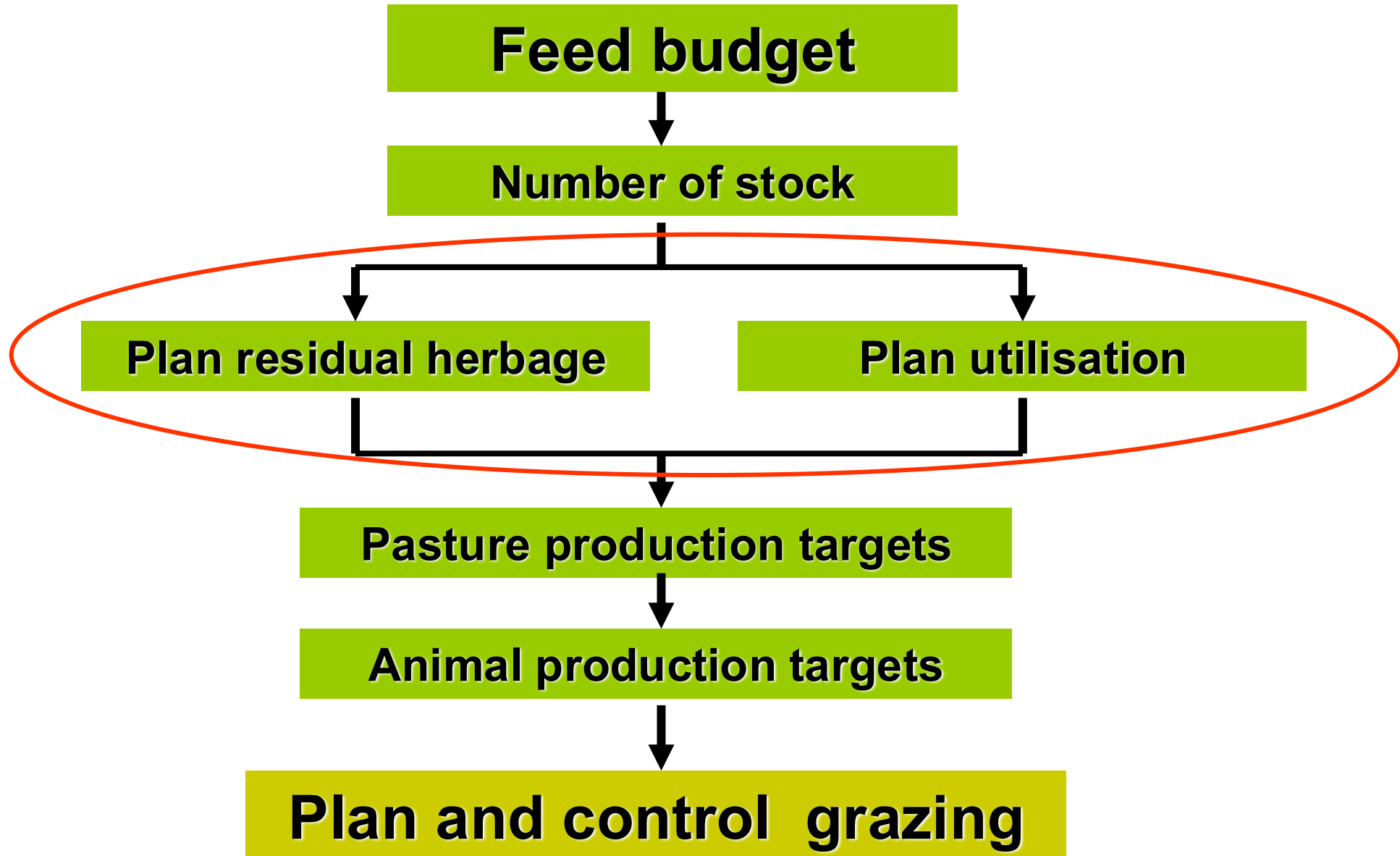
Pasture Checklist Calculator

Graze Plan Calculator

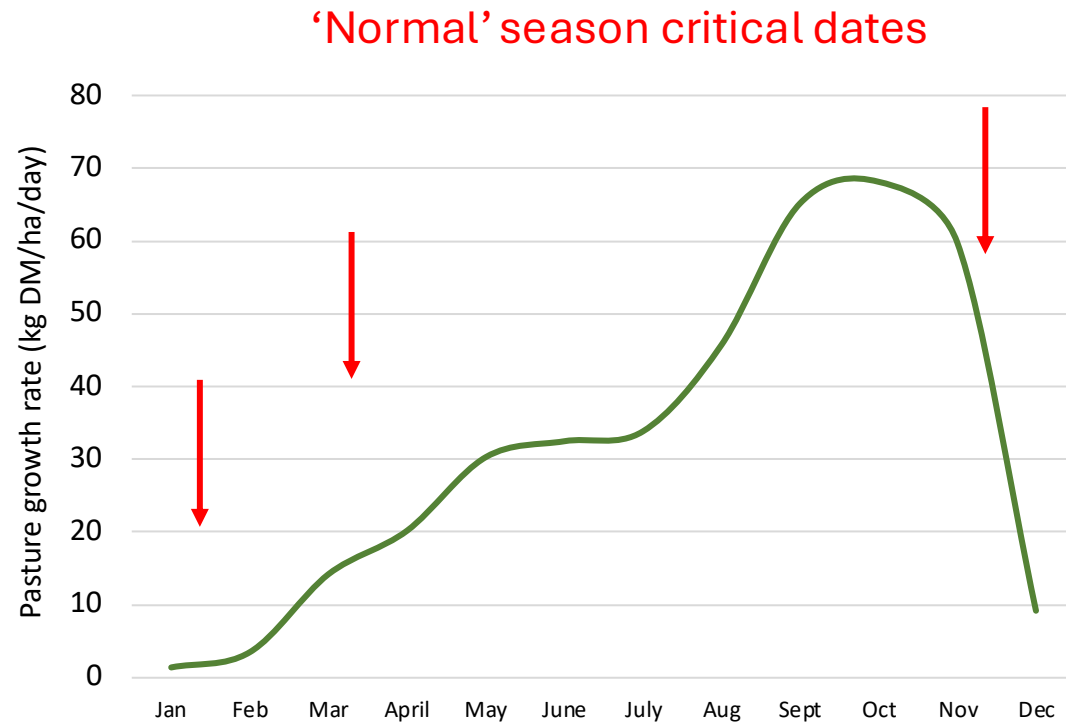
Guidelines for Graze Plan Calculator

www.aimsag.com.au/software

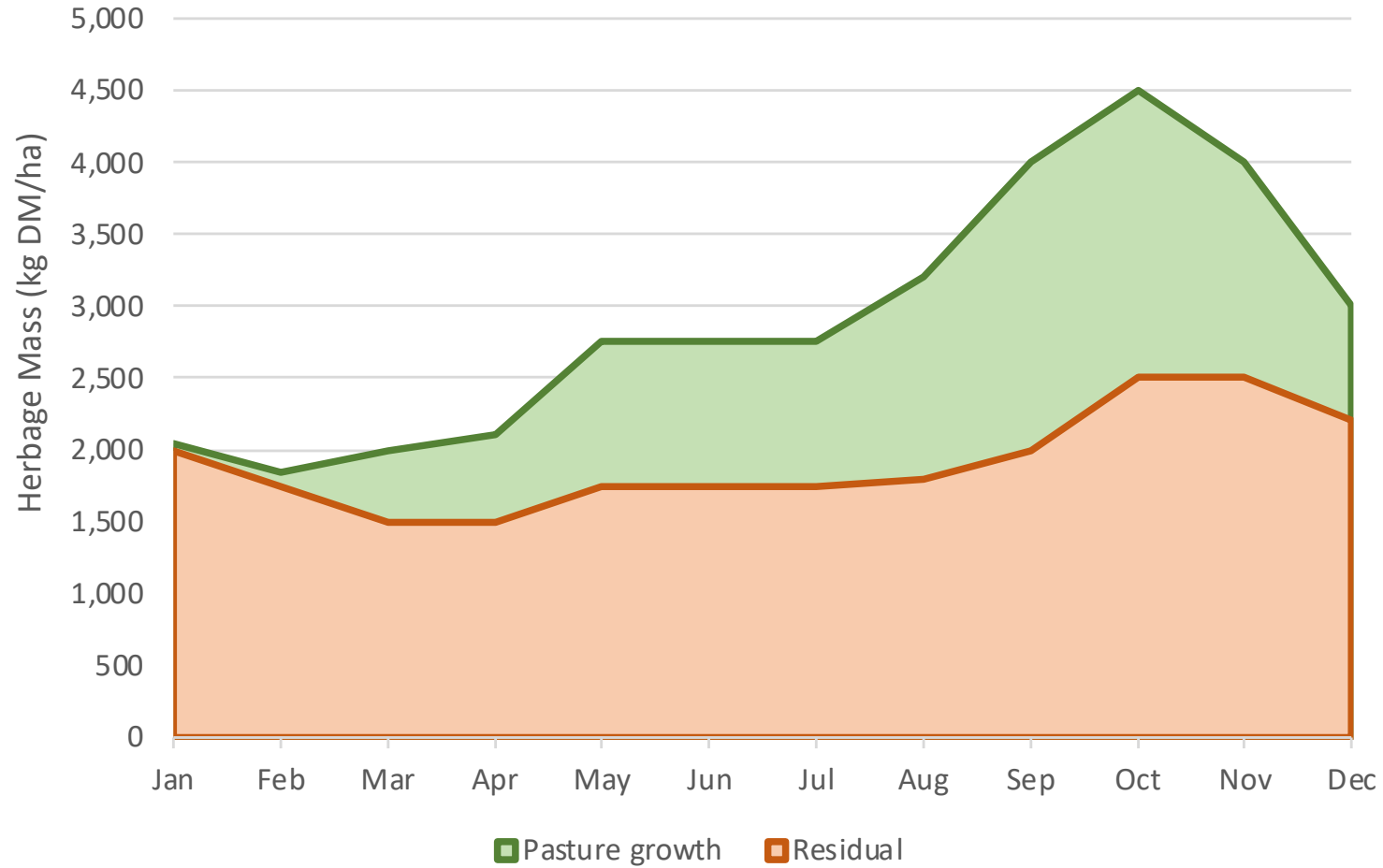




Feed year



Residual herbage mass



Things needed for a feed budget

Estimate

- Grazeable area
- Herbage mass
- DSE values – stock requirements
- Pasture growth rate

Set

- Minimum herbage mass – residual targets

Feed budget

- Feed budgeting process aids decision making about selling, keeping or feeding livestock
 - how much pasture is available
 - how much pasture needs to remain
 - what's the likely pasture growth
- Calculate feed budgets using this information
 - how many animals can I carry and for how long

Feed budget

Identifies the number of stock (DSE) able to be carried

| | | |
|---|-------------------------------------|----------------|
| A | Grazable area (ha) | 175 ha |
| | Start of period (date) | 1 November |
| | End of period (date) | 1 April |
| B | Length of period (days) | 152 days |
| C | Type of stock | 300 kg steer |
| D | DSE rating (DSE/stock unit) | 7 DSE/head |
| E | Start herbage mass (kg DM/ha) | 2,600 |
| F | Desired end herbage mass (kg DM/ha) | 2,000 |
| G | Pasture growth rate (kg DM/ha/d) | 1 kg DM/ha/day |
| 1 | Available feed (kg DM/ha/d) | |
| 2 | Number of stock units/ha | |
| 3 | Number of stock units | |

Feed budget

| | | |
|---|-------------------------------------|-------------------------|
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| G | Pasture growth rate (kg DM/ha/d) | 1 kg DM/ha/day |
| 1 | Available feed (kg DM/ha/d) | 4.9 kg DM/ha/day |
| 2 | Number of stock units/ha | |
| 3 | Number of stock units | |

1. Available feed = $\frac{(\text{start herbage 'E'} - \text{end herbage 'F'})}{\text{length of period 'B'}}$ + pasture growth rate 'G'

$$= \frac{(2,600 - 2,000)}{152 \text{ days}} + 1 = 4.9 \text{ kg DM/ha/day}$$

Feed budget

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| G | Pasture growth rate (kg DM/ha/d) | 1 kg DM/ha/day |
| 1 | Available feed (kg DM/ha/d) | 4.9 kg DM/ha/day |
| 2 | Number of stock units/ha | 0.7 head/ha |
| 3 | Number of stock units | |

$$2. \text{ Number of stock units/ha} = \frac{\text{available feed}}{\text{DSE rating 'D'}} = \frac{4.9}{7} = 0.7 \text{ head/ha}$$

Feed budget

| | | |
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| 2 | Number of stock units/ha | 0.7 head/ha |
| 3 | Number of stock units | 124 |

3. Number of stock units = number of stock units/ha x grazable area 'A'

$$= 0.7 \text{ head/ha} \times 175 \text{ ha} = 124 \text{ head}$$

Pasture assessment – Why?

- Pasture growth is the basis of the business
- Improve profitability & sustainability with adaptive management
- Take a proactive approach to optimise pasture growth & production
- Needs to be a daily management activity



Pasture monitoring

- Measure herbage mass
- Check pasture health
- Make informed decisions
- Inform the feed budget
- Inform the grazing plan



Pasture Management Checklist

PASTURE MANAGEMENT CHECKLIST

FOR THE

NORTHERN TABLELANDS OF NSW



Lewis Kahn and Judi Earl

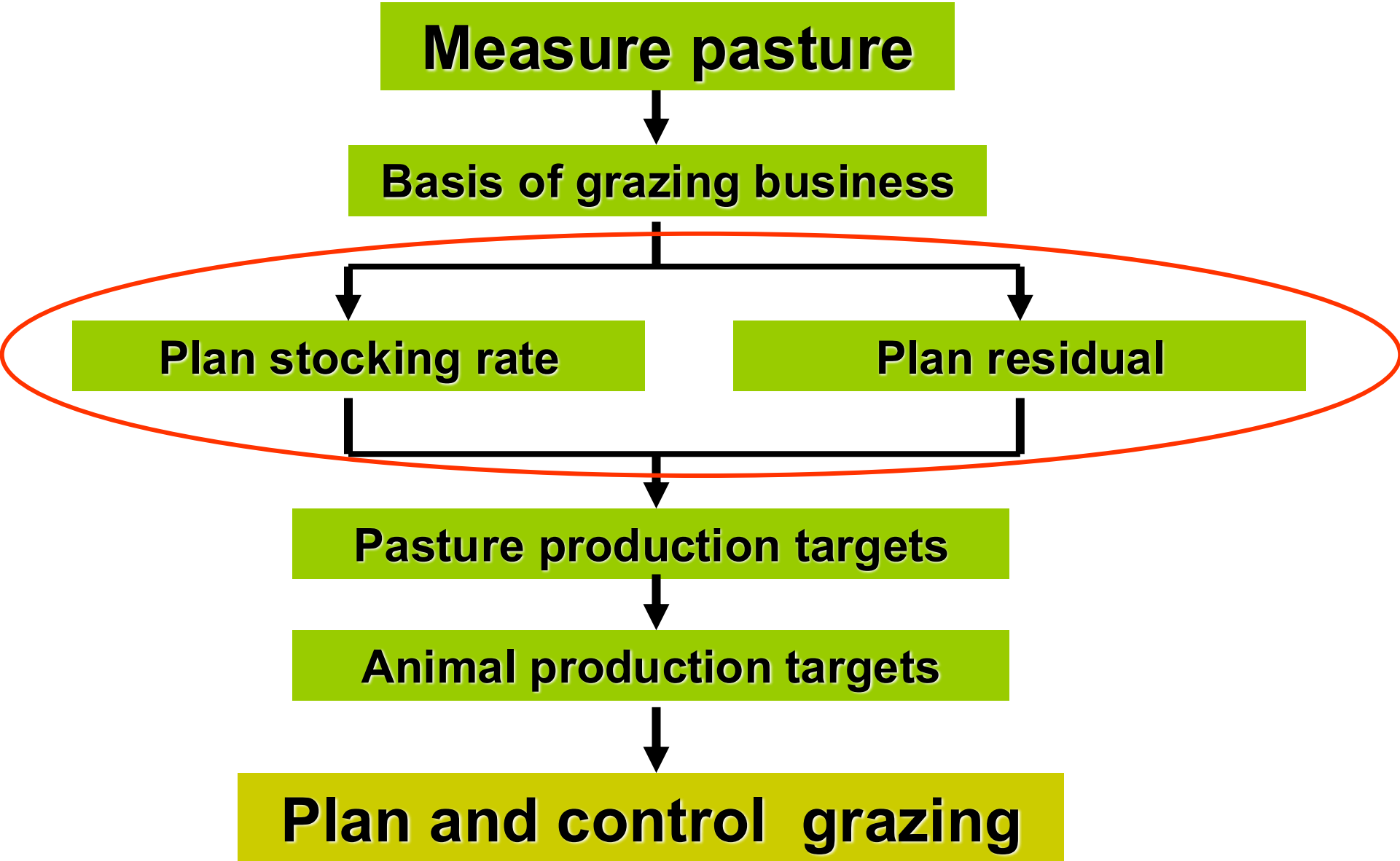
AIMS
Agricultural Information
& Monitoring Services



A 12 point checklist which enables you to quickly and effectively assess elements of the condition and productivity of your pastures.

www.aimsag.com.au/software

Document and excel file



Measure pasture

Basis of grazing business

Plan stocking rate

Plan residual

Pasture production targets

Animal production targets

Plan and control grazing

Grass Growth

**Herbage Mass
Low**

**Herbage Mass
Good to High**

**Herbage Mass
High**

**Herbage Mass
High**

Quality High

Quality High

Quality declining

Quality Low



Time



Environmental Variability

- Emphasises the need for regular monitoring
- Periodic drought is 'the norm'
- Monitoring allows for a proactive approach to changing conditions



Pasture assessment – How to

Height x weight relationship



How to estimate herbage mass

Measure pasture height in centimetres

Pasture height = 10 cm



Estimate pasture density

Very low Density = 200 kg DM/ha/cm
Ground seen through sparse pasture



Low Density = 250 kg DM/ha/cm
Ground occasionally seen through average pasture



Average Density = 300 kg DM/ha/cm
Ground not visible through average pasture



High Density = 400 kg DM/ha/cm

How to estimate herbage mass

Multiply pasture height x density



Pasture height = 10 cm



Density = 300 kg DM/ha/cm



Herbage mass = 10 x 300 = 3,000 kg DM/ha

Additional considerations

- Herbage mass – percentage edible
- Percentage green
- Groundcover
- Contribution of plant types to herbage mass
 - Perennial grasses
 - Annual grasses
 - Legumes
 - Forbs
- Diversity of desirable perennial grasses



Summary

- Managing grazing livestock appropriately regenerates land
- Inappropriate management degrades land
- Stock density is an important tool to control grazing
- Fewer mobs and more paddocks per mob
- Control utilisation and residual herbage mass
- Measure herbage mass – conduct feed budgets regularly and develop a graze plan
- Grow more – use more – leave more