Planted Pasture & Lucerne Production – Base line Data for the North West Province

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Content

Production guidelines for *Cenchrus ciliaris* Blue Buffalo grass/Fox tail buffalo grass in the North West Province

Introduction to the grass

These data are from different sources and different trials but are relatively applicable in the whole of the province. When you must decide what works best for you take the conservative route or consult with a seed consultant.

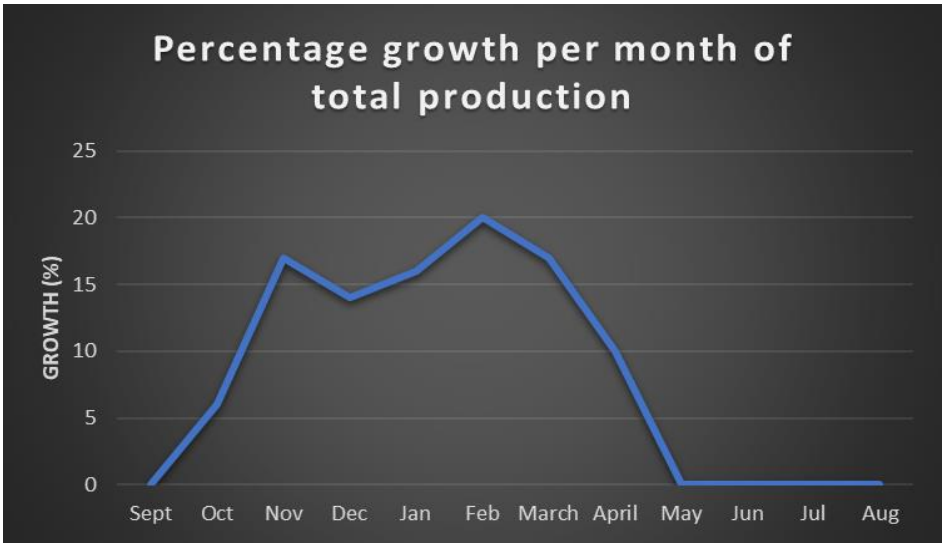
- Life span – 8 years and longer (up to 25 years)
- Perennial
- Highly productive
- Drought resistant
- Has good summer growth in warmer areas
- Sensitive to low temperatures
- Rainfall in excess of 350mm is essential
- Up to 1.5m high in growth
- Grows on all soils except very sandy soils

Production yield and carrying capacity

- Average 3-4ton/ha
- 1 cow and calf per ha with rainfall between 500 – 600mm
- 1.2LSU/ha/180days – rainfall 416mm – 537mm
- 147 to 168kg/ha meat production
- Mostly used for young growing animals and not for dry cows
- Hay yields: between 1.8 and 4.1 ton/ha with 593mm rainfall and 75kg N/ha

- With higher rainfall 12ton/ha has also been reached
- 350 - 450mm – 2.5ton DM per ha – 1.46ha/LSU/year
- 450 - 500mm – 3.5ton DM per ha – 1.04ha/LSU/year
- 500 - 600mm – 5ton DM per ha – 0.73ha/LSU/year

Percentage growth of total production per month



Month	% Growth	Month	% Growth	Month	% Growth
September	0%	**January**	16%	**May**	0%
October	6%	**February**	20%	**June**	
November	17%	**March**	17%	**July**	
December	14%	**April**	10%	**August**	

- Crude protein (CP) with fertilizer 8-12%
- CP hay = 8.12%, green material = 14.19% and foggage 4.75%
- With no fertilizer CP = 3.8%
- With 50kgN/ha CP = 4.7%
- With 100kgN/ha CP = 5.8%

Seeding rate and plant density

- Seed must be older than 9 months (12 months), to break dormancy before it is planted
- In rows of 1.5m when rainfall is lower than 500mm and 0.75m rows where rainfall is higher than 500mm
- Rows - 2 - 6kg/ha-(uncoated) and 5-8 kg/ha (coated)
- Broadcast – 4-6kg/ha
- Don't plant deeper than 5mm
- Establishment is quite difficult
- Can also be planted with root cuttings (10 -30 maize bags full per ha)

Cenchrus can be planted by the so-called Gandi applicator, wool seed planter, cotton seed attachment, hand sown and with roots.

Seed mixtures

- None

Weed control

- It is better to use a broad-spectrum herbicide on the land before planting, make sure of the days needed before planting, on the chemical label. If needed a broad leaf herbicide after establishment.

Planting time

- Spring (October to November)
- Autumn (15 January to end of February)
- Rolling soil before and after planting and sufficient soil moisture will benefit establishment

Some available cultivars

- Molopo – more drought resistant and less sensitive to cold – Dry matter production is more than Biloela and double that of Gayndah
- Gayndah – more palatable and finer leaves
- Biloela – more palatable – not generally planted in South Africa

Fertilization

Soil analysis beforehand is strongly recommended

- The pH must be more than 5.5 (water)
- Phosphate (P) before or at time of planting is essential as well as 10 – 20kg N/ha

- P must be higher than 15mg/kg (Bray 1)
- To increase the P status with 1 mg/kg you need 5Kg P/ha
- K must be 80 - 100mg/kg
- Nitrogen application can be between 40kg/ha to 100kg/ha but is very dependent on the rainfall in the area

Management

- Can withstand considerable grazing pressure however heavy defoliation intervals of less than 4 weeks will result in deterioration
- Optimum use can be achieved by moderate defoliation with short rest periods in a rotational system
- Is unpalatable when mature
- Uses:
    - Hay, if cut every 6 to 8 weeks to ensure palatability
    - Foggage – only Gayndah

Grazing

- Pasture must be cultivated (loosened) with a chisel plough once every 2 years
- With 500 mm rainfall
- 75kg N/ha = 2.0ton/ha
- 125kg N/ha = 3ton/ha
- 225Kg N/ha = 6ton/ha (700mm rain)

Irrigation

- Is occasionally irrigated

Seed production

- From 20-50kg seed/ha

Production guidelines for *Anthephora pubescens* Bottle Brush Grass in the North West Province

Introduction to the grass

These data are from different sources and different trials but are relatively applicable in the whole of the province. When you must decide what works best for you take the conservative route or consult with a seed company

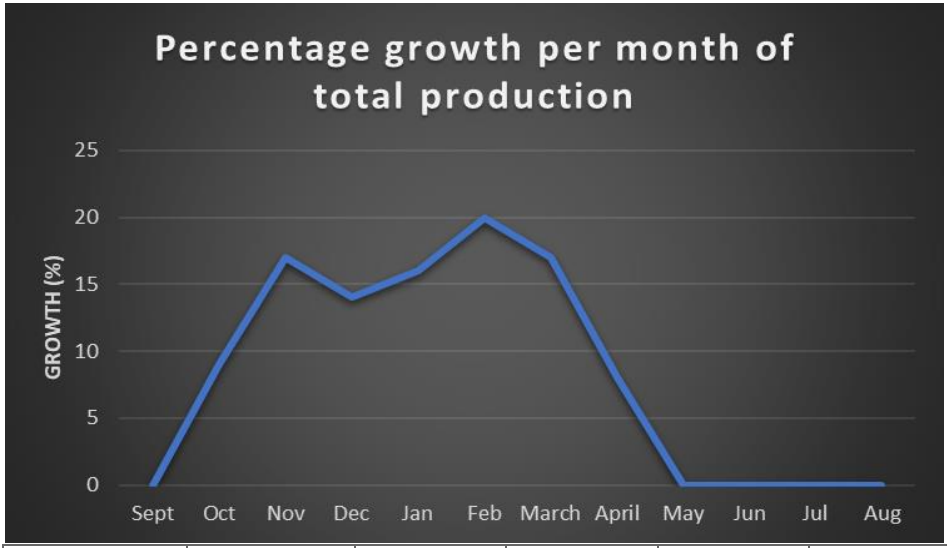
- Life span – more than 8 years
- Perennial
- Can also be planted as a cash crop
- Drought resistant, easy to establish, acceptable to animals, low sensitivity to poor soil nutrient conditions, produces a lot of seed
- Summer growing grazing
- Minimum rainfall must be 350mm up to 650mm (even 250mm)
- At rainfall above 500mm preference must be given to Smuts finger and Blue buffalo grass establishment
- Can be used effectively in the dry areas as a veld restoration crop or bare patches
- Excellent on sandy soils

Production yield and carrying capacity

- 0.75ton/ha/100mm rainfall
- 136 grazing days at 2.68 ha/LSU
- Rainfall – lower than 400mm – 1LSU per 5 to 6 ha

- Rainfall – 600mm – 1LSU per 2 to 3ha
- 2-5ha/LSU
- With no fertilizer a production of twice the veld production in the area can be expected
- 350-450mm = 2tonDM/ha = 1.82ha/LSU/year
- 450 -500mm = 3tonDM/ha = 1.22ha/LSU/year
- 0.4 - 0.5LSU/ha/180days

Percentage growth of total production per month



Month	% Growth	Month	% Growth	Month	% Growth
September	0%	**January**	16%	**May**	0%
October	9%	**February**	20%	**June**	
November	17%	**March**	17%	**July**	
December	14%	**April**	8%	**August**	

Seeding rate and plant density

- Rows - (750mm - 1500mm) – 4 - 6kg/ha (uncoated) 5 - 8kg/ha (coated)
- Broadcast – 7 - 9kg/ha

Seed mixtures

- Can be grown in a mixture with Smuts finger, Guinea grass, Rhodes, and Bottle brush (known as Potch mixture)

Weed control

- It is better to use a broad-spectrum herbicide on the land before planting, make sure of the days needed before planting, on the chemical label. If needed a broad leaf herbicide after establishment.

Planting time

- Autumn (February to end of March)
- October and November
- Rolling soil before and after planting and sufficient soil moisture will benefit establishment

Some available cultivars

- Wollie
- SSW 21
- Molopo type

Fertilization

Soil analysis beforehand is strongly recommended

- pH (KCL) is 4.8 – 5.8
- 25kg N/ha, 8kg P/ha, 50kg K/ha = 2.1ton/ha
- 75kg N/ha, 24kg P/ha, 50kg K/ha = 5.1ton/ha
- It depends on soil type and cultivar
- Depending on fertilizer 75kg N/ha (between 1-2ton/ha) and 125kg N/ha (between 2-3ton/ha)
- The Zinc content of the grass can sometimes be low

Management

- Uses:
    - Grazing
    - Foggage
    - Hay

- Bottle brush has a 33% lower production than Blue Buffalo. However, the utilization percentage is 90% which compensates for the low production
- Crude protein – summer 10-20% and winter 5-6%

Maintenance fertilization

- Rainfall lower than 500mm/year
- Fertilize 10kg N and 1kg P per ton every third year

Production fertilization

- Rainfall higher than 500mm/year
- Fertilize 10kg N and 1 kg P per ton annually
- Grazing periods from 2 – 3 weeks are recommended

Irrigation

- Not recommended

Seed production

- Can be harvested by hand or with special harvesters if done mechanically
- 10 - 40kgseed/ha

Production guidelines for *Eragrostis curvula* Weeping Love Grass/Oulandsgrass in the North West Province

Introduction to the grass

These data are from different sources and different trials but are relatively applicable in the whole of the province. When you must decide what works best for you take the conservative route or consult a seed company.

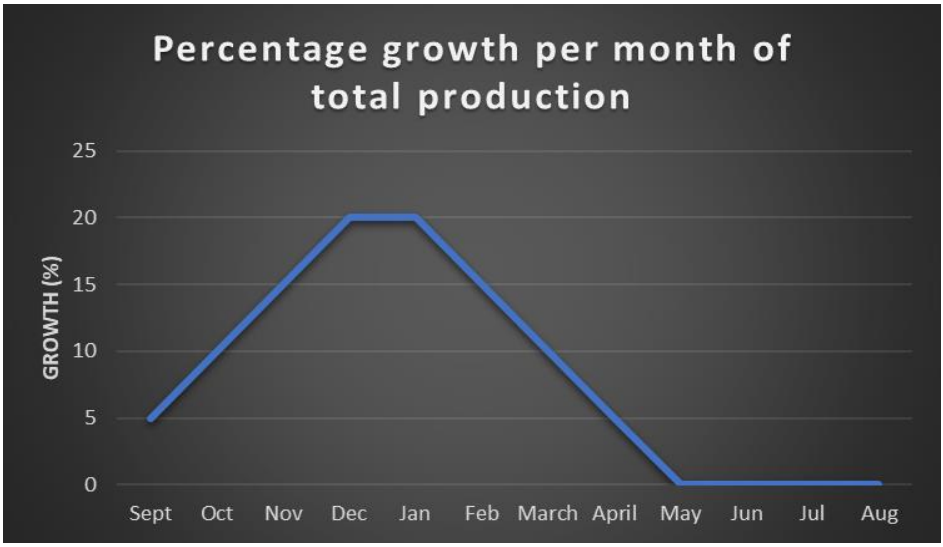
- Life span – 8 years and longer
- Perennial
- Sub climax grass on a wide range of disturbed soils
- Adapted best at rainfall of 650mm and more but does do well at 600mm
- Summer growth
- Grows best on sandy soil types but does not do well on clayey soils
- Does not tolerate prolonged water logging or alkaline soils

Production yield and carrying capacity

- 4-9 ton/ha/season = can be up to 20 ton DM/ha
- With 4 tons = grazing capacity- 0.65 lactating cows per ha and with 9 tons 1.47 lactating cows per ha
- Weaner calves 1.37 at 4ton/ha and 3.08 at 9 tons/ha
- Lambs at 8.24 at 4ton/ha and 18.54 at 9 tons/ha
- Summer: 6.6 tollies/ha ADG = 0.48kg/day - at 4 tollies/ha ADG = 0.7kg/day
- Summer: 2.1 LSU/ha (100 days) ADG = 0.4kg/ha

- Winter: tollies on hay for 194 days ADG = 0.12kg/ha
- Low fertilizer application = low quality = low production
- Grazing capacity 1.5 – 4 LSU/ha
- 4ton/ha = 0.91ha/LSU/year
- 5ton/ha = 0.73ha/LSU/year
- 6 ton/ha = 0.61ha/LSU/year

Percentage growth of total production per month



Month	% Growth	Month	% Growth	Month	% Growth
September	5%	**January**	20%	**May**	0%
October	10%	**February**	15%	**June**	
November	15%	**March**	10%	**July**	
December	20%	**April**	5%	**August**	

Seeding rate and plant density

- Broadcast – 6-8kg/ha
- Lower rainfall – in 250mm rows – 3-5kg/ha
- Don't graze during year of establishment

Seed mixtures

- Can be pure or mixed with Teff or in alternative rows with a legume (Lucerne)
- Low rainfall – broadcast - 2-4kg/ha weeping love grass and 4 -6 kg/ha Teff
- Low rainfall – rows – 2kg/ha weeping love grass and 5kg/ha Teff
- High rainfall – broadcast – 6-8kg/ha weeping love grass and 8-10kg/ha Teff
- High rainfall – rows – 3kg/ha weeping love grass and 6kg/ha Teff

Weed control

- It is better to use a broad-spectrum herbicide on the land before planting, make sure of the days needed before planting, on the chemical label. If needed a broad leaf herbicide after establishment.

Planting time

- Spring (October to November) (January)

- Sowing must cease about eight weeks before the first frost is expected
- Rolling soil before and after planting and sufficient soil moisture will benefit establishment

Some available cultivars

- Ermelo
- Agpal
- PUK E 436
- PUK E3
- PUK E40

Fertilization

Soil analysis beforehand is strongly recommended

- Can tolerate low pH
- At this stage there is no indication that Lime application is compulsory except if the pH (KCL) is less than 4.5 and the calcium and magnesium is very low
- Phosphate (P) must be 15mg/kg (Bray 1) and higher - With a legume it should be 25mg/kg
- To increase the P status with 1 mg/kg you need 5Kg P/ha K must be 100mg/kg and higher (120mg/kg)
- Most of the Nitrogen should be applied during September and October

- Splitting the N fertilizer has the advantages that the protein content and the growth rate are maintained at a relatively constant level throughout the season, and it allows for the modification of the total amount in the event of a dry or wet season.
- With 600mm rain apply 50-75kgN/ha
- With 800 mm rain apply 120-150kgN/ha
- 6.2ton/ha = 100kgN/ha, 16.6kg P/ha,
- 8.6ton/ha = 200kgN/ha, 16.6kg P/ha,
- 10.5ton/ha = 300kg N/ha, 16.6kg P/ha,
- 6.8ton/ha = 0kg P/ha
- 7.3ton/ha = 16.2kg P/ha
- 7.8ton/ha = 33,2kg P/ha
- Nitrogen is important after each cutting especially after December

Management

- One of the first grasses that can be used in spring (20 - 30 days earlier than veld)
- If fertilized well it is excellent grazing for high production animals
- It should not be left to grow out otherwise it becomes unpalatable
- Rotational grazing is recommended – 14-day grazing periods

- First graze in spring and then cut and bale it for hay purposes
- The grass must grow up to 10% flowering stage and then be cut and baled
- The grass gets a dark colour (nearly black) when the inflorescences appear
- Cut then immediately
- The baler must be adjusted to a higher level with the first cutting
- Don't cut more per day than can be cut with the available machinery
- Uses: Grazing, excellent for hay, no silage, no foggage
- Crude protein (CP) 8.5% up to 16%
- Average daily gain (ADG) 0.58 -0.65 kg per day
- Leaf stage CP =15.7%
- Pipe stage CP = 13.1%
- Flowering CP = 11.3%
- 60kg/N/ha CP = 11.3%
- 120kgN/ha CP = 15%
- 240kgN/ha CP = 19%

Fire is used to get rid of the abundant material, but it was found in research that in the long run production decreases although a cold fire in spring does not do too much damage. The grass must be allowed to grow to a height of at least

200mm before it is grazed after burning.

Irrigation

- Can be irrigated although not a general practice

Seed production

- Successful seed production depends on the following:
- Tiller forming during autumn
- N application during early spring
- The removal of surplus growth by the end of winter
- Average seed production is 100 – 250kg/ha but it can be up to 400kg/ha with enough moisture and N
- The grass can be grazed twice at a height of 100 – 150mm without seed production decreasing but then 200kg N/ha must be added in spring.

Production guidelines for *Megathyrsus maximus (Panicum maximum)* White Buffalo grass/Guinea grass in the North West Province

Introduction to the grass

These data are from different sources and different trials but are relatively applicable in the whole of the province. When you have to decide what works best for you take the conservative route or consult a seed company.

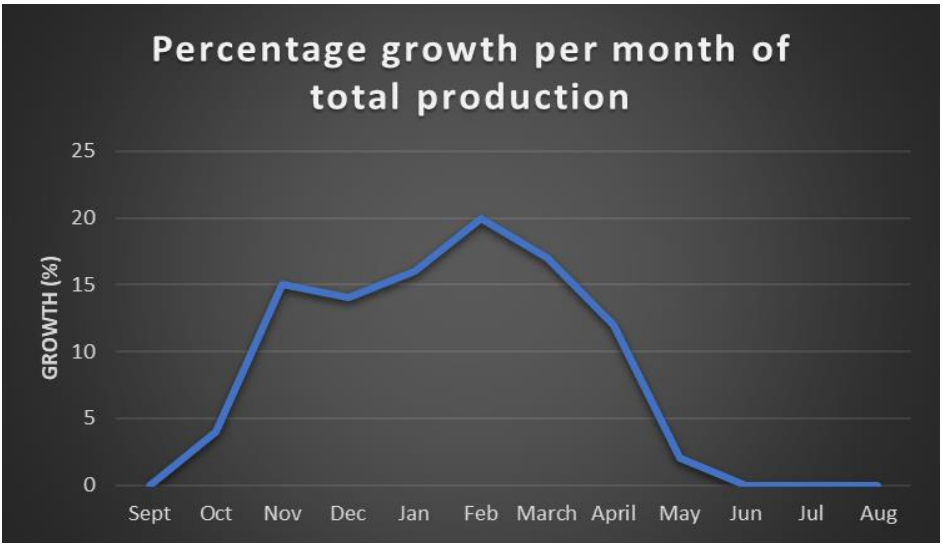
- Life span – 8 years and longer
- Perennial
- White Buffalo produces green material during spring later than Smuts finger
- White Buffalo has a long growing season
- Summer growth
- The grass likes to grow under trees and in bushes and shrubs
- Adapted at rainfall in excess of 500mm up to 1700mm
- Grows on most soil types except very sandy and very clayey soils but cannot withstand long periods of water logging
- Reacts quickly to even light rain due to the huge amounts of roots in the topsoil
- Also known as Bushveld buffalo grass

Production yield and carrying capacity

- With 75 – 150kg N/ha – 1 to 1.5 ton DM per 100mm rain

- With 650 mm rain it produces 4-12 ton/ha and can maintain 1.2 weaner calves per ha or 091ha/LSU/year with little fertilizer.
- With more than 500mm rain and 55kg N the production can be 5ton DM/ha and the grazing capacity 0.73ha/LSU/year
- With 500 – 600mm rain without fertiliser plan for 3ton DM/ha and 1.22ha/LSU/year

Percentage growth of total production per month



Month	% Growth	Month	% Growth	Month	% Growth
September	0%	**January**	16%	**May**	2%
October	4%	**February**	20%	**June**	0%
November	15%	**March**	17%	**July**	
December	14%	**April**	12%	**August**	

Seeding rate and plant density

- In rows – 0.75m to 1.5m rows – (uncoated 3 - 5kg/ha) - (coated 5 - 9kg/ha)
- On black clayey soils increase to 10kg/ha (not recommended)
- Broadcast – 6-8kg/ha
- Irrigation – 8 -10kg/ha
- Don't plant deeper than 10 to 15mm
- Don't plant seed before 18 months after harvesting

Seed mixtures

- Can be planted in mixtures with Smuts finger, Rhodes and Bottle brush grass
- Can also be planted with Lucerne

Weed control

- It is better to use a broad-spectrum herbicide on the land before planting, make sure of the days needed before

planting, on the chemical label. If needed a broad leaf herbicide after establishment.

Planting time

- Spring (October to November)
- Autumn (15 January to 15 February)
- Sowing must cease about eight weeks before the first frost is expected
- Rolling soil before and after planting and sufficient soil moisture will benefit establishment

Some available cultivars

- Green Panic (Petri)
- Gatton
- PUK P8 (relative resistant to cold)

Fertilization

Soil analysis beforehand is strongly recommended

- At this stage there is no indication that Lime application is compulsory except if the pH (KCL) is less than 4.5
- Phosphate (P) must be higher than 15mg/kg (Bray 1)
- To increase the P status with 1 mg/kg you need 5Kg P/ha

- 75 to 150kgN/ha/year is recommended
- K must be 80 - 100mg/kg
- N – 45kg N/ha/year - 4.5ton/ha/year
- 55kgN/ha/year – 5 ton/ha /year
- P 10kg P/ha every third year

Management

- Uses:
    - Hay dries relatively slow
    - Foggage dries relatively slow
    - Makes good silage if finely chopped

- Don't graze lower than 200mm (definitely not lower than 100mm) due to the growing point being higher above ground than other grasses.
- Crude protein summer 13% and higher and winter 7%
- Most of the redundant carbohydrates accumulate in the above ground growth (leaves) and are not translocated to the roots. This is different in comparison to other grasses. Short grazing during late summer is more restrictive in comparison to other grasses. Graze 14 days with a 42-day rest period.

Irrigation

- Under exceptional circumstances it can be irrigated

Seed production

- Cut off the stalks (must be long), place them straight up make sheaves and then knock out the seed – yields of between 100 and 200kg/ha are obtained
- Mechanical harvesting – 50 – 100 kg seed/ha
- From 40-60kg seed/ha

Production guidelines for *Chloris gayana* Rhodes grass in the North West Province

Introduction to the grass

These data are from different sources and different trials but are relatively applicable in the whole of the province. When you must decide what works best for you take the conservative route or consult a seed company.

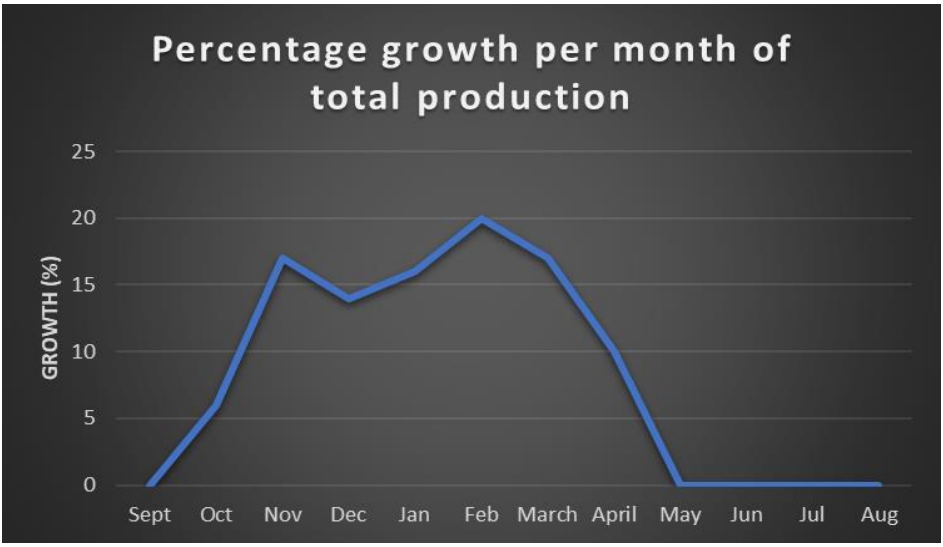
- Life span – 3 to 5 years
- Weak perennial
- When only used for hay then the life span can be up to 14 years
- Moderately drought resistant
- Minimum rainfall must be 550mm
- Good grass to combat erosion
- Ideal as rotational crop and ideal for Root-knot nematode control
- Very popular amongst tobacco and potato farmers for nematode control

Production yield and carrying capacity

- 0.5GVE/ha to 2 GVE/ha
- 75kg N/ha – 700mm rainfall – 4ton DM/ha
- 125kg N/ha – 700mm rainfall – 5.5ton DM/ha
- Up to 12 ton DM/ha with very high rainfall
- Cutting frequency 30 days rainfall 500 – 600mm Production 5.8ton/ha/year

- Cutting frequency 60 days rainfall 500 – 600mm Production 9.6ton/ha/year
- Cutting frequency 90 days rainfall 500 – 600mm Production 9.9ton/ha/year
- Rainfall – 500 – 600 mm = 5tonDM/ha = 0.73ha/LSU/year
- 600 – 675 mm = 6tonDM/ha = 0.61ha/LSU/year

Percentage growth of total production per month



Month	% Growth	Month	% Growth	Month	% Growth
September	0%	**January**	16%	**May**	0%
October	6%	**February**	20%	**June**	
November	17%	**March**	17%	**July**	
December	14%	**April**	10%	**August**	

Seeding rate and plant density

- Rows - (600 to 900 mm) – 5 – 7 kg/ha uncoated and 10 - 20kg/ha coated
- Broadcast – 8 – 12kg/ha

Seed mixtures

- Either all four or some of them in combination can be planted - Smuts finger, White buffalo, Bottlebrush with Rhodes grass – but Rhodes seed is relatively expensive. The recommended sowing rate is 1.5 to 2kg/ha of each grass.
- Medium rainfall – 0.5 to 2 kg/ha of each (Rhodes, Smuts finger, Guinea, Bottle brush)
- Low rainfall and sandy soils – 1 to 2 kg/ha of each (Smuts finger, Rhodes, Bottle brush)
- High rainfall and loamy soils – 1 to 3 kg/ha of each (Rhodes, Smuts finger Guinea grass)

Weed control

- It is better to use a broad-spectrum herbicide on the land before planting, make sure of the days needed before planting, on the chemical label. If needed a broad leaf herbicide after establishment.

Planting time

- Spring (October to November)
- Autumn (15 January to middle of March)
- Sowing must cease about eight weeks before the first frost is expected
- Rolling soil before and after planting and sufficient soil moisture will benefit establishment

Some available cultivars

- Common Rhodes grass (a mixture of all) (not independent cultivar)
- Katambora (very palatable but frost sensitive) (resistant to nematodes)
- Finecut
- Reclaimer

Fertilization

Soil analysis beforehand is strongly recommended

- At this stage there is no indication that Lime application is compulsory except if the pH (KCL) is less than 4.5. - The preferred pH is between 6 and 8
- It tends to decline in productivity when fertility is not maintained.
- Phosphate (P) must be higher than 15mg/kg (Bray 1)
- To increase the P status with 1 mg/kg you need 5Kg P/ha

K must be 120mg/kg

- For foggage 150kg per ha N can be added after cutting or grazing in the higher rainfall areas and 70kg N in the lower rainfall areas.
- 50 – 60kg N/ha can be applied in early summer
- For areas lower than 500mm/year apply 10kg N and 1kg P for every ton DM expected.
- Other areas 5 ton DM/ha = 50 kg N to 90 kg N each year and 10 kg P each third year.

Management

- Uses:
    - Grazing
    - Hay
    - Foggage

- Crude protein – summer 15-20% and winter 4-5%
- Rhodes can recover well after infrequent severe grazing, but it cannot withstand heavy grazing for extended periods, especially during autumn. The feeding value drops quickly if allowed to become rank or stemmy. Prevent the problem by slashing and making hay.

Maintenance fertilization

- Rainfall lower than 500mm/year
- Fertilize 10kg N and 1kg P per ton every third year

Production fertilization

- Rainfall higher than 500mm/year
- Fertilize 10kg N and 1 kg P per ton annually
- Grazing periods from 2 – 3 weeks are recommended

Irrigation

- Not general practice, but can be irrigated when used for hay to optimise production

Production guidelines for *Digitaria eriantha* Smuts finger grass in the North West Province

Introduction to the grass

These data are from different sources and different trials but are relatively applicable in the whole of the province. When you must decide what works best for you take the conservative route or consult a seed company.

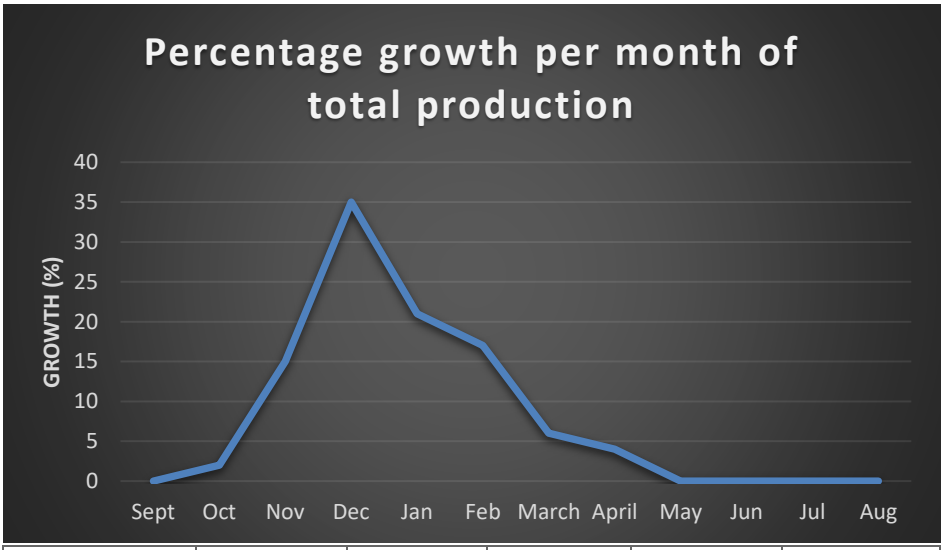
- Life span – 8 years and longer
- Perennial
- Summer growth
- 6 to 10 fingers per stem
- Basis of leaf sheaf is hairy, but the leaf blade has got little hair Adapted at rainfall in excess of 450mm
- In the medium and high rainfall areas it is prone to get encroached by Weeping love grass (*Eragrostis curvula*). Do not plant immediately on previously planted *Eragrostis* lands.
- Grows on most soil types but cannot withstand long periods of water logging

Production yield and carrying capacity

- 4 - 9 ton/ha/season
- 1.5 to 2 LSU/ha or 0.5ha to 0.7ha/LSU Without fertilizer 1.5 to 2ha/LSU
- 2ton DM/ha/year = 1.83ha/LSU/year
- 4 -5 ton DM/ha/year = 0.91 to 0,73ha/LSU/year

- Sheep = 40 weaner lambs/ha for 6 months in summer with an average daily gain of 80g/lamb
- Production from November to April in the North West was 4.7ton DM/ha with 60kgN/ha and with 100kg N/ha the production was 6.5tonDM/ha

Percentage growth of total production per month



Month	% Growth	Crude Protein	Month	% Growth	Crude Protein
September	0%	15-25%	**March**	6%	8-10%
October	2%		**April**	4%	
November	15%		**May**	0%	5-7%
December	35%		**June**		
January	21%		**July**		
February	17%		August		

Seeding rate and plant density

- In 1 meter rows – 3 - 6kg/ha- On black clayey soils increase to 10kg/ha Broadcast – 5-7kg/ha
- Don't plant deeper than 5mm
- Important is to use seed which was harvested the previous season and do not use fresh seed. The germination period should be between 40 – 50%.
- The seed is woolly and hence does not flow easily. This can be overcome by seed coating or mixed with fertilizer. However, this is not absolutely necessary, depending if one wants to add cost.

Seed mixtures

- Smuts finger can be mixed with *Chloris gayana* (Rhodes grass) – but Rhodes seed is relatively expensive. The recommended sowing rate is 2kg of Rhodes and 4kg of Smuts.

Weed control

- It is better to use a broad-spectrum herbicide on the land before planting, make sure of the days needed before planting, on the chemical label. It increases the initial production by 75%. If needed a broad leaf herbicide after establishment.

Planting time

- Spring (October to November)
- Autumn (15 January to end of February)
- Sowing must cease about eight weeks before the first frost is expected
- Rolling soil before and after planting and sufficient soil moisture will benefit establishment

Some available cultivars

- Irene
- Tip Top

Fertilization

Soil analysis beforehand is strongly recommended

- At this stage there is no indication that Lime application is compulsory except if the pH (KCL) is less than 4.5
- Phosphate (P) must be higher than 15mg/kg (Bray 1)
- To increase the P status with 1 mg/kg you need 5Kg P/ha K must be 80 - 100mg/kg
- A 20kg mixture of N, P, K can be used with planting for mixing with the seed.
- For foggage 100kg per ha N can be added after cutting or grazing in the higher rainfall areas and 70kg N in the lower rainfall areas.
- 50 – 60kg N/ha can be applied in early summer

- For areas lower than 500mm/year apply 10kg N and 1kg P for every ton DM expected.
- Other areas: 5 ton DM/ha = 50 kg N to 90 kg N each year and 10 kg P each third year.

Management

- Uses:
    - Hay dries relatively slow
    - Foggage dries relatively slow
    - Makes good silage is finely chopped

- Graze until 1 Jan – CP = 6% of the complete plant, CP = 8% of leaves Can maintain 30 sheep/ha/100days until middle August
- Graze until 1 Feb – CP = 9% of the complete plant, CP = 10% of leaves Can maintain 18 sheep/ha/100days until middle August
- Graze until 1 Mar – CP = 9% of the complete plant, CP = 17% of leaves Can maintain 16 sheep/ha/100days until middle August
- Grazing periods 2 weeks With 500 mm rainfall 75kg N/ha = 2.7ton/ha 125kg N/ha = 3ton/ha 225Kg N/ha = 3.5ton/ha
- Don't graze lower than 50mm
- Resting period of 30 -60 days is enough

Irrigation

- Not normal practice

Seed production

- Cut off the stalks (must be long), place them straight up make sheaves and then knock out the seed – yields of between 100 and 200kg/ha are obtained
- Mechanical harvesting – 50 – 100 kg seed/ha From 20-50kg seed/ha

Production guidelines for *Lolium multiflorum* Rye grass in the North West Province

Introduction to the grass

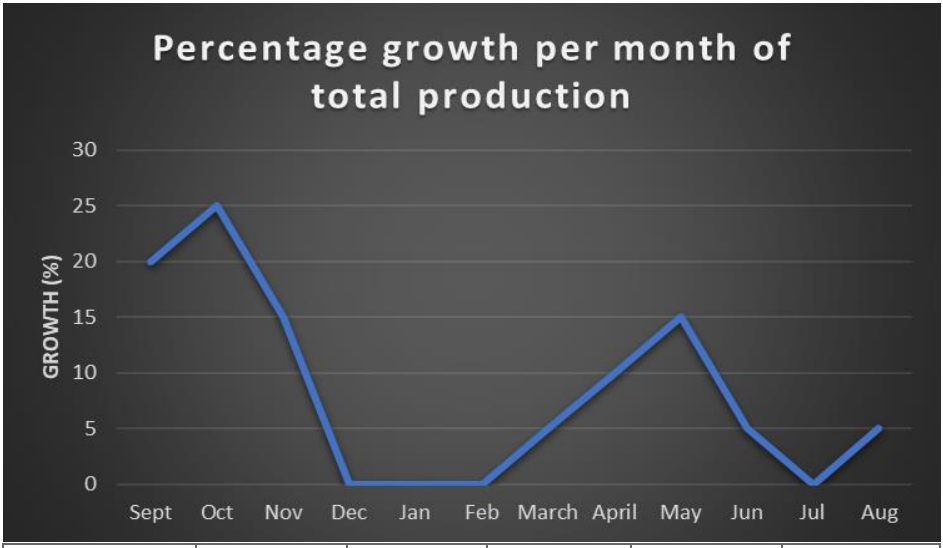
These data are from different sources and different trials but are relatively applicable in the whole of the province. When you must decide what works best for you take the conservative route or consult a seed company.

To be cultivated on sufficiently drained, fertile and irrigated soils.

Production yield – ton/ha/season

- 8 – 12 ton/ha (can be up to 18 ton/ha in certain areas)
- 270 kg N/ha gives 12 ton/ha production and a grazing capacity of 4.8LSU/ha/8months
- 320 kg N/ha gives 14 ton/ha production and a grazing capacity of 5.7LSU/ha/8months
- 360 kg N/ha gives 16 ton/ha production and a grazing capacity of 6.4LSU/ha/8months

Percentage growth of total production per month



Month	% Growth	Crude Protein	Month	% Growth	Crude Protein
September	20%	14-18%	**March**	5%	20-26%
October	25%	8-12%	**April**	10%	
November	15%		**May**	15%	
December	0%	N/A	**June**	5%	
January			**July**	0%	14-18%
February			**August**	5%	

Seeding rate and plant density

- Under irrigation broadcast– 25 -40 kg/ha (lastly especially for tetraploids)

Planting time

- Italian cultivars can be planted as either an autumn planting – February to April or
- Spring planting - August to September, after frost
- Westerwold cultivars only to be planted as an autumn planting, during February to April

Weed control

- It is better to use a broad-spectrum herbicide on the land before planting, make sure of the days needed before planting, on the chemical label. If needed a broad leaf herbicide after establishment.

Cultivars

- Italian cultivars need a cold inductive period before they will flower. Italian cultivars planted in autumn produce early winter feed, but production declines during the colder months. Produces best dry matter during spring. Italian cultivars established in spring (August – September), have a high production during spring, autumn and the next spring.
- Westerwold cultivars are triggered by day and night lengths, stimulating flowering and seed production. Good production during autumn and early winter.

- Within each Ryegrass are grouped into diploids and tetraploids. Plants from diploids are hardier than tetraploids, while tetraploids have bigger seed, grow taller, have darker, broader and more palatable leaves than the diploids.

Fertilization

Soil analysis beforehand is compulsory

Lime

- Calcium analysis must be 350mg/kg (sandy soils) and 750mg/kg (clay)
- Magnesium must be added when the analysis is less than 60mg/kg
- pH must be above 4.5 (KCL)
- Acid saturation must preferably be less than 10% but can be up to 25%
- With establishment phosphate must be more than 20mg/kg (Bray 1) and potassium must be 120mg/kg

Nitrogen and phosphorus

- Enough N and water are very IMPORTANT
- Nitrogen must be divided into 3-4 applications
- 300kg LAN/ha (130kg N) before planting or before 4 leaf stage
- Or 350 – 450kg N/ha/season

- Or 1070kg LAN/ha (460kg N) over a season
- Or 250kg LAN/ha (108kg N) after every 2nd grazing
- Or 35 – 45kg N/ha after every grazing

Management

- Uses:
    - Hay (Specific cultivars and difficult practice)
    - Foggage
    - Silage – too risky
    - Grazing for 240 days and rest for 25-30 days - 5 days in spring and 14 days in winter. Graze 2-3 hours per day times 2 - After grazing cycle let grow to 20cm in height

- When grazed supply dry hay (roughage) to avoid runny stomach
- Growth of tollies - 890g/day
- Growth of heifers – 645g/day

Irrigation

- 1400 – 1600mm /annum (rainfall included)

- Water can be added at the following rates:

Month	mm/week	Month	mm/week
August	20	**February**	20
September	40-50	**March**	
October		**April**	
November		**May**	
December	17	**June**	7
January	20	**July**	
• Average 20 -25mm/week • Rain in excess of 12mm can be calculated as 60% effective			

Perennial Rye grass (*Lolium perenne)*

- Most of these cultivars do not produce for longer than 3 years so it might be more viable to establish an annual rye grass every year. The pasture must be strengthened every year with 7-10kg seed/ha.
- Slow to establish
- No Nitrogen during summer months
- Yield from 10 -23 ton dry matter/ha during first year
- Please consult with local seed merchant for information on suitability and availability of the different cultivars in your area.

Production guidelines for *Medicago sativa* Lucerne/Alfalfa in the North West Province

Introduction to Lucerne

These data are from different sources and different trials but are relatively applicable in the whole of the province. When you must decide what works best for you take the conservative route or consult with a seed company.

General

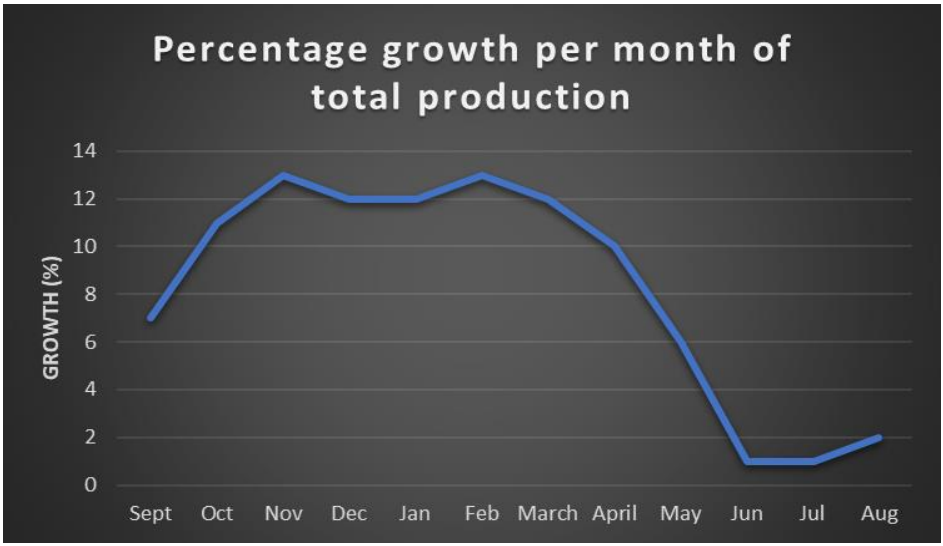
Lucerne is not freely recommended in this Province under dry land conditions because the rainfall is too low and erratic. However, depending on rainfall yield will vary between 3.5 - 5.5ton/ha. Most of the recommendations in this manual are thus for Lucerne under irrigation.

- Lucerne has a deep taproot (up to 1.5m)
- It fixes nitrogen at 150 – 250kg N/ha/annum
- Lucerne is of high quality (18 -20% protein content) but has low energy levels
- It has a dual purpose (Hay/silage/grazing)
- Lucerne can be expensive to produce if not managed well
- Susceptible to waterlogging – don't over irrigate
- Growth rate 2.5cm/day at 27 degrees Celsius and 10 degrees minimum

Production yield – ton/ha/season

- 10-30 ton/ha/season (even 40) depending on cultivar, soil fertility, utilization frequency and environmental conditions
- Rule of thumb – 120 ton over the life span of 6 years
- Hotter areas produce more per hectare than cooler areas especially under irrigation
- Total dry matter yield (ton/ha) = 1.794 x average maximum January temperature minus 37.1

Percentage growth of total production per month



Month	% Growth	Month	% Growth	Month	% Growth
September	7%	**January**	12%	**May**	6%
October	11%	**February**	13%	**June**	1%
November	13%	**March**	12%	**July**	1%
December	12%	**April**	10%	**August**	2%

Seeding rate and plant density

- Under irrigation broadcast– 25 (even 35kg/ha) flood irrigation needs more seed than sprinkler irrigation
- Dry land – (3 – 6kg/ha)
- Can be uncoated or coated for easier establishment
- Depth of planting (sandy soils 0.5-1 cm) (clayey soils 1-2 cm)
- Planting density 60-90 plants/m^2
- Plant density cannot be improved after planting. The number of tillers per plant can compensate up to a certain point for poor plant density.
- Seed must be inoculated with *Rhizobium* bacteria before planting at 500g inoculant for every 25kg seed. Plant one day after inoculation

Planting time

- Spring (August to September) after frost

- Autumn (March to May) to allow 6 weeks of growth before frost arrives

Weed control

- It is better to use a broad-spectrum herbicide on the land before planting, make sure of the days needed before planting, on the chemical label. If needed a broad leaf herbicide after establishment.

Some available cultivars

- Dormancy – varies from strong dormant in winter (no growth) to winter active or non –dormant (grows during winter)
- In South Africa we use dormancy classes from 5 to 9 (5 is more winter dormant than 9) 5=semi-dormant, 6+7 = intermediate dormant, 8 = non-dormant, 9 strong not dormant:
    - Grazing – more dormant types
    - Hay – more non-dormant (crowns are high above ground)
- Most cultivars cannot withstand continuous defoliation whether by grazing or cutting without letting it grow to full flowering once a year.

- Please consult with local seed merchant for information on suitability and availability of the different cultivars in your area.

Fertilization

Soil analysis beforehand is compulsory

Lime

- Calcium analysis must be 350mg/kg (sandy soils) and 750mg/kg (clay) – Can even be up to 2000mg/kg
- Magnesium must be added when the analysis is less than 60mg/kg
- pH must be between 5.5 and 6.5 (KCL)
- Lucerne is sensitive to high Al content (acid saturation must be minimal =0)
- If yield is below 30ton/ha no nitrogen is needed
- If yield is above 30ton/ha 10-20kg N/ha can be added after each harvest

Amount of nutrients that are removed when harvested (cut)

Quality of hay	N/ha	P/kg soil	K/kg soil
Good	51 kg	5.2 mg	36.3 mg
Average	33 kg	2.5 mg	24.6 mg
Poor	19 kg	1 mg	13.2 mg

- Calcium removed 13 - 15kg/ton
- Magnesium removed 2.7 – 3 kg/ton
- Sulphur removed 2.5 – 2.7 kg/ton

- To produce 1 ton DM uses 21kg K, 13kg Ca, 2,7kg Mg, 2.7kg P, 2.7kg S and 25-30kg N
- With establishment phosphate must be 30-40mg/kg (Bray 1) and potassium must be 120-150mg/kg
- With seasonal application – use removal rates (both macro and micronutrients)
- A guideline is 3kg P added per ton Dry matter removed, every 2 years during spring (use superphosphate for the sulphur needs). For potassium apply 200g KCL during spring and then especially for hay production again in summer.
- Boron and Molybdenum are both very important. For Mo (should not be a problem if the pH is correct) - apply 200g/ha Sodium molybdite (enough for a few years). Alternatively, molybdenum trioxide can be mixed with the seed at 150g/25 kg seed
- For Boron apply 1 kg B/ha on light soils and up to 3kg B/ha on clay soils
- If grazed 40% of the Phosphate is put back via dung and urine and 90% of the potassium is put back (recycled) – The difference must be added via fertiliser

- Yield 12ton DM/ha/year needs 20kg P/ha/year and 100kg K/ha/year
- 20 ton DM/ha/year needs 33 kg P/ha /year and 150kg K/ha/year

Management

- Uses:
    - Hay (Specific cultivars)
    - Grazing (be careful of bloat and nitrate poisoning – can use Hypo in the drinking water)
    - Silage (mix chopped Lucerne with grain sorghum or maize)

- Bloat (suffocation of animals) - add 5% flowers of sulphur into lick. Alternatively cut it with a hammer mill, load on a trailer and let it sweat and only feed then. Merinos have less problems with bloat. All other sheep and cattle are prone to bloat.
- When harvested don't cut shorter than 7.5cm
- Harvest when new growth is 1-3cm (usually when flowering is at 10%) (30 -40 days after previous harvest)
- Don't graze during winter without autumn or spring rest
- Grazing periods of 5 to 7 days per camp are recommended
- Grazing pressure must be 100 to 150 small stock units (SSU)/ha or 17 – 25 large stock units (LSU) per ha

Irrigation

- 1400 – 1600mm /annum (rainfall included)
- It must be weighed against yield and water costs
- The average water scheduling figures (mm per 7days or 14 days) for Lucerne per month are as follows:

Month	mm	Frequency (days)	Month	mm	Frequency (days)
August	28	14	February	38	7
September	24	7	March	27	
October	38		April	32	14
November	44		May	21	
December	45		June	23	
January	42		July	15	
• Rainfall in excess of 12mm can be calculated as 60% effective					

Insects and diseases

- Cultivars resistant against flees and diseases are recommended
- Leaf spot and rust can be problematic
- Root and crown diseases are the most important that could occur
- Stem eelworm, green Lucerne caterpillar and American bollworm can occur

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