



Matching pasture production to livestock enterprises –

**North West Plains
Central West Plains
Riverine Plain (South West Plains)
of NSW**

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Warren McDonald, formerly Technical
Specialist (Pastures), Tamworth**

This publication contains both estimates of the daily growth rate of pastures and selected forage crops, as well as a guide to selecting pasture and forage crop types for enterprises requiring high livestock growth rates. The estimates presented are approximations only and intended only as a guide to assist producers in budgeting feed supply to meet livestock requirements.

Estimates are of the median growth rate and are based on available research results and growth predictions from 'GrassGro' (a growth model developed by CSIRO using soil moisture, temperature, light and pasture species growth characteristics and modified using long-term observations by experienced agronomists and livestock officers where appropriate). This approach has been adopted as it is inappropriate to base growth rates solely on limited research data given the climatic variability and the relatively short period over which research results are collected. It is anticipated that these guidelines will be updated as further information comes to hand.

Presented growth curves are 'smoothed' with variability reduced to facilitate use.

Information presented is based on a locality representative of the region. These estimates must be modified for specific situations by taking into account factors that affect growth e.g. rainfall, soil and elevation, and how they differ from the area for which estimates are needed. Growing conditions vary greatly between seasons, between regions, districts and indeed between parts of paddocks. Reference to the section covering variability is strongly advised.

Where more accurate estimates of growth are needed, you are referred to tools such as



'GrassGro'. The suitability of the model is subject to parameter sets of species characteristics in the model matching the pasture type involved.

ASSUMPTIONS

Pastures are of satisfactory density for the area, growing on a soil of good moisture holding capacity (e.g. clay loam), grazed at moderate stocking pressure, well managed and fertilised adequately (except where specified) to avoid nutrient deficiencies. It is assumed that pasture is maintained in the vegetative phase of growth where possible. Pastures are grown under rainfed conditions unless specified otherwise.

Climatic and soil type data used in 'GrassGro' were from:

North West Plains: Narrabri on a medium to heavy clay

Central West Plains: Trangie on a red medium clay

Riverine Plain (South West Plains): Leeton on a transitional red brown earth

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ESTIMATES OF DAILY GROWTH RATE OF PASTURES

NORTH WEST PLAINS

Description of pasture types used in estimates

Native grass /annual legume: Dominated by summer active grasses such as Mitchell grass, Queensland bluegrass, native millet, significant quantities of burr medic, woolly burr medic and winter growing forbs (e.g. emufoot, bindweed, tar vine) and with a minor quantity of barley grass, button grass.

Moderate grazing pressure only. No fertiliser unless with previous cropping activity. Soil P and S levels moderate only.

Tropical grass/annual legume/lucerne: Mixture of bambatsi panic, purple pigeon grass, and Katambora rhodes grass at least 2 years-old with a significant amount of burr medic depending on seasonal conditions and grazing management. Minor but useful lucerne content. Managed at low to moderate stocking rates. No fertiliser applied since sowing. Soil P and S levels moderate only.

Medic dominant: The main species present is burr medic but also a range of winter growing grasses (e.g. barley grass) and forbs and

occasionally other winter growing medics (woolly burr medic, cut-leaf medic, barrel medic). A low presence of perennial grasses, but a small presence of summer growing annual grasses. No fertiliser applied except in previous cropping program. Moderate stocking pressure. Soil P and S levels moderate only.

Winter active lucerne: At least 2 years-old winter active aphid and root rot tolerant variety, sown under a crop of wheat at 2 kg/ha with fertiliser as for the crop. Moderate stocking rate. A flexible grazing system (not a rigid rotation) with rest periods provided as far as practical. No fertiliser since sowing. Minor invasion of winter growing weeds such as barley grass, medic, and some summer growing annual grasses (button grass, lovegrass). Soil P and S levels moderate only.

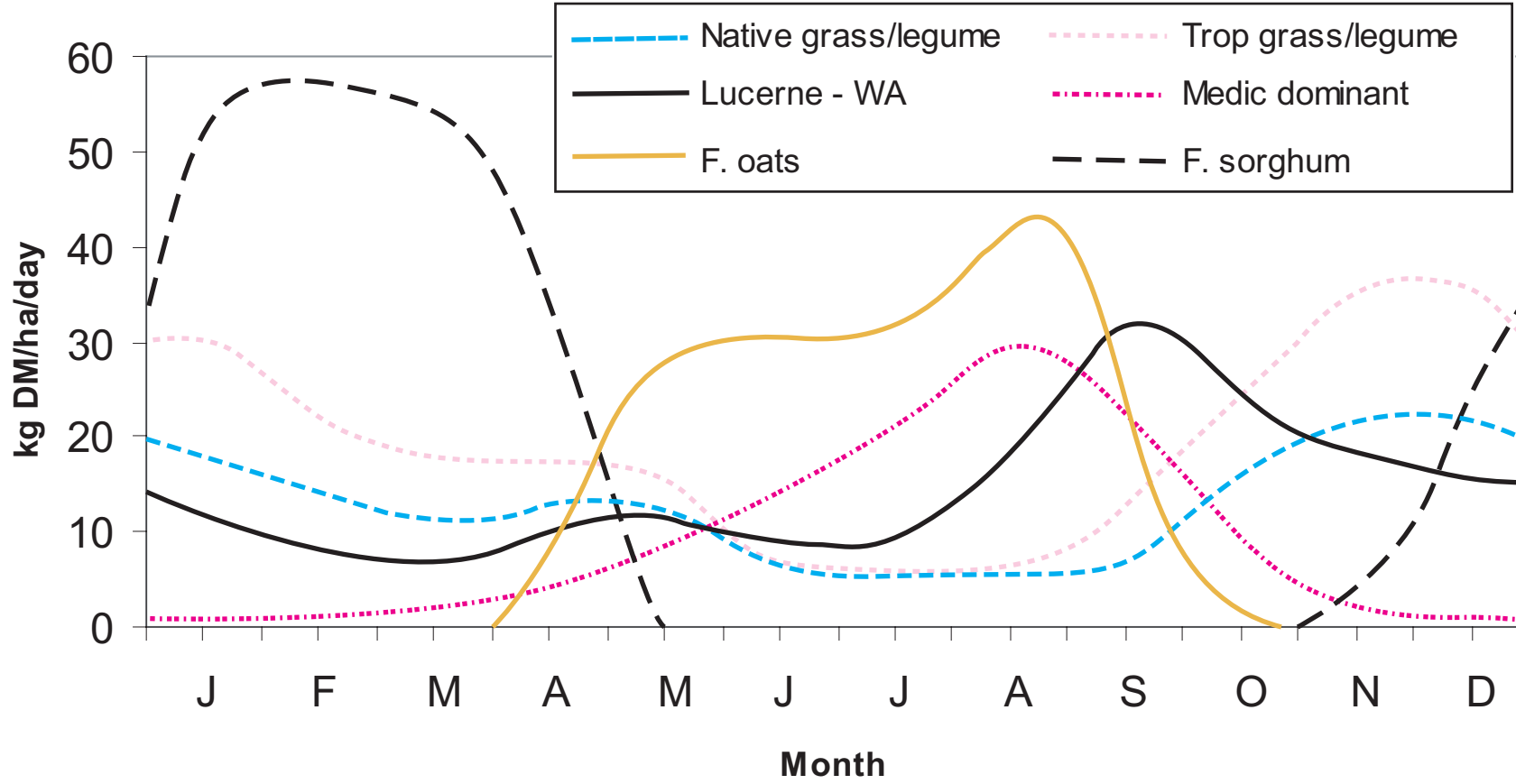
Forage oats: Sown as a dual purpose crop in late March and grazed intensively from May to July. Grain harvested occasionally where potential exists, otherwise crops grazed. No additional fertiliser applied after sowing.

Forage sorghum: Hybrid forage sorghum sown in late October. Paddocks intensively grazed with moderate stocking rate. Feed kept in vegetative stage. Sown with a starter fertiliser with no follow up application.

Table 1. Estimated pasture growth rate (mid month) of specific pasture types (kg DM/ha/day)

	J	F	M	A	M	J	J	A	S	O	N	D
Lucerne – winter active	12	8	7	10	11	8	8	19	32	24	18	15
Medic based dominant	1	2	2	5	10	17	25	37	31	14	2	1
Native grass/and legume	18	14	11	13	12	6	5	5	7	16	22	22
Forage oats	0	0	0	8	28	31	32	42	27	2	0	0
Forage sorghum	33	57	54	34	0	0	0	0	0	0	45	24
Tropical grass/ annual legume/lucerne	30	22	17	17	15	6	6	6	12	24	35	35

Estimated Pasture Growth Rate – NW Plains Cropping Belt



CENTRAL WEST PLAINS

Description of pasture types used in estimates

Lucerne – winter active: A winter active variety (e.g. Aurora), sown under last wheat crop with additional fertiliser, and lasting about 4–5 years. Fertility moderate only with P/S levels just adequate. Grazing management is a flexible rotation, at moderate stocking pressure. There is some invasion of annual weeds (20%) such as barley grass and ryegrass, with broadleaf weeds such as saffron thistle and Paterson’s curse.

Native grass: Low to medium density native perennial grasses (50%) consisting of species such as curly windmill grass, wallaby grass, windmill grass, spear grass, corkscrew grass, plains grass, neverfail grass, summer grass, with a large proportion of naturalised annual medic (when seasons permit), annual grasses and broadleaf weeds. P and S levels are low to moderate – never top-dressed. May have been cropped sometime in the past, and pasture volunteered since. Largely, moderate stocking with occasional rest periods.

Annual legume based pasture: Sown under last crop to species such as barrel medic. Producing pasture from autumn through to spring. Annual weeds up to 25% of composition consisting of barley grass, saffron thistle, Paterson’s curse in winter/spring. Additional fertiliser is added with

the last crop. Fertility generally moderate only with nil or very little top dressing of P and S. Stocking pressure moderate only with occasional rest periods. Volunteer summer growing annuals present but not included in accompanying graphic as growth is sporadic and unreliable in this area especially in the south of the region.

Oats: Sown as a dual purpose crop in early April at 40 kg/ha, on short fallow moisture with adequate P, S and N fertiliser. No further top dressing during growth. Grazed intensively from mid May to late July.

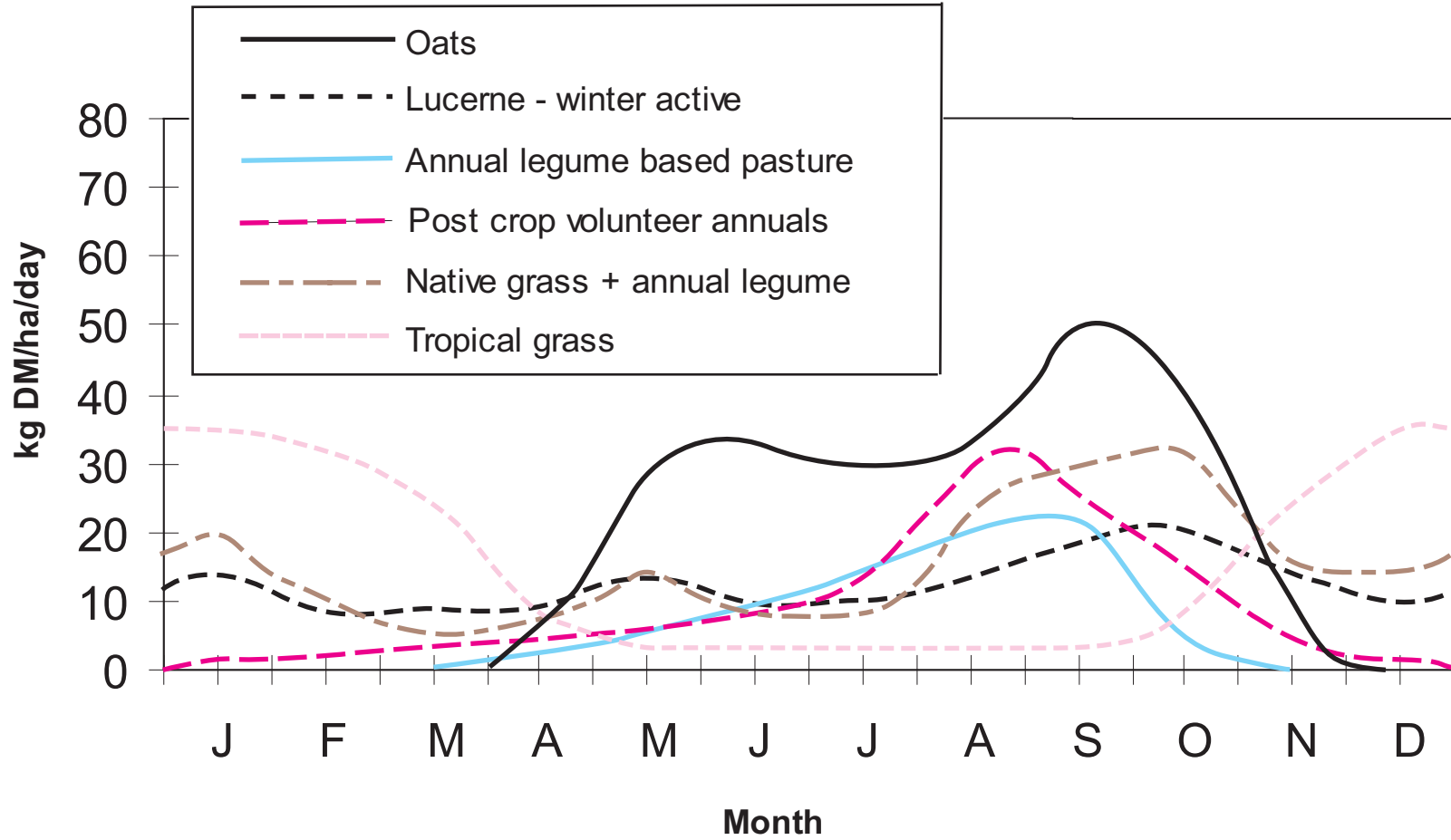
Post-crop volunteer annuals: Volunteer annual grass dominant paddock with up to 10% perennial species. Cropped in the past. Barley grass, some ryegrass and up to 20% vulpia and 20% broadleaf weeds are present such as Paterson’s curse and saffron thistle. Some summer growth but extremely variable in this region. No fertiliser applied, since cropping phase. Low to moderate fertility country. Stocked at moderate pressure with long periods of grazing with occasional rests.

Tropical grass: Consisting of a mix of Bambatsi panic, purple pigeon grass and Katambora rhodes grass with less than 5% legume present. Moderate fertility with little or no top dressing. Moderate stocking pressure with long periods of grazing and occasional rests. Applicable to northern half of region only.

Table 2. Estimated pasture growth rate (mid month) of specific pasture types (kg DM/ha/day)

	J	F	M	A	M	J	J	A	S	O	N	D
Lucerne – winter active	13	9	9	9	14	11	10	13	19	21	14	10
Native grass + legume	20	10	5	7	14	8	8	23	30	31	16	14
Annual legume based pasture	0	0	0	2	5	9	14	20	22	5	0	0
Oats	0	0	0	0	23	32	30	33	50	40	10	0
Post-crop volunteer annuals	1	2	3	4	6	8	13	29	25	15	4	2
Tropical grass	35	32	24	9	3	3	3	3	3	8	24	35

Estimated Pasture Growth Rate – Central West Plains Cropping Belt



RIVERINE PLAIN (SOUTH WEST PLAINS)

Description of pasture types used in estimates

Dryland pastures

Annual pasture: Consisting of sub clover and invaded by significant annual ryegrass, barley grass, some vulpia and broadleafed weeds. The sub clover is the major species present during winter and spring, with moderate amounts of annual ryegrass and barley grass, with high amounts of broadleaf weeds. Grazing pressure is moderate with substantial periods of set stocking. P and S fertiliser is applied when the pasture is undersown and maintenance levels are below optimum for top production. Weed control using herbicides – occasional to moderate use.

Lucerne - semi-dormant: The lucerne is sown under the last crop of the rotation at 1–3 kg/ha. P and S fertiliser is applied at the equivalent of 125 kg/ha of superphosphate every 2 years.

Grazing pressure is moderate with stock being grazed on a flexible rotation system. (Winter active varieties are used by a moderate proportion of producers, but semi dormant varieties dominate).

Lucerne/sub clover: A similar pasture to the pasture above, except that it is sown with an additional 3–5 kg/ha of sub clover under a cover crop. Fertiliser is applied for maintenance as above. Grazing management less rigid than with the pure lucerne pasture, however paddocks are intermittently spelled to enhance lucerne persistence.

Oats: Oats is sown as a dual purpose crop in early April. It is sown into moderately fertile soil or better. A compound fertiliser is used at sowing, supplying adequate P, S and N for good crop growth. Nitrogenous fertiliser is applied to boost grazing yields in winter.

Irrigated pastures

Annual ryegrass/sub clover: High producing pasture, sown with late maturing sub clover at 10 kg/ha with 250 kg/ha of superphosphate or equivalent and maintained with 125 kg/ha of single superphosphate or equivalent. Pasture is intensively utilised at 20–24 dry sheep equivalents/ha when established. First irrigated in early March with irrigation extending through until early October. At lower levels of input, production is significantly lower.

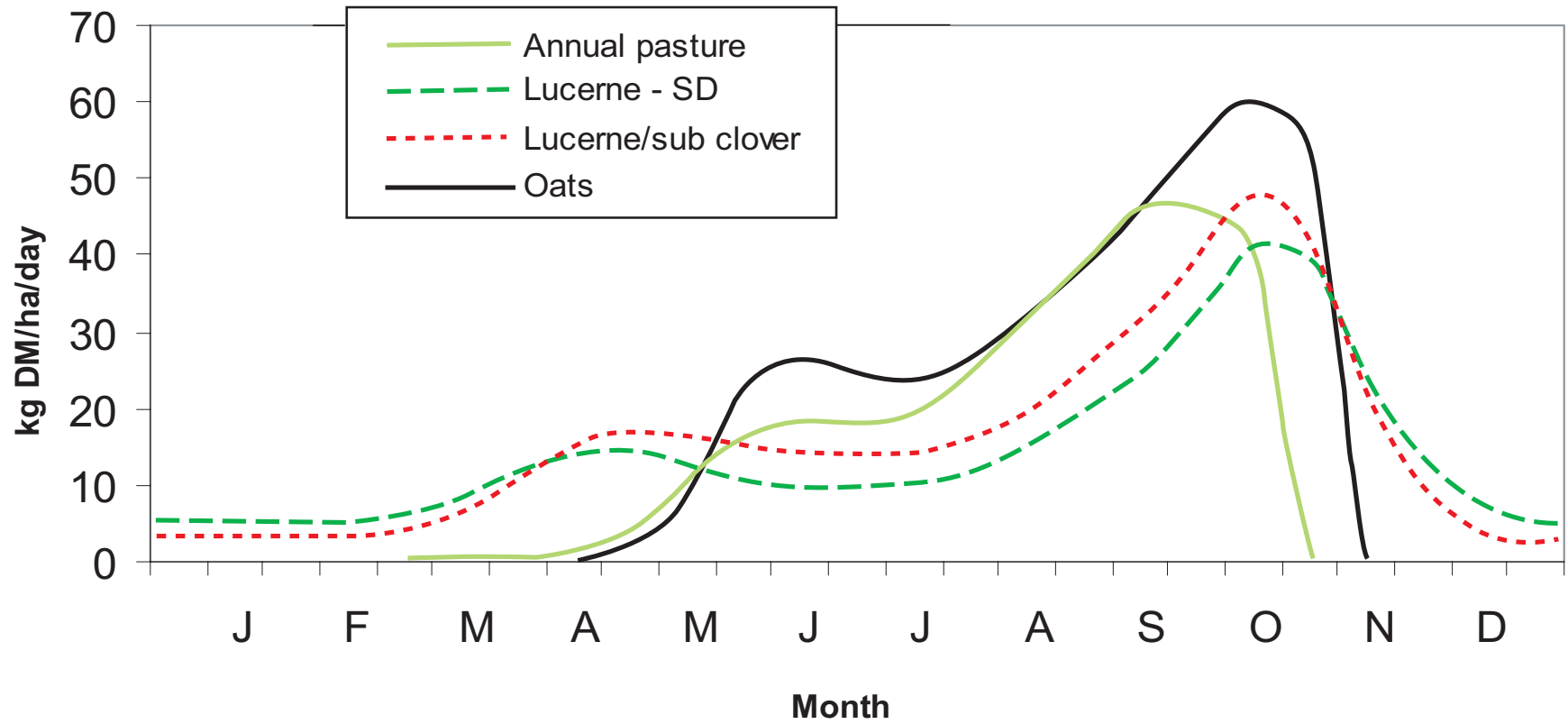
Lucerne: Sown in autumn with a winter active variety with good pest and disease resistance into moderately fertile alluvial soils. This pasture is well managed and grazed on good rotational grazing principles at high utilisation levels. Pests and weeds are controlled, and fertiliser is applied to address any deficiencies. Water scheduling management at moderate to high standard.

Paspalum/White clover: High producing well managed perennial pasture dominated by paspalum with up to 20 percent white clover. Irrigation commences at the end of October, continuing through until late February to early March. Grazing management is intensive with feed maintained short and leafy. Fertiliser is applied at 250 kg/ha of superphosphate or equivalent.

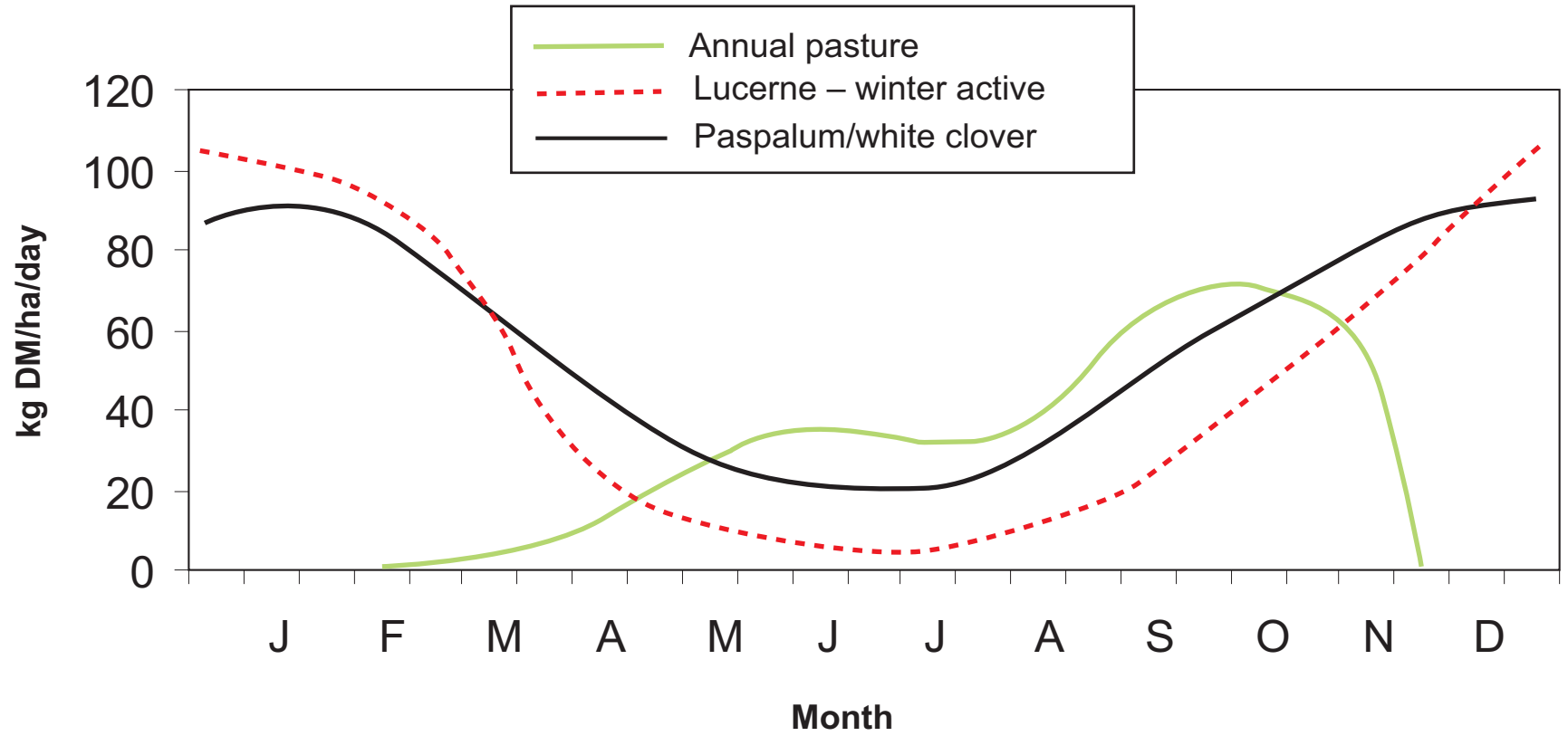
Table 3. Estimated pasture growth rate (mid month) of specific pasture types (kg DM/ha/day)

	J	F	M	A	M	J	J	A	S	O	N	D
Dryland pastures												
Lucerne – semi dormant	5	5	8	14	13	10	10	14	24	42	23	7
Lucerne/sub clover	3	3	6	15	16	14	14	19	31	48	21	4
Forage oats	0	0	0	0	8	27	24	32	46	60	0	0
Annual pasture	0	0	0	1	10	18	19	32	46	40	0	0
Irrigated pastures												
Lucerne – Winter active	90	83	62	44	27	20	20	27	49	66	82	90
Annual pasture	0	0	3	12	25	36	30	37	65	70	54	0
Paspalum/white clover	101	93	66	23	11	6	6	11	23	44	66	93

Estimated Pasture Growth Rate, Riverine Plain Cropping Zone – Dryland



Estimated Pasture Growth Rates Riverine Plain – Irrigated



GUIDE TO PASTURES AND FORAGE CROPS FOR HIGH LIVE WEIGHT GAIN IN CATTLE

Feed Plans

Estimates made on the likely availability of feed of adequate quality have been made on the basis of,

a) Pastures are grown in suitable soils and are well adapted to that environment.

b) Pastures are well managed for both the good of the pasture and the livestock enterprise. This may involve spelling pastures for 6–8 weeks to accumulate adequate quantity of feed to supply enterprise requirements. Pastures are also maintained in the vegetative growth phase so that quality is at a high level. (This is especially relevant with summer growing grass species).

c) Quality feed in the context of these plans means feed on offer having a digestibility of 70% or better, and means a ‘mixed’ pasture with a good balance of legumes present.

d) Plans do not infer that this is only one paddock of a particular pasture type i.e. one may be grazed while others are rested to enable availability to be improved to meet livestock requirements.




e) The estimates are intended as a guide only to assist in selection of appropriate pasture types to suit the enterprise targets. The variability in production is large and is covered in the variability section.

f) The quantity of feed available will depend on the growth rate of the pasture, fertility, stocking rate, rate of wastage, and previous management of the pasture. These estimates only indicate that in any particular half month period the pasture type is capable of having feed on offer of adequate quantity and quality to suit requirements in average seasonal conditions. Additionally, potential production may be greater than that indicated, given exceptional management and/or favourable aspects of pasture production. Similarly, production can be less than that indicated, especially if management is less than accepted ‘best practice’.

A guide to pastures and forage crops capable of achieving 75% of maximum liveweight gain* given best practice management of pastures and livestock. - Estimates of likely availability of quality feed - North West Plains Cropping Belt

Pastures	JAN JAN	FEB FEB	MAR MAR	APR APR	MAY MAY	JUN JUN	JUL JUL	AUG AUG	SEP SEP	OCT OCT	NOV NOV	DEC DEC
Trop grass/ann legume/luc	High quality	High quality	High quality	High quality	High quality	High quality	High quality	High quality	High quality	High quality	High quality	High quality
Native grass/ann legume	Feed inadequate	Feed inadequate	Feed inadequate	Feed inadequate	Feed inadequate	High quality	High quality	High quality	High quality	High quality	High quality	High quality
Lucerne (winter active)	High quality	High quality	High quality	High quality	High quality	High quality	High quality	High quality	High quality	High quality	High quality	High quality
Ann medic based pasture	Feed inadequate	Feed inadequate	Feed inadequate	Feed inadequate	High quality	High quality	High quality	High quality	High quality	High quality	High quality	High quality
Forage Crops												
Millet (Sown Sept-Jan)	High quality	High quality	High quality	High quality	High quality	High quality	High quality	High quality	High quality	High quality	High quality	High quality
Forage Oats (Sown March)	Feed inadequate	Feed inadequate	Feed inadequate	Feed inadequate	High quality	High quality	High quality	High quality	High quality	High quality	High quality	High quality
Cowpeas(Sown Oct -Dec)	High quality	High quality	High quality	High quality	High quality	High quality	High quality	High quality	High quality	High quality	High quality	High quality
F.sorghum (Sown Oct-Dec)	Feed inadequate	Feed inadequate	Feed inadequate	High quality	High quality	High quality	High quality	High quality	High quality	High quality	High quality	High quality
Lab lab (Sown Oct-Dec)	Feed inadequate	Feed inadequate	Feed inadequate	High quality	High quality	High quality	High quality	High quality	High quality	High quality	High quality	High quality

Key:

-  High quality sheep and cattle feed, capable of achieving at least 75% of potential liveweight gain
-  Feed inadequate in quality and or quantity to reliably provide for high growth rates in either sheep or cattle
-  High quality sheep feed, capable of achieving at least 75% of potential liveweight gain.

Note: These estimates are provided by agronomists and livestock officers as an aid to pasture selection and represent the likely production from these feed sources in average years, given the feeds are grown in appropriate soils and are well managed. Adjustments will need to be made in most situations to cover the many variables involved in pasture production. Months are represented by two half months i.e. JAN JAN.

* See Segment 2 of PROGRAZE manual for benchmarks on feed availability requirements for various levels of liveweight gain.

**A guide to pastures and forage crops capable of achieving 75% of maximum liveweight gain* given best practice management of pastures and livestock. Estimates of likely availability of quality feed
- Central West Plains Cropping Belt**

Pastures	JAN JAN	FEB FEB	MAR MAR	APR APR	MAY MAY	JUN JUN	JUL JUL	AUG AUG	SEP SEP	OCT OCT	NOV NOV	DEC DEC
Trop grass	■	■								■	■	■
Native grass/ann leg						■	■	■	■		■	■
Lucerne (winter active)	■	■	■	■	■	■	■	■	■	■	■	■
Post Crop Vol. Ann spec.						■	■	■	■		■	■
Ann legume based past			■	■	■	■	■	■	■			
Cereal stubble/weeds						■	■	■	■			
Forage Crops												
Japanese/ shirhoe millet	■											■
Oats (full grazing)April sown					■	■	■	■	■			
Cowpeas		■	■	■	■							
High density legumes							■	■	■	■		
Hyb for.sorghum/sudan	■	■	■	■	■							
Lab lab	■	■	■	■	■							

Key:

- High quality sheep and cattle feed, capable of achieving at least 75% of potential liveweight gain
- ▨ High quality sheep feed, capable of achieving at least 75% of potential liveweight gain
- Feed inadequate in quality and or quantity to reliably provide for high growth rates in either sheep or cattle

Note: These estimates are provided by agronomists and livestock officers as an aid to pasture selection and represent the likely production from these feed sources in average years, given the feeds are grown in appropriate soils and are well managed. Adjustments will need to be made in most situations to cover the many variables involved in pasture production. Months are represented by two half months i.e. JAN JAN.

* See Segment 2 of PROGRAZE manual for benchmarks on feed availability requirements for various levels of liveweight gain.

**A guide to pastures and forage crops capable of achieving at least 75% of maximum liveweight gain* given best practice management of pastures and livestock - Estimates of likely availability of quality feed
- Riverine Plain (South West Plains) Cropping Belt**

Dryland Pastures	JAN JAN	FEB FEB	MAR MAR	APR APR	MAY MAY	JUN JUN	JUL JUL	AUG AUG	SEP SEP	OCT OCT	NOV NOV	DEC DEC
Lucerne - semi dormant			///	///	///	■	■	///	///	■	■	///
Annual grass/sub clover					■	///	///	///	■		///	
Lucerne/sub clover			///	///	■	///	///	///	■		///	
Forage Crops												
Oats (grain recovery)					■	■	■	■	■			
Irrigated Pastures												
Lucerne - winter active	■	■	■	■	■	■	■	■	■	■	■	■
Annual pasture				///	///						///	///
Paspalum/White clover	■	■	■	///	///	■	■	■	///	///	■	■
Key:	<p>High quality sheep and cattle feed, capable of achieving at least 75% of potential liveweight gain</p> <p>High quality sheep feed, capable of achieving at least 75% of potential liveweight gain,</p> <p>Feed inadequate in quality and or quantity to reliably provide for high growth rates in either sheep or cattle</p> <p>Note: These estimates are provided by agronomists and livestock officers as an aid to pasture selection and represent the likely production from these feed sources in average years, given the feeds are grown in appropriate soils and are well managed. Adjustments will need to be made in most situations to cover the many variables involved in pasture production. Months are represented by two half months i.e. JAN JAN.</p> <p>* See Segment 2 of PROGRAZE manual for benchmarks on feed availability requirements for various levels of liveweight gain.</p>											

VARIABILITY IN FEED PRODUCTION

Important factors affecting reliability of feed production

The variability in pasture production on the plains can be very large and for this reason, it is wise to consider all important variables that may affect pasture production in a paddock.

The more important factors to consider are:

Climate

This is the most important variable to consider for the plains in western NSW. The variability of occurrence of rainfall events and the effectiveness of rainfall in those falls to drive pasture growth is particularly important.

To get an idea of the extent that climate can affect pasture production, the growth model used to assist in producing the rainfed pasture curves elsewhere in this publication can also give an indication of how much variation occurred in the past based on historical climatic data. Responsive species have been used to gauge the variability in the 4 seasons and the median, 10, and 90 percentiles, have been used to indicate the likely variability in good and poor conditions relative to the median. Variability can of course exceed these predictions in droughts and years of excessive rainfall.

Geographic location

The growing conditions within these geographic areas can be very significant. Generally growing conditions are more favourable in the east than they are to the west, which is drier with less reliable rainfall.

North to South differences can also be significant with summer dominance in rainfall increasing to the north.

Soil type

The daily growth curves presented assume a soil type that has good moisture holding capacity (e.g. clay loam).

On lighter textured soils (e.g. granites) the pasture production will be much less as soil dries out more rapidly reducing pasture production potential. On the positive side, lighter soils respond quicker following rain than do heavier soils.

Grazing management

Pasture production estimates assume that pastures are in the vegetative phase of growth, stocked at moderate grazing pressure and well managed.

Overstocking and inappropriate grazing management for the species concerned may greatly affect the ability of the pasture to reach its full potential. Alternatively, correct management can greatly enhance the probability of the pasture reaching its full potential.

Pastures that have been grazed hard in the months beforehand may have inadequate leaf area to produce to maximum potential. Similarly, lax grazing will result in low potential for growth rate

Soil fertility/fertiliser use

Soil deficiencies especially nitrogen, phosphorus, sulfur, potassium and molybdenum, can greatly affect the potential of the pasture to produce. Similarly, low pH may have an adverse affect depending on the species in the mixture. Nutrient deficiencies can affect not only the overall production but also the reliability of production, seasonal production, botanical composition and quality of feed produced.

Pasture quality

Pasture quality is also very variable along with production quantity.

In the growth curves presented, quality will not be uniform throughout the year from any one species. For example, in spring, growth will tend to be lower quality than in autumn because of the greater proportion of stem than leaf produced. This factor is extremely important with summer growing grasses when they are in the reproduction phase.

Other factors

A large range of other factors may influence the potential of a pasture to reach its full potential. In some instances, these minor factors can cause a devastating reduction in the reliability of feed supply.

Factors include pasture species adaptability, weeds, pests, diseases, aspect, waterlogging, salinity.

If in doubt about the extent of the potential reduction in pasture production due to any of the above mentioned factors consult your district agronomist.

Note: The wide variation in pasture growth that occurs between years needs to be remembered. For example, the computer growth model used to provide growth rate information on pastures indicates the following variability in seasonal production based on using sub clover as an indicator of a winter growing species and a native

grass as an indicator plant for summer growing species and using the average, 10, and 90 percentiles, to indicate the likely variability compared to the median. Seasonal growth could vary as indicated in Table 4.

Table 4. The variability in seasonal production from responsive pastures as predicted by GrassGro, based on long term rainfall records for the localities and soil types specified.

	Good growing conditions	Poor growing conditions
North West Plains		
Spring	99 per cent above	86 per cent below
Summer	158 per cent above	90 per cent below
Autumn	215 per cent above	88 per cent below
Winter	128 per cent above	97 per cent below
Central West Plains		
Spring	105 per cent above	76 per cent below
Summer	130 per cent above	98 per cent below
Autumn	79 per cent above	89 per cent below
Winter	100 per cent above	91 per cent below
Riverine Plain		
Spring	93 per cent above	93 per cent below
Summer	157 per cent above	92 per cent below
Autumn	175 per cent above	81 per cent below
Winter	61 per cent above	32 per cent below

CONTRIBUTORS

The following agronomists and livestock specialists have contributed to the information presented for the respective areas.

North West Plains: W McDonald, Technical Specialist (Pastures) Tamworth; T Launder, Senior Research Agronomist, Taree (formerly Research Agronomist, Narrabri); D Alcock, Livestock Officer (Sheep and Wool), Cooma; A Bell, Technical Specialist (Grazing Systems), Tamworth; S Murray, Goddard Agricultural Services P/L, Narrabri, R Anderson, Moree ; G Avendano, Narrabri; G Esdaile, formerly University of Sydney, Moree; B Clarke, District Agronomist Casino; L Serafin, District Agronomist, Gunnedah; C Cole, Program Leader (Central farming Systems); A Bowman, Program Leader (Southern Farming Systems); R Everleigh, former District Agronomist, Narrabri; C Burchell, former District Agronomist at Moree; and G Rummery, former District Agronomist, Walgett.

Central West Plains: W McDonald, Technical Specialist, (Pastures), Tamworth; D Alcock, Livestock Officer (Sheep and Wool), Cooma; A Bell, Technical Specialist (Grazing Systems), Tamworth; A Bowman, Program Leader (Farming Systems), Wagga Wagga; R Hacker, Program Leader (Rangelands), Trangie; Robert Thompson, District Agronomist, West Wyalong; L Roesner, Research Agronomist, Condobolin; P Milthorpe, Research Agronomist, Condobolin; P Lukins, former District Agronomist, Condobolin; Leigh Jenkins, District Agronomist, Warren; G Orman, Agronomist, Elders Ltd, Trangie; W Smith, Technical Officer, Warren; C Mullen, District Agronomist, Dubbo; G Brooke, District Agronomist, Nyngan; N Ferguson, former District Agronomist, Coonamble and S Exton, Livestock Officer (Beef Cattle), Wagga Wagga.

Riverine Plain (South West Plains): W McDonald, Technical Specialist (Pastures) Tamworth; D Alcock, Livestock Officer (Sheep and Wool), Cooma; A Bell, Technical Specialist (Grazing Systems), Tamworth; C Langford, Livestock Officer (Sheep and Wool) Goulburn; M Lattimore, District Agronomist, Yanco; A Storrie, Agronomist (Weeds), Tamworth; J Read, Program Leader (Pastures), Orange; P Witchi, formerly Director, Elizabeth Macarthur Agricultural Institute, Menangle; J Fowler, agricultural consultant, Deniliquin and W Booth, agricultural consultant, Hay.

FURTHER READING

PROGRAZE manual. NSW Agriculture

DISCLAIMER

The information contained in this publication is based on knowledge and understanding at the time of writing (January 2004). However, because of advances in knowledge, users are reminded of the need to ensure that information upon which they rely is up to date and to check currency of the information with the appropriate officer of the New South Wales Agriculture or the user's independent advisor.

Note

Pasture improvement may be associated with an increase in the incidence of certain livestock health disorders. Livestock and production losses from some disorders are possible. Management may need to be modified to minimise risk. Consult your veterinarian or adviser when planning pasture improvement.

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