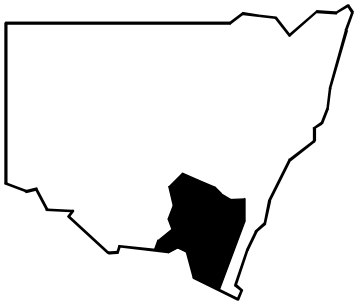
NSW Agriculture

agnote

ISSN 1034-6848

Matching pasture production to livestock enterprises

Southern Tablelands and South West Slopes



Agnote DPI 213
First Edition, July 1998
Warren McDonald
Technical Specialist (Pastures)
Tamworth
Division of Plant Industries

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.

Estimates are of the median growth rate, and are based on available research results, growth predictions from the 'Growest' model, (a simple growth model using soil moisture, temperature and light) and from long term observations by experienced agronomists and livestock officers. This approach has been adopted as it is inappropriate to base growth rates solely on research data given the climatic variability and the relatively short period over which research results are collected.

Growing conditions vary greatly between seasons, between regions, districts and indeed between parts of paddocks. The estimates presented are therefore **approximations only and intended only as a guide** to assist producers in budgeting feed supply to meet livestock requirements.

It is anticipated that as further information comes to hand that these guidelines will be updated. Feedback is most welcome.
In the future, improved models such as 'GrassGro' (currently being developed by CSIRO) will provide more accurate estimates.

Producers are advised when using these estimates that large variability in the reliability of feed supply occurs and reference to the section covering variability is strongly advised. Presented growth curves are 'smoothed' with variability reduced to facilitate use.

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. Pasture is assumed to be maintained in the active phase of growth at all times.

Climatic data used in the 'Growest' model was Canberra 1967–91 (Southern Tablelands); Wagga 1965–91 (South West Slopes).

CONTENTS

ESTIMATES OF DAILY GROWTH RATE OF PASTURES

SOUTHERN TABLELANDS

Description of pasture types used in estimates

Introduced perennial grasses with maintenance fertiliser.
Older established perennial pasture consisting of approximately 30% introduced perennial grasses (e.g. phalaris), 20% native perennial grasses, 20% annual clover, 20% annual grasses, and 10% weeds. pH 4.5-5.0, fertilised occasionally.

High quality native grasses with maintenance fertiliser.
Better native grasses (Microlaena and Danthonia) making up 50-60% of pasture with 25-30% clover and 10-20% annual grasses, pH 4.0-5.0, fertilised occasionally.

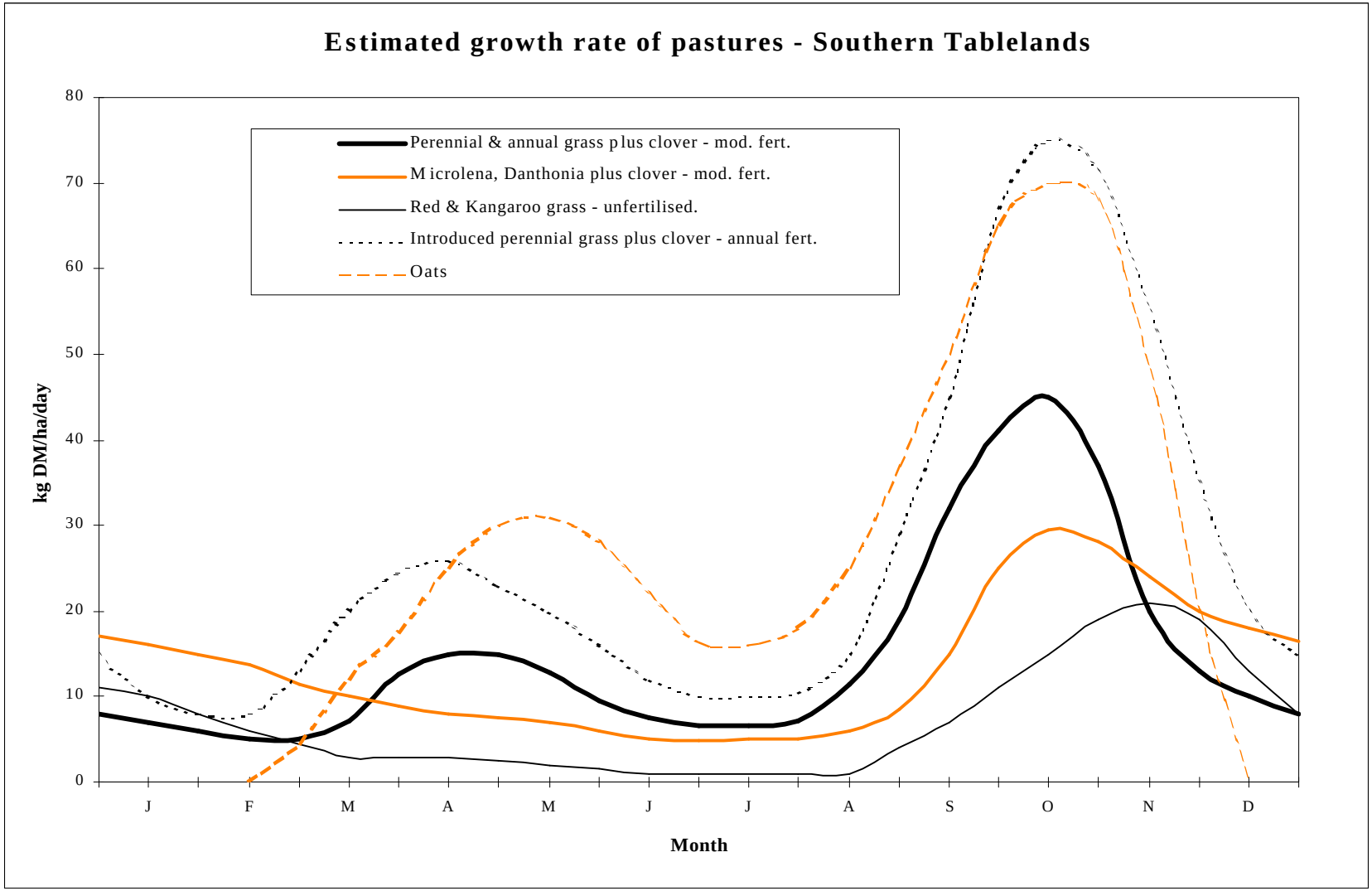
Low quality native grass-unfertilised.
Frost sensitive native grasses like Stipa, Poa, Kangaroo and Red grass with less than 5% clover. pH usually 4.0-5.0, and not fertilised.

Introduced perennial grass - well managed
Well adapted perennial grasses for the area with a good balance of grass and clover. Fertiliser application and management optimum for good production.

Grazing oats
Suitable variety sown early February with adequate fertility for good growth.

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

	J	F	M	A	M	J	J	A	S	O	N	D
Introduced perennial grass – maintenance fertiliser	7	5	7	15	13	8	7	12	32	45	20	10
High quality native perennial grass – maintenance fertiliser	16	14	10	8	7	5	5	6	15	30	24	18
Low quality native perennial grass - unfertilised	10	6	3	3	2	1	1	1	7	15	21	13
Introduced perennial grass – well managed	10	8	20	26	20	12	10	15	45	75	55	20
Oats	0	0	12	25	31	22	16	25	50	70	48	0


Estimated growth rate of pastures - Southern Tablelands
Perennial & annual grass plus clover - mod. fert.
Microlena, Danthonia plus clover - mod. fert.
Red & Kangaroo grass - unfertilised.
Introduced perennial grass plus clover - annual fert.
Oats
kg DM/ha/day
0
10
20
30
40
50
60
70
80
J
F
M
A
M
J
J
A
S
O
N
D
Month

SOUTH WEST SLOPES

Description of pasture types used in estimates

Phalaris/sub clover
Good balance of phalaris and sub clover (at least 20%), with lesser quantities of annual grass/weeds. Soils of moderate fertility, and fertiliser occasionally applied at maintenance levels only.

Cocksfoot/sub clover
Cocksfoot and clover (at least 20%) in good balance with some minor quantities of annual grasses/weeds. Soils low-mod, fertility status and fertiliser occasionally applied to maintenance levels only.

Lucerne/sub clover
Dense pasture of lucerne (greater than 60%) and sub clover (greater than 15%), with very little annual grass or weeds present. Fertiliser occasionally applied to maintenance levels only. Lucerne variety is winter active (e.g. Aurora).

Annual grass/sub clover
Mainly consisting of ryegrass, barley grass, vulpia and sub clover (clover content at least 20%). Moderate to good fertility soils with fertiliser applied occasionally.

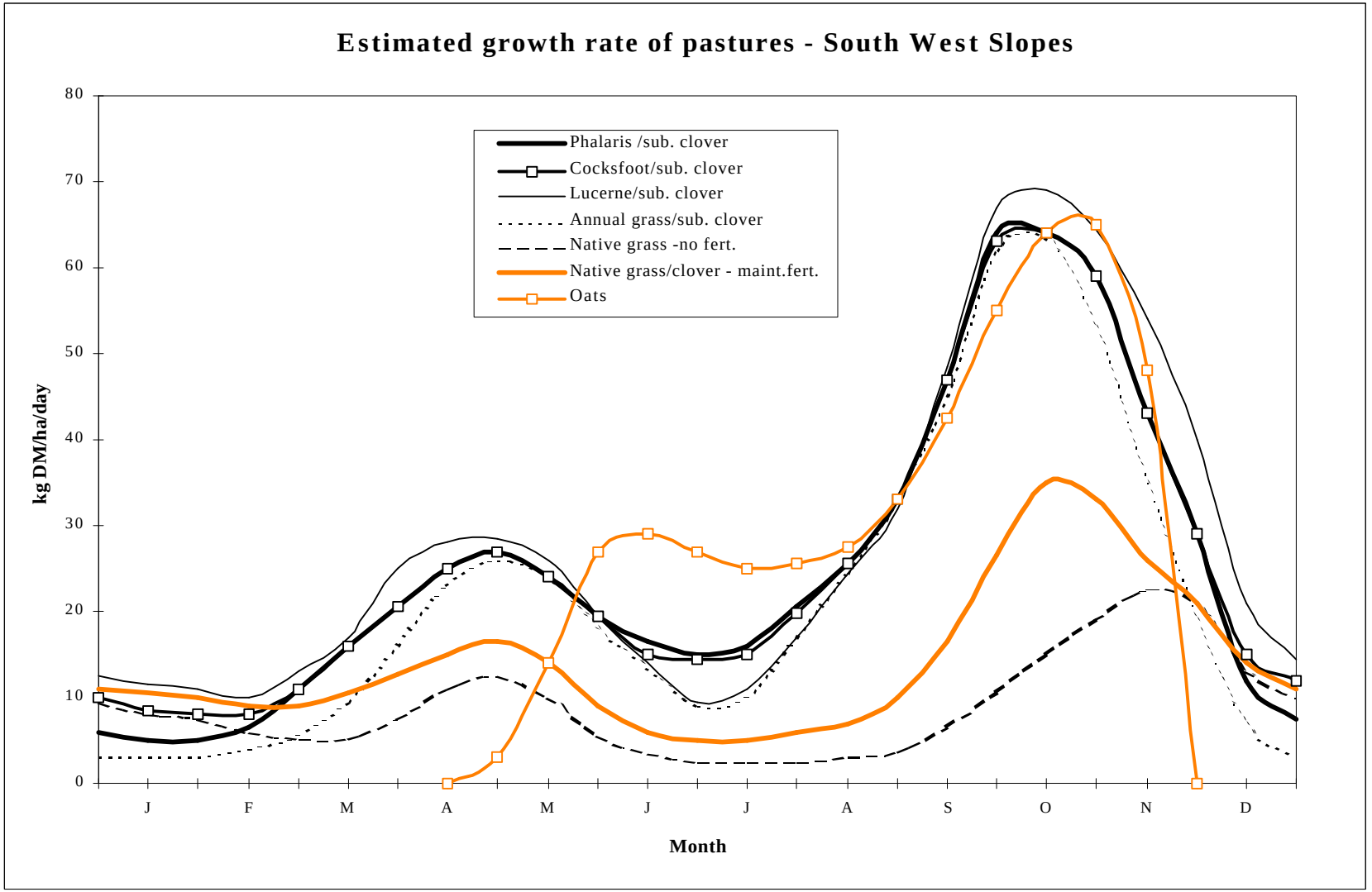
Native grass-no fertiliser.
Typical frost sensitive native perennial grass (e.g. redgrass), with small amounts of clover. No fertiliser applied for many years, if at all.

Native grass/clover-maintenance fertiliser.
Mainly native frost sensitive perennials with moderate amounts of sub clover present (at least 20% in winter spring period). Maintenance fertiliser applied occasionally.

Oats
Early sown grazing/grain recovery variety, either for closing up for grain in late August or grazing through. Good fertility soil with adequate fertiliser applied.

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

	J	F	M	A	M	J	J	A	S	O	N	D
Phalaris/sub clover	5	7	16	25	24	17	16	26	47	64	43	12
Cocksfoot/sub clover	9	8	16	25	24	17	16	26	47	64	43	15
Lucerne/sub clover	12	10	17	28	26	14	11	25	49	69	54	21
Annual grass/sub clover	3	4	10	23	24	14	10	25	45	64	35	7
Native grass – no fertiliser	8	6	5	11	10	4	3	3	7	15	23	13
Native grass – maintenance fertiliser	11	9	11	15	14	14	10	7	17	35	26	14
Oats	0	0	0	0	14	29	25	28	43	64	48	0


Estimated growth rate of pastures - South West Slopes
kg DM/ha/day
80
70
60
50
40
30
20
10
0
J
F
M
A
M
J
J
A
S
O
N
D
Month
Phalaris /sub. clover
Cocksfoot/sub. clover
Lucerne/sub. clover
Annual grass/sub. clover
Native grass -no fert.
Native grass/clover - maint.fert.
Oats

GUIDE TO PASTURES FOR HIGH LIVEWEIGHT GAIN IN SHEEP AND CATTLE

Feed Plans

Estimates for likely availability of feed of adequate quality are based on:

a) Pastures are grown in suitable soils etc. 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 say up to two months to accumulate adequate feed to supply enterprise requirements. Pastures are also maintained in the active growth phase so that quality is at a high level. (This is especially relevant with summer growing species such as forage sorghums etc.).

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 legume 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 enterprise targets. The variability in production is large and is covered in the variability section.

f) The quantity of feed available will be dependent on the growth rate of the pasture, 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 at least 75% of maximum liveweight gain* given best practice management of pastures and livestock

SOUTHERN TABLELANDS

Key

High quality sheep and cattle feed capable of achieving at least 75% of potential liveweight gain

High quality sheep feed capable of achieving 75% of potential liveweight gain

Feed inadequate in quality and/or quantity to reliably provide for high growth rates in either sheep or cattle

Pasture	**JAN**		**FEB**		**MAR**		**APR**		**MAY**		**JUN**		**JUL**		**AUG**		**SEP**		**OCT**		**NOV**		**DEC**	
Native summer grasses																								
Microlaena/danthonia/sub clover																								
Summer grass/sub clover																								
Cocksfoot//sub clover																								
Phalaris/sub clover																								
Lucerne																								
Annual grass/sub clover																								
Lucerne/sub clover																								
Forage crops																								
Japanese/shirohie millet																								
Oats																								
Brassicas (mid September sown)																								
Short term ryegrass (autumn sown)																								
Short term ryegrass (spring sown)																								

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.

* See 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

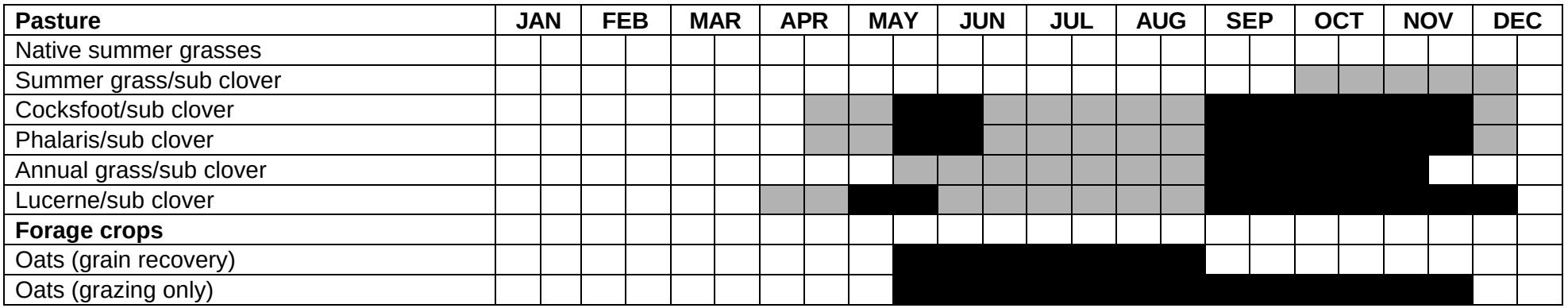
SOUTH WEST SLOPES

Key

High quality sheep and cattle feed capable of achieving at least 75% of potential liveweight gain

High quality sheep feed capable of achieving 75% of potential liveweight gain

Feed inadequate in quality and/or quantity to reliably provide for high growth rates in either sheep or cattle



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.

* See Prograze manual for benchmarks on feed availability requirements for various levels of liveweight gain.

VARIABILITY IN FEED PRODUCTION

Important Factors Affecting Reliability of Feed Production

The variability in pasture production in tableland and slopes districts 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
- Soil type
- Grazing management
- Soil fertility/fertiliser use

Climate

This is the largest variable across the tablelands and slopes of NSW

To get an idea of the extent that climate can affect pasture production, the growth model used to assist in producing the pasture curves elsewhere in this publication can also give an indication of how much variation occurred in the past based on historical climatic data.

On the **Southern Tablelands**, assuming that species capable of growing in all months make up the pasture and that they are capable of producing at 100 kg/ha/day, the model predicts that in good growing conditions in spring, summer and autumn, growth rates can be 50% above the median values. In a good winter, growth may be 80% above the median. In poor growing conditions across summer, autumn and winter, the growth rate predictions are about 40% or more below the median values. However, spring growth predictions in a poor season could be 80% below the median.

Table 3 indicates the variability of tableland pastures as estimated by NSW Agriculture advisory officers, based on long term experience.

Similarly, on the **South West Slopes**, the model predicts that in good growing conditions in summer growth rates could be 200% above, and winter 80% above the median values. In the other seasons (autumn and spring) the differences were not as great, being about 30% higher. In poor growing conditions in winter the growth rate predictions are about 20% or more below the median values. While the predictions for the other seasons could be up to 70% below the median.

Variability can 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 (eg. clay loam).

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

Grazing management

Pasture production estimates assume that pastures are in the active stage of growth, and 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 phosphorus, sulfur and molybdenum, can greatly affect the potential of pasture to produce. Similarly, low pH may have an adverse affect depending on the species in the mixture. Nutrient deficiencies not only affect 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 species when they are in the reproduction phase.

Other factors

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

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

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.

CONTRIBUTORS

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

Southern Tablelands & South West Slopes:

P Simpson, District Agronomist, Goulburn, M Keys, Agronomist (Prime Pastures), Queanbeyan, D Garden, Research Agronomist, Canberra, S Burge, District Agronomist, Cooma, P Graham, District Livestock Officer, Yass, B Dear, Research Agronomist, Wagga, W McDonald, Program Leader (Pastures), G Fenton, District Agronomist, Lockhart, of NSW Agriculture and P Cregan, Lecturer, and J Paul, Post Graduate student, of Charles Sturt University, Wagga,

Acknowledgments

G. Donald of CSIRO, Armidale for assistance with climatic data and growth indices.

A. Bell, Program Leader (Grazing Systems), NSW Agric. Tamworth for technical advice on livestock enterprise requirements for feed year plans, and data on a wide range of sites from the Pasture and Animal Assessment Trials conducted by NSW Agriculture.

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.

Produced by Bill Noad
Approval No. PL(PN) 3/98
Agdex 130/13

Table 3. Estimates (kg/ha/day) by NSW Agriculture officers of the variability in production on Southern Tableland pastures

PASTURE TYPE		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Introduced perennial grass with maintenance fertiliser (5,765 kg/ha)	**Average**	7	5	7	15	13	9	7	10	35	45	20	10
	Range	0–20	0–20	3–30	5–30	6–23	5–11	3–9	7–20	20–52	4–60	5–60	2–20
Native grass with maintenance fertiliser (4,770 kg/ha)	**Average**	15	10	10	8	7	5	5	6	15	30	25	20
	Range	3–40	3–30	3–20	5–15	3–12	2–7	2–7	3–10	5–20	5–45	8–40	3–40
Native grass unfertilised (2,613 kg/ha)	**Average**	10	6	3	3	2	1	1	1	7	15	25	13
	Range	3–25	3–20	2–15	1–7	1–5	0–2	0–2	0–2	2–10	5–25	6–35	3–30
Introduced perennial grass well managed (9,830 kg/ha)	**Average**	10	8	20	26	20	12	10	15	45	80	55	20
	Range	8–40	3–40	5–45	10–50	10–35	8–15	5–12	5–25	20–60	10–100	10–70	5–40
Oats (sown end February) high fertility	**Average**	–	–	12	25	35	25	15	25	50	70	10	–
	Range	–	–	5–20	8–40	12–40	5–35	3–20	10–40	25–60	25–90	2–20	–

Figures in brackets represent the total dry matter production in an average year from these species.