APPENDIX 4

ESTIMATES OF PASTURE GROWTH AND FEED YEAR PLANS

Following are estimates of pasture growth based on regional areas and are available for use when fodder budgeting. Extended fodder budgets – for greater than, say, three weeks – will be greatly improved by including pasture growth.

These estimates were derived from agronomists, livestock officers and scientists from NSW DPI and CSIRO. Pasture growth rate estimates and feed year plans have been broadly grouped into regions.

PASTURE GROWTH ESTIMATES

These estimates are for long term average conditions for the respective regions and are based on available research results and growth predictions from long-term observations by experienced agronomists and livestock officers. Growth predictions from the *Growest* and GrassGro® models were also used.

This approach has been adopted as it is inappropriate to base growth rates solely on research data. This is because of the climatic variability and the relatively short period over which research results are collected.

Growing conditions vary greatly between seasons, between regions, districts and even 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 expected that as further information comes to hand that these guidelines will be updated. Feedback is most welcome.

When using these estimates remember that large variability in feed supply can occur. Put together across the year, these monthly values do not reflect a 'typical' year. **Each month is an estimate in its own right, without any reference to what occurred the previous month.**

Consequently, the curves across a whole year may not reflect what is seen on your property. Nevertheless, for fodder budgeting these figures provide a good basis to assist in decision making about livestock moves over a 2–6 month period especially during the growing season.

Assumptions used

- Pastures are of satisfactory density for the area.
- Soil is of good moisture holding capacity (e.g. clay loam).
- Grazed at moderate stocking pressure and allowing for some pasture decay.
- Well managed and fertilised adequately (except where specified) to avoid nutrient deficiencies.
- Pastures are assumed to be maintained in the active phase of growth at all times.

Variability in feed production

The variability in pasture production in tableland and slopes districts can be very large. Therefore 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 by far the largest variable. Note the comments below each growth rate table. These indicate the extent of the variation in pasture growth caused by climate. Growth rates are presented for regions. The growing conditions *within* these geographic areas can vary significantly. Generally growth conditions are more favourable in the east with drier and less reliable rainfall to the west. North to south differences can also be significant with summer dominance in rainfall increasing to the north. The major variable is the time of the season break.

Soil type. The daily growth rates assume a soil type with good moisture holding capacity, such as clay loam. It is also assumed to have good depth – not a shallow skeletal soil. On lighter textured soils, such as granites, the pasture production will be much

less. These soils dry out rapidly reducing potential pasture production. 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, stocked at a moderate grazing pressure and well managed. Overstocking and inappropriate grazing management 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 may have inadequate leaf area to produce to its maximum potential. Similarly, previous lax grazing will result in a growth rate significantly lower than its potential.

Soil fertility/fertiliser use. Soil deficiencies – especially phosphorus, sulfur and molybdenum – can greatly affect potential pasture production. Similarly, low pH may have an adverse affect on growth rate, depending on the species in the mixture. Nutrient deficiencies can not only affect the overall production but also the reliability of production, seasonal production, botanical composition and feed quality.

Pasture quality. Along with pasture *quantity*, pasture *quality* is also very variable. In the growth rates presented, quality will not be uniform throughout the year from any one species. For example, in the spring of a winter-growing pasture, growth will tend to be lower quality than in the autumn. This is because of the greater proportion of stem-to-leaf produced. This factor is extremely important with summer growing species when they are in the reproductive phase. Summer growing grass can be especially low in quality during this phase.

Other factors. Other factors such as pasture species adaptability, weeds, pests, diseases, aspect, waterlogging, salinity and so on, can have a major impact on pasture growth. Consult your district agronomist if in doubt about the extent of the potential reduction in pasture production due to these factors.

FEED YEAR PLANS

For each of the following regional areas, tables are provided as a guide to planning the feed year. They identify those pastures and crops capable of giving high liveweight gain in cattle and sheep.

The estimates for the likely availability of feed of adequate quality are based on:

- Pastures are grown in suitable soils etc, and are well adapted to that environment.
- 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 quantity of 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.
- Quality feed, in these plans, means feed on offer having a digestibility of 70 per cent or better, and that a 'mixed' pasture has a good balance of legume present.
- Plans do not infer that this is only one paddock of a particular pasture type. That is, one may be grazed while others are rested to improve availability for livestock requirements.
- The estimates are intended as a guide only to help in selection of appropriate pasture types to suit the enterprise targets. Variability in production can be quite large.
- The quantity of feed available depends on the growth rate of the pasture, stocking rate, rate of wastage, and previous management of the pasture. These estimates only show 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.

In addition, 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' or the season is unfavourable.

Northern Tablelands

Pasture types used in estimates:

Fescue/white and subterranean clover. High content of fescue, with at least 20 per cent legume – white clover significant during the warmer months. Minor amount of annual weeds only. Soils of at least moderate fertility with nutrient requirements maintained.

Phalaris/white and subterranean clover. High content of phalaris, with at least 20 per cent legume – with white clover significant during the warmer months. Minor amount of annual weeds only. Soils of moderate to high fertility with nutrient requirements maintained.

Red grass dominant pasture. Main perennial grass is red grass but other frost susceptible summer growing native grasses also present. There is little clover present with low to moderate annual weeds. Soils of moderate natural fertility. No fertiliser applied for many years, if at all.

Microlaena/white and subterranean clover. Microlaena (Weeping grass) is the dominant perennial grass with about 20 per cent legume present in the pasture. Soils of moderate to high fertility, with nutrient requirements maintained.

Oats. Sown early February on moderate to good fertility soil. Sown with adequate fertiliser applied at sowing.

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

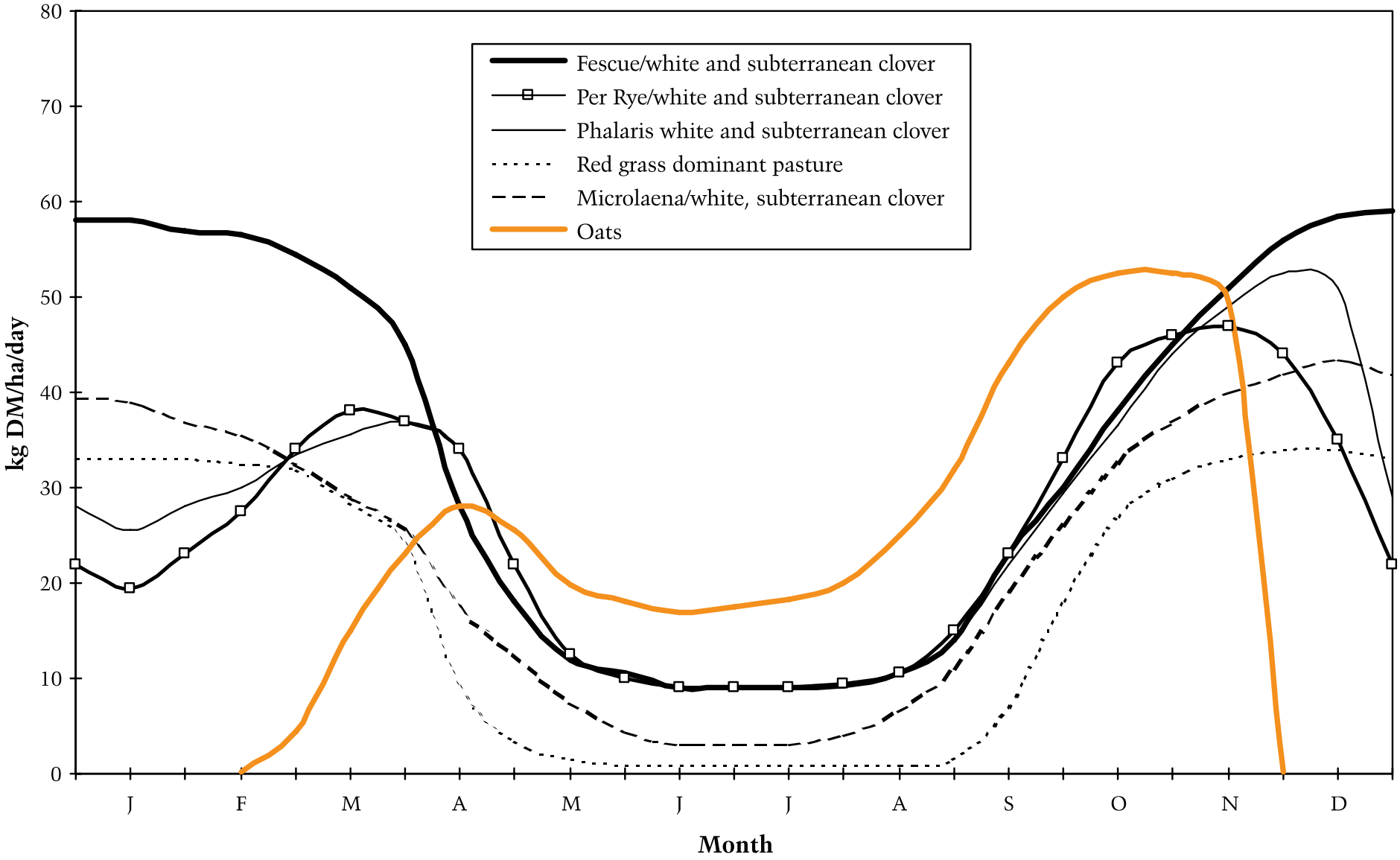
	J	F	M	A	M	J	J	A	S	O	N	D
Fescue/white and subterranean clover	58	57	51	28	12	9	9	11	23	38	51	59
Phalaris/white and subterranean clover	26	30	36	34	13	9	9	11	22	37	49	51
Red grass dominant	33	33	29	9	2	1	1	1	7	27	33	34
Microlaena/white and subterranean clover	39	36	29	18	8	3	3	7	19	33	40	44
Oats	0	3	19	27	19	18	19	29	47	53	25	0
Perennial rye/white and subterranean clover	20	28	38	34	13	9	9	11	23	43	47	35

Note: The wide variation in pasture growth which occurs between years needs to be remembered. For example the computer growth model, used to help generate these median values, predicts the growth rate could vary as follows:

	Good growing season	Poor growing season
Spring	30 per cent above	40 per cent below
Summer	30 per cent above	40 per cent below
Autumn	75+ per cent above	60+ per cent below
Winter	30 per cent above	40 per cent below

As red grass pastures have a low leaf:stem ratio and mature rapidly, pasture quality may not be adequate, or be maintained, to ensure livestock production targets are met.

Estimated growth rate of pastures - Northern Tablelands



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 — Northern Tablelands

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
Native summer grasses																								
Microlaena/white clover																								
Native/white clover																								
Cocks/fescue/white clover																								
Phalaris/white clover																								
Phalaris/sub clover																								
Lucerne																								
Chicory																								
Forage Crops																								
Japanese/shirhoe millet																								
Oats																								
Brassics (autumn sown)																								
Brassicas (spring sown)																								
S.T. ryegrass/red clover																								
Short term ryegrass																								

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 appropiate 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 for benchmarks on feed availability requirements for various levels of liveweight gain.

North West Slopes and Upper Hunter

Pasture types used in estimates:

Phalaris/subterranean clover. Good balance of phalaris and subterranean clover with at least 20 per cent of the pasture being sub clover in the growing season. Low percentage of annual weeds present. Soils moderate to good fertility, with nutrients applied to maintenance level only.

Summer grass dominant. Red grass or frost sensitive summer growing grass dominant in pasture, with little or no clover. Small quantity of annual weeds present. No fertiliser applied for many years, if at all.

Austrodanthonia/subterranean clover. Main perennial grass is Austrodanthonia (wallaby grass) with at least 20 per cent subterranean clover present in the growing season. Small quantity of annual weeds are also present. Soils are of moderate fertility with fertiliser applied at maintenance levels.

Lucerne at 85 per cent content or more, with minor amounts of annual weeds. Soils are well drained, moderate to good fertility, with only maintenance applications of fertiliser.

Subterranean clover dominant. The pasture is 75 per cent subterranean clover, with lesser amounts of annual weeds. Soils moderate to good fertility with fertiliser applied to maintenance levels only.

Medic dominant. Pasture comprises 75 per cent barrel or naturalised burr medic with smaller amounts of annual weeds present. Soils moderate to good fertility. Fertiliser applied to maintenance levels.

Oats. Late February sown on good moisture with adequate fertiliser. Sown on moderate to good fertility soils.

Tropical grass pasture consists of a mix of bambatri panic and purple pigeon grass with less than 5% content of sub clover or medic. Moderate fertility with fertiliser at maintenance levels.

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

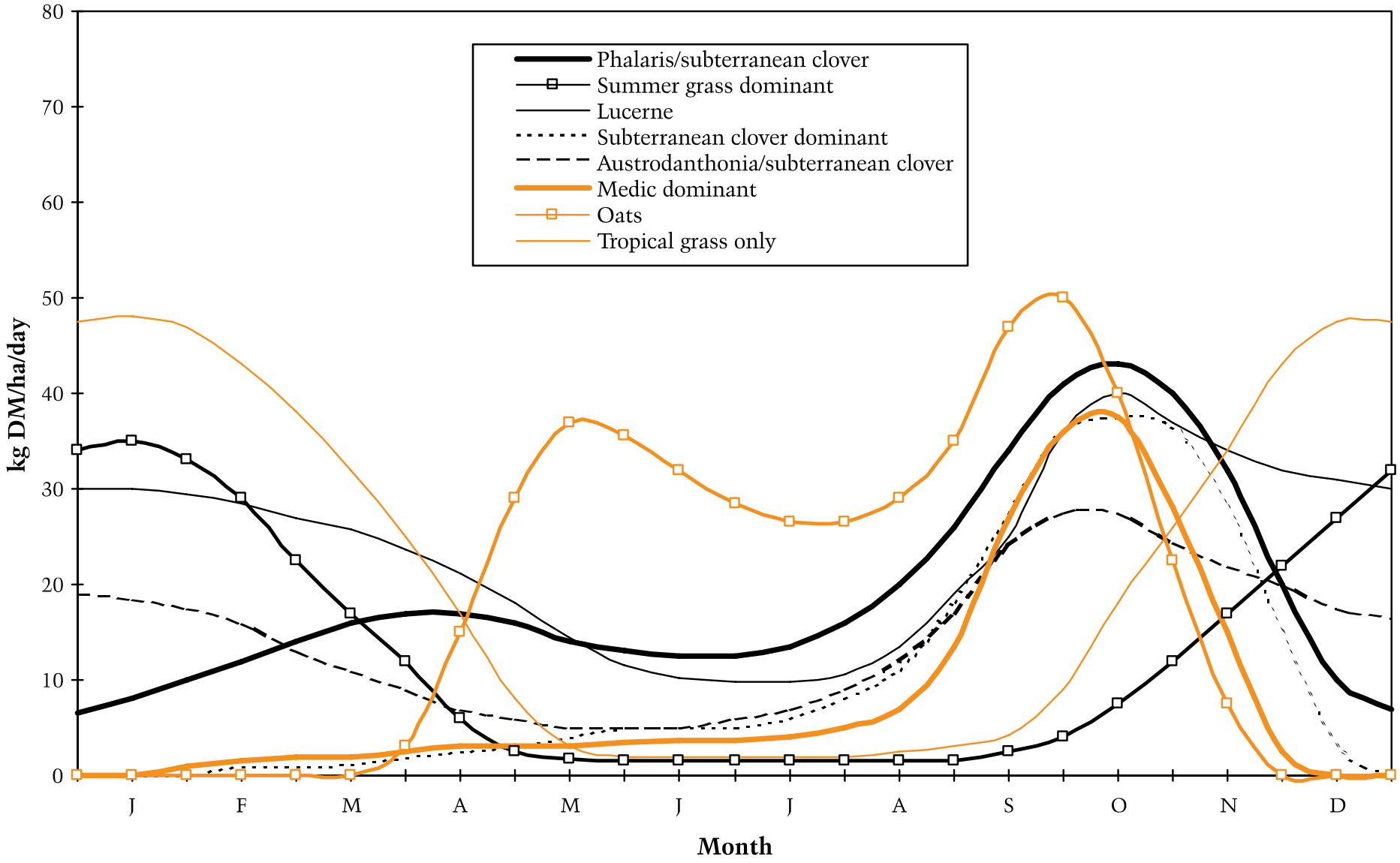
	J	F	M	A	M	J	J	A	S	O	N	D
Phalaris/sub. clover	8	12	16	17	14	13	14	20	34	43	32	10
Summer grass dominant	35	29	17	6	2	2	2	2	3	8	17	27
Austrodanthonia/ sub. clover	19	16	11	7	5	5	7	12	24	28	22	18
Lucerne	30	29	26	21	15	10	10	14	25	40	34	31
Sub. clover dominant	0	1	1	3	4	5	6	11	28	38	28	3
Medic dominant	0	2	2	3	5	4	4	7	27	38	15	0
Oats	0	0	0	15	37	32	27	29	47	40	8	0
Tropical grass only	48	43	32	17	3	2	2	3	4	18	34	48

Note: The wide variation in pasture growth which occurs between years needs to be remembered. For example, the computer growth model used to help generate these median values predicts the growth rate could vary as follows:

	Good growing conditions	Poor growing conditions
Spring	50 per cent above	50 per cent below
Summer	100 per cent above	50 per cent below
Autumn	100 per cent above	60 per cent below
Winter	30 per cent above	50 per cent below

As red grass pastures have a low leaf:stem ratio and mature rapidly, pasture quality may not be adequate, or be maintained, to ensure livestock production targets are met.

Estimated growth rate of pastures - North West Slopes and Upper Hunter



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 — North West Slopes and Upper Hunter

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
Native summer grasses																								
Native/sub. clover																								
Phalaris/sub clover																								
Lucerne																								
Chicory																								
Lucerne/sub clover																								
Annual ryegrass/sub clover																								
Danthonia/sub. clover																								
Trop. grass/minor luc./sub cl.																								
Lovegrass/serradella/sub cl.																								
Forage Crops																								
Hybrid pearl millet																								
Jap/shirhoe millet																								
Oats																								
Short term ryegrass																								
Forage sorghums																								
Lab lab																								
Cowpeas																								

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 appropiate 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 for benchmarks on feed availability requirements for various levels of liveweight gain.

Central Tablelands

Pasture types used in estimates:

Oats. Sown early February into good moisture and moderate to good fertility soil with adequate fertiliser.

Temperate perennial grass/subterranean clover. Phalaris, cocksfoot, fescue or perennial ryegrass suited to the soil and area. Well balanced, with clover being at least 20 per cent in the growing season. Fertiliser applied to maintenance levels.

Microlaena/Austrodanthonia/subterranean clover. Year-long green perennial native grasses with a good balance of subterranean clover – greater than 20 per cent in the growing season. Moderate to good fertility soil. Fertiliser applied to maintenance levels.

Microlaena/Austrodanthonia grass. Pasture dominated by these species. Very little clover present, minor amounts of broadleaf weeds present. No fertiliser applied for many years.

Summer grass plus subterranean clover. Main grasses are frost sensitive species such as Red grass. Subterranean clover at least 20 per cent of pasture in growing season and minor amounts of annual weeds present. Soils moderate to good fertility. Fertiliser applied to maintenance levels. Usually found at lower altitudes of the tablelands.

Summer grass. Dominated by frost sensitive grasses such as red grass. Very little clover or annual weeds. Soils have moderate to good fertility. Not fertilised for many years if at all – usually found at lower altitudes.

Annual grass/subterranean clover. Dominated by grasses such as vulpia, barley grass and ryegrass, with a good balance of at least 20 per cent clover. A moderate amount of broad leaf weeds. Soil fertility good.

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

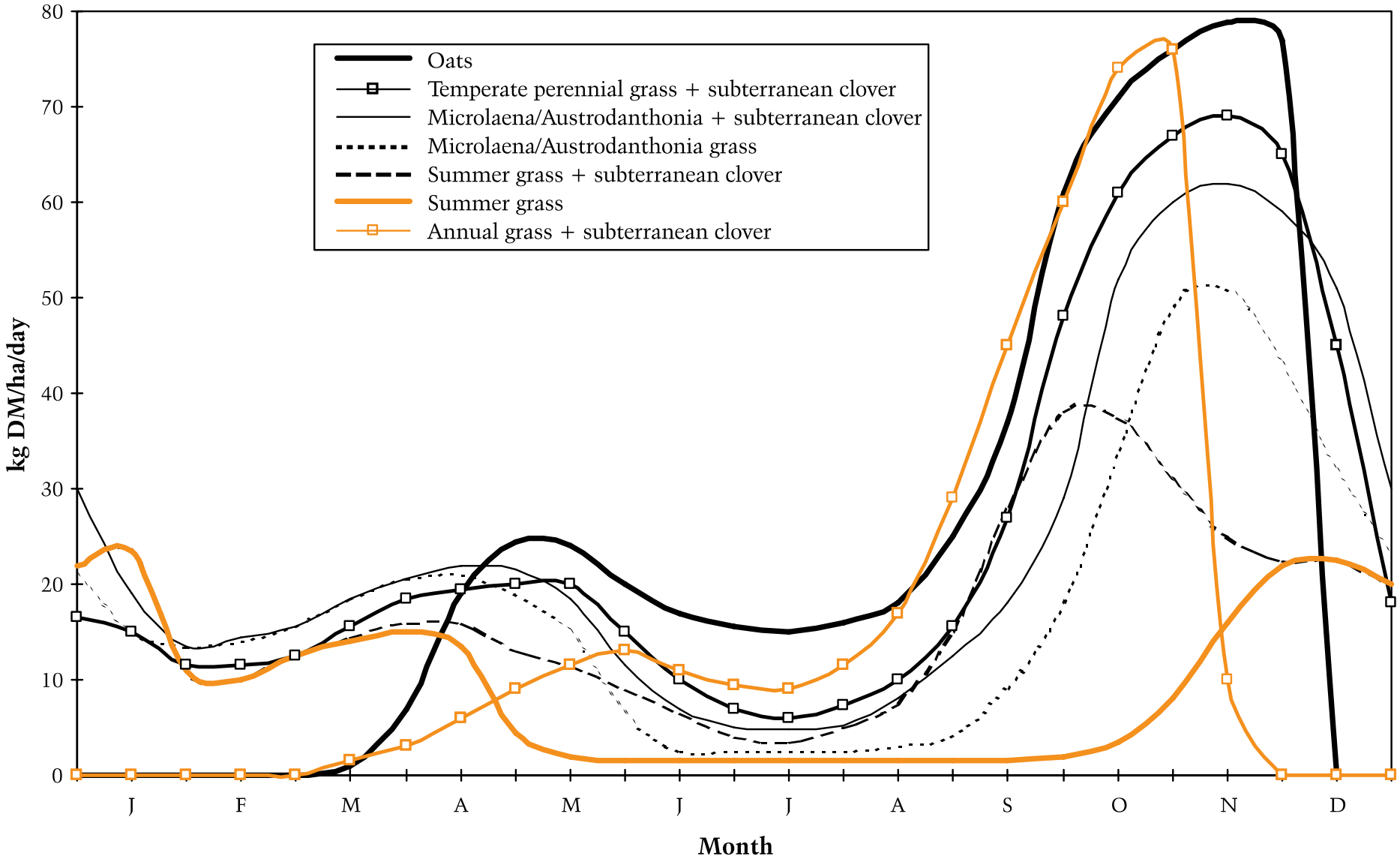
	J	F	M	A	M	J	J	A	S	O	N	D
Oats	0	0	1	19	24	17	15	18	37	71	79	0
Temperate perennial grass + subterranean clover	15	12	16	20	20	10	6	10	27	61	69	45
Microlaena/Austrodanthonia + subterranean clover	19	15	19	22	19	7	5	8	18	52	62	51
Microlaena/ Austrodanthonia grass	15	14	19	21	15	3	3	3	9	34	51	32
Summer grass/ subterranean clover	24	10	15	16	12	7	4	8	28	38	25	23
Summer grass	24	10	14	14	2	2	2	2	2	4	16	23
Annual grass/ subterranean clover	0	0	2	6	12	11	9	17	45	74	10	0

Note: The wide variation in pasture growth which occurs between years needs to be remembered. For example, the computer growth model used to help generate these median values predicts the growth rate could vary as follows:

	Good growing season	Poor growing season
Spring	50 per cent above	40 per cent below
Summer	100+ per cent above	70 per cent below
Autumn	65 per cent above	60+ per cent below
Winter	40 per cent above	60+ per cent below

As red grass pastures have a low leaf:stem ratio and mature rapidly, pasture quality may not be adequate, or be maintained, to ensure livestock production targets are met.

Estimated growth rate of pastures - Central Tablelands



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 — Central Tablelands

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
Native summer grasses																								
Microlaena/white clover																								
Summer grass/sub clover																								
Cocks/white/sub clover																								
Phalaris/sub clover																								
Phalaris/white clover																								
Lucerne																								
Chicory																								
Annual ryegrass/sub clover																								
Lucerne/sub clover																								
Per. Ryegrass/sub clover																								
Forage Crops																								
Jap./shirhoe millet																								
Oats																								
Brassicas, spring sown																								
Short term ryegrass																								
Hybrid sorghum/sudan																								

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 appropiate 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 for benchmarks on feed availability requirements for various levels of liveweight gain.

Central West Slopes

Pasture types used in estimates:

Temperate perennial grass/subterranean clover. Phalaris, cocksfoot, ryegrass or fescue sown in soils and localities suited to appropriate species. Clover content good – more than 20 per cent in winter and spring. Fertiliser applied at maintenance levels.

Lucerne plus subterranean clover. Good density of lucerne at greater than 60 per cent. Subterranean clover content significant in winter/spring months – more than 15 per cent. Low content of annual grass or broadleaf weeds. Moderate to good fertility soils, with fertiliser applied at maintenance levels.

Lucerne. Good density of lucerne at greater than 75 per cent of pasture, with minor annual weeds present. Moderate to good fertility soils. Fertiliser applied at maintenance levels.

Annual grass/subterranean clover. Good density of annual grasses such as barley grass, vulpia, brome grass, with at least 20 per cent sub clover through winter/spring. Soils moderate to good fertility, fertiliser applied to maintenance levels only.

Tropical grass pasture consists of a mix of bambatsi panic and purple pigeon grass with less than 5% content of subterranean clover or medic. Moderate fertility with fertiliser at maintenance levels.

Subterranean clover. Predominantly sub clover – at least 60 per cent – with minor quantities of annual grasses and broadleaf weeds. Moderate to good fertility soils with fertiliser applied to maintenance levels.

Summer grass. Dominated by frost sensitive native grasses such as red grass. Very little clover, annual grasses, or broadleaf weeds present. Soils moderate fertility. Fertiliser not applied for many years, if at all.

Oats. Early March sown on good moisture. Soil fertility good and sown with adequate fertiliser.

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

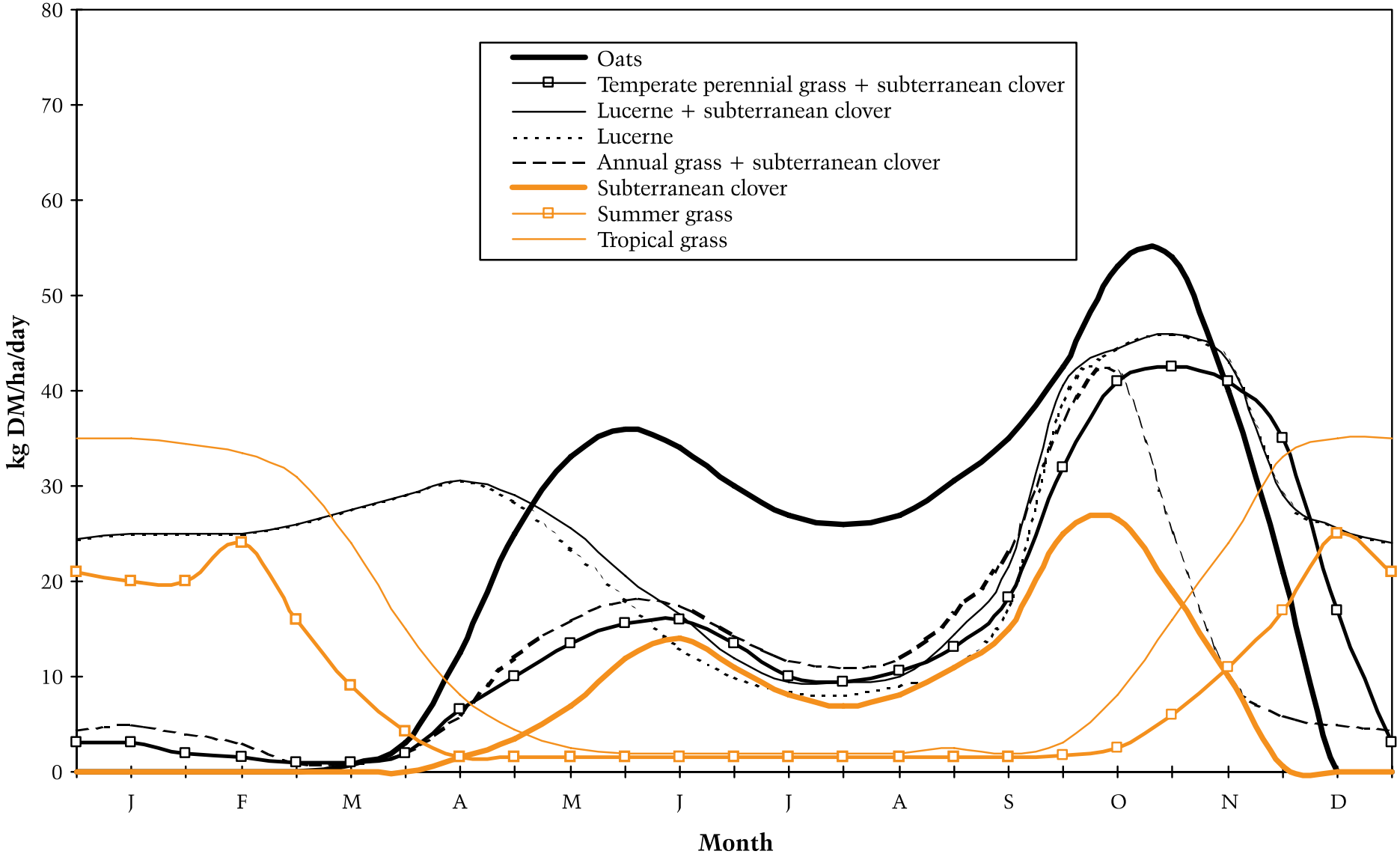
	J	F	M	A	M	J	J	A	S	O	N	D
Temperate perennial grass + subterranean clover	3	2	1	7	14	16	10	11	18	41	41	17
Subterranean clover	0	0	0	2	7	4	8	8	15	27	10	0
Summer grass	20	24	9	2	2	2	2	2	2	3	11	25
Lucerne/ subterranean clover	25	25	28	31	26	17	10	10	22	45	43	26
Lucerne	25	25	28	31	24	13	9	9	18	45	43	26
Annual grass/ subterranean clover	5	3	1	6	16	18	12	12	23	42	10	5
Oats	0	0	1	13	33	34	27	27	35	53	40	0
Tropical grass	35	34	24	8	3	2	2	2	2	8	24	35

Note: The wide variation in pasture growth that occurs between years needs to be remembered. For example, the computer growth model used to help generate these median values predicts the growth rate could vary as follows:

	Good growing conditions	Poor growing conditions
Spring	75 per cent above	80 per cent below
Summer	100+ per cent above	80 per cent below
Autumn	100+ per cent above	60+ per cent below
Winter	75 per cent above	60 per cent below

As red grass pastures have a low leaf:stem ratio and mature rapidly, pasture quality may not be adequate, or be maintained, to ensure livestock production targets are met.

Estimated growth rate of pastures - Central West Slopes



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 — Central West Slopes

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
Native summer grasses																								
Summer grass/sub clover																								
Phalaris/sub clover																								
Lucerne																								
Chicory																								
Annual rye/sub clover																								
Lucerne/sub clover																								
Perennial rye/sub clover																								
Cocksfoot/sub clover																								
Forage Crops																								
Japanese/shirhoe millet																								
Oats (grain recovery)																								
Oats (full grazing)																								
Brassicas, spring sown																								
Cowpeas																								
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 appropiate 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 for benchmarks on feed availability requirements for various levels of liveweight gain.

Central West Plains (wheat belt areas only)

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 a 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 and legume. 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, in a put and take system, with occasional rest periods.

Annual legume based pasture. Sown under last crop to species such as barrel medic. Producing 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 topdressing of P and S. Stocking pressure is moderate, and paddocks are stocked in a put and take system 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 in early April at 40 kg/ha, on short fallow moisture with adequate P, S and N fertiliser. No further topdressing during growth. Grazed intensively from mid May to November or until late July if locked up for grain production.

Post-crop volunteer annuals. Volunteer annual grass dominate, with up to 10% perennial species. Cropped in the past. Barley grass, some ryegrass and up to 20% vulpia and 20% broadleaf weeds e.g. Paterson's curse and saffron thistle. Some summer growth but this is extremely variable. No fertiliser applied, since the cropping phase. Low to moderate fertility. Stocked at moderate pressure, on a 'put and take' approach, which can include long periods of grazing with occasional periods of rest.

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 topdressing. Moderate stocking pressure with a 'put and take' approach, including long periods of grazing and occasional periods of rest. Applicable to northern half of region only.

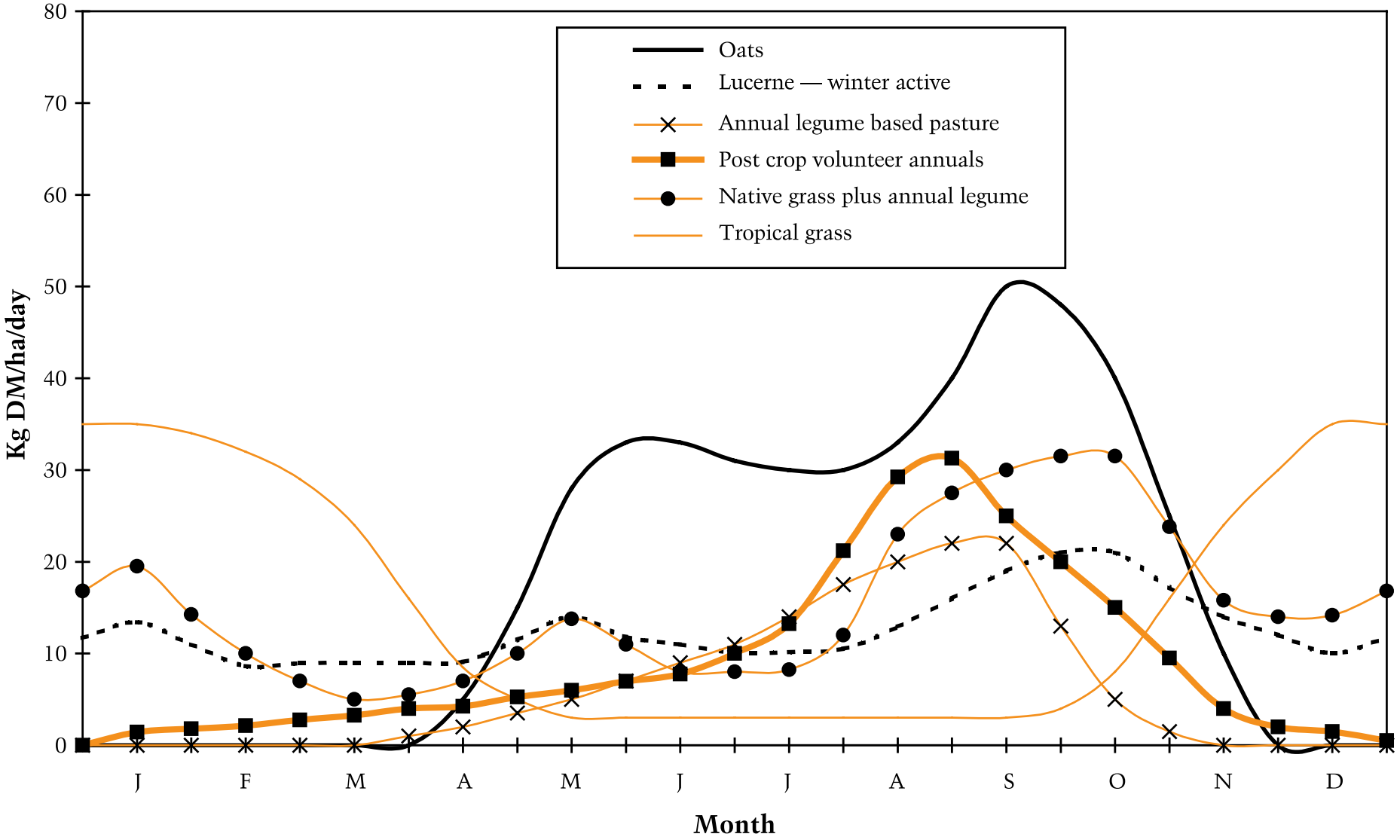
Estimated pasture growth rate (mid month) of specific pasture types (kg DM/ha/day)

	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	32	16	14
Annual legume based pasture	0	0	0	2	5	9	14	20	22	5	0	0
Oats	0	0	0	10	31	32	30	37	49	32	5	0
Post-crop vol. 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

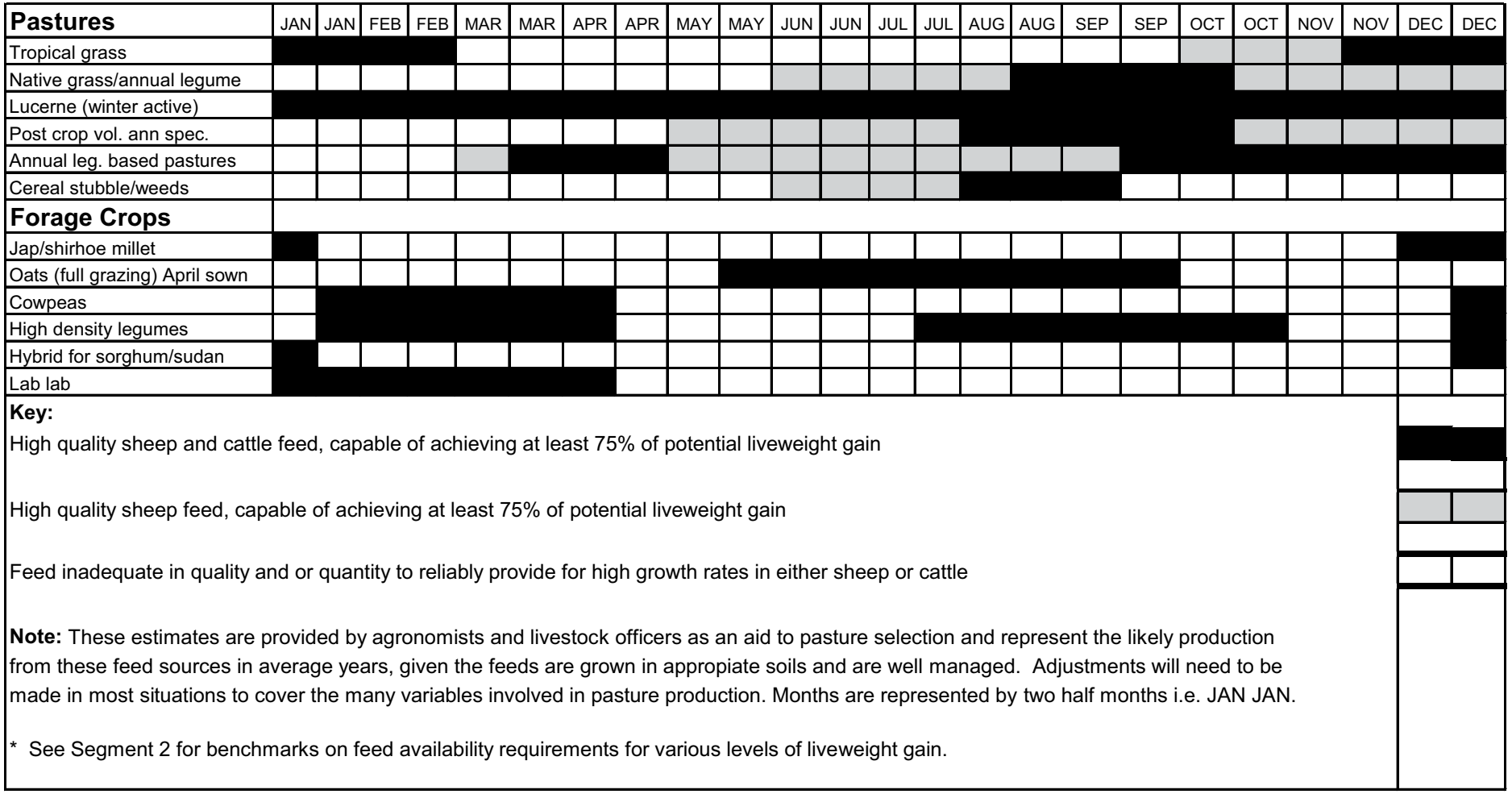
Note. The wide variation in pasture growth that occurs between years needs to be remembered. For example, the computer growth model used to help generate these values predicts the growth could vary as follows:

	Good growing conditions	Poor growing conditions
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

Estimated growth rate of pastures - wheat belt of the Central West Plains



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 — Central West Plains wheat belt



Southern Tablelands

Pasture types used in estimates:

Perennial and annual grass plus clover – fertilised 1 in 2–3 years. Older established perennial pasture of about 30 per cent introduced perennial grasses such as phalaris, 20 per cent native perennial grasses, 20 per cent annual clover, 20 per cent annual grasses, and 10 per cent weeds. Fertilised occasionally and around pH 4.5–5.0.

Microlaena, Austrodanthonia plus clover fertilised 1 in 2–3 years. Better native grasses – Microlaena and Austrodanthonia – making up 50–60 per cent of pasture. Also with 25–30 per cent clover and 10–20 per cent annual grass pastures. Fertilised occasionally, with a soil pH of 4.0–5.0.

Redgrass, Kangaroo grass – unfertilised. Frost sensitive native grasses like Stipa, poa, kangaroo and red grass with less than 5 per cent clover – pH usually 4.0–5.0 and not fertilised.

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

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

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

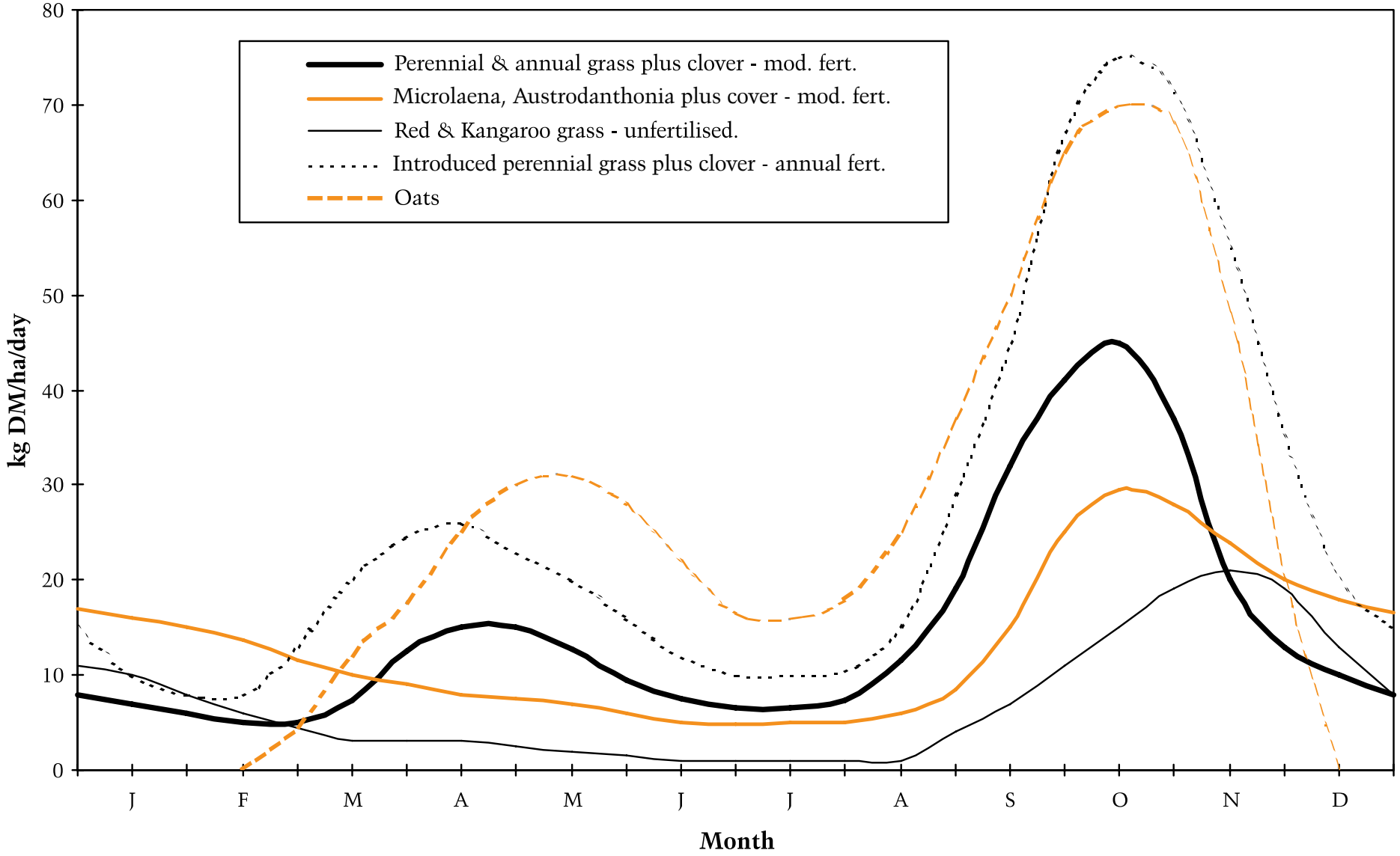
	J	F	M	A	M	J	J	A	S	O	N	D
Perennial and annual grass plus clover – fertiliser 1 in 2–3 years	7	5	7	15	13	8	7	12	32	60	20	10
Microlaena, Austrodanthonia plus clover – fertiliser 1 in 2–3 years	16	14	10	8	10	7	7	12	15	30	30	18
Red grass, Kangaroo grass – unfertilised	10	6	3	3	2	1	1	1	7	15	21	20
Introduced perennial grass and clover – annual fertiliser	10	10	15	26	20	12	10	15	45	75	55	20
Oats	0	0	12	25	31	22	16	25	50	70	48	0

Note: The wide variation in pasture growth that occurs between years needs to be remembered. For example, the computer growth model used to help generate these median values predicts the following variations from the Table's values:

	Good growing conditions	Poor growing conditions
Spring	80 per cent above	40 per cent below
Summer	100 per cent above	40 per cent below
Autumn	100 per cent above	30 per cent below
Winter	60 per cent above	60 per cent below

As red grass pastures have a low leaf:stem ratio and mature rapidly, pasture quality may not be adequate, or be maintained, to ensure livestock production targets are met.

Estimated growth rate of pastures - Southern Tablelands



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

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
Native summer grasses																								
Microlaena/danthonia/sub cl.																								
Summer grass/sub clover																								
Cocksfoot/sub clover																								
Phalaris/sub clover																								
Lucerne																								
Annual grass/sub clover																								
Lucerne/sub clover																								
Forage Crops																								
Japanese/shirhoe millet																								
Oats																								
Brassicas, mid Sept. sown																								
ST ryegrass (autumn sown)																								
ST ryegrass (spring sown)																								

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 appropiate 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 for benchmarks on feed availability requirements for various levels of liveweight gain.

South West Slopes

Pasture types used in estimates:

Phalaris/subterranean clover. Good balance of phalaris and at least 20 per cent subterranean clover, with lesser quantities of annual grass/weeds. Soils are of moderate fertility and fertiliser is occasionally applied at maintenance levels only.

Cocksfoot/subterranean clover. Cocksfoot and at least 20 per cent clover in good balance, with some minor quantities of annual grass/weeds. Soils are of low-medium fertility and fertiliser is occasionally applied at maintenance levels.

Lucerne/subterranean clover. Dense pasture of lucerne at greater than 60 per cent and sub clover greater than 15 per cent. Very little annual grass or weeds present. Fertiliser is occasionally applied at maintenance levels.

Annual grass/subterranean clover. Mainly consisting of ryegrass, barley grass, vulpia, and subterranean clover at least 20 per cent. Moderate to good fertility soils with fertiliser applied occasionally.

Native grass – no fertiliser. Typical frost sensitive native perennial grass, such as red grass, 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 per cent in the winter/spring period. Fertiliser applied occasionally at maintenance levels.

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

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

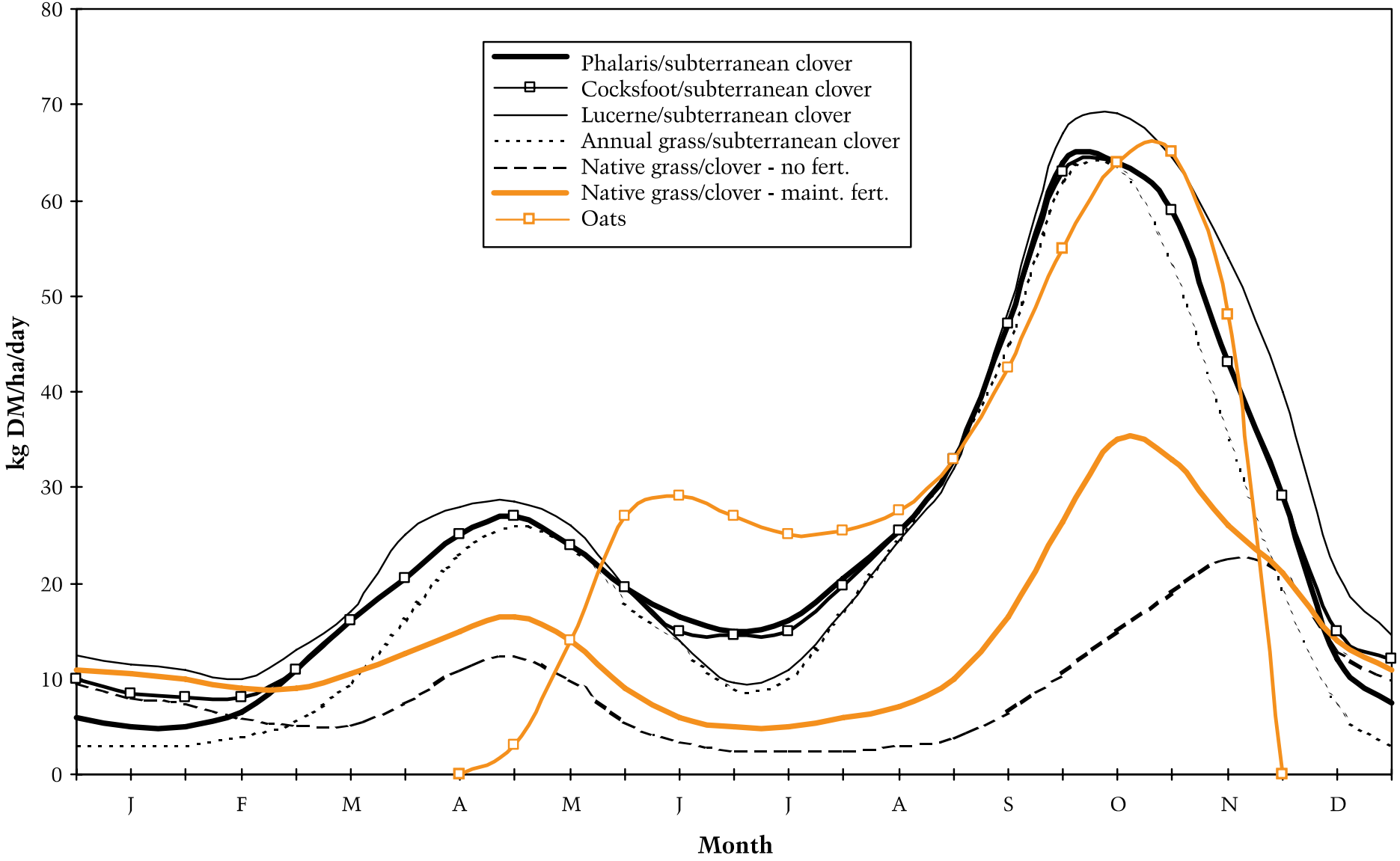
	J	F	M	A	M	J	J	A	S	O	N	D
Phalaris/ subterranean clover	5	7	16	25	24	14	16	26	47	64	43	12
Cocksfoot/ subterranean clover	9	8	16	25	24	14	16	26	47	64	43	15
Lucerne/ subterranean clover	12	10	17	28	26	14	11	25	49	69	54	21
Annual grass/ subterranean clover	3	4	10	23	24	14	10	25	45	64	35	7
Native grass – no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

Note: The wide variation in pasture growth that occurs between years needs to be remembered. For example, the computer growth model used to help generate these median values, predicts the growth rate could vary as follows:

	Good growing conditions	Poor growing conditions
Spring	75 per cent above	60 per cent below
Summer	100 per cent above	70 per cent below
Autumn	30 per cent above	60 per cent below
Winter	80 per cent above	20 per cent below

As red grass pastures have a low leaf:stem ratio and mature rapidly, pasture quality may not be adequate, or be maintained, to ensure livestock production targets are met.

Estimated growth rate of pastures - South West Slopes



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

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
Native summer grasses																								
Summer grass/sub clover																								
Cocksfoot/sub clover																								
Phalaris/sub clover																								
Annual grass/sub clover																								
Lucerne/sub clover																								
Forage Crops																								
Oats (grain recovery)																								
Oats (grazing only)																								

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 appropiate 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 for benchmarks on feed availability requirements for various levels of liveweight gain.

North Coast

Pasture types used in estimates (dryland pastures only):

Naturalised pasture. Dominated by carpet grass on lower slopes with no introduced legumes present. The pasture has patches of blady grass, with occasional red grass, pitted blue grass, wire grass, traces of paspalum. On drier sites, Queensland blue couch, common couch, forbes and Parramatta grass are present depending on locality. Pastures are on low fertility soil with no fertiliser history. Generally continually stocked at low stocking rates. Occasionally burnt.

Naturalised pasture/clover. Pasture as above but a greater proportion of introduced clover (5–10%) and paspalum especially on lower slopes. Management consists of top dressing at 125 kg/ha of superphosphate or equivalent and white clover seed has been added. Management is usually by continuous stocking, but also used by alternated grazing and resting periods with growing stock.

Kikuyu. Grown on moderately fertile soils, kikuyu is dominant with minor proportions of clover and paspalum and carpet grass. Management consists of low fertiliser input, with intensive stocking at moderate stock pressure.

Kikuyu plus Nitrogen (N). As above but with routine N application. Kikuyu is dominant with most other species excluded. Management consists of intensive stocking at moderate rates. Pastures fertilised for P,S,K and N applied routinely (e.g. up to 300 kg N/ha) so that it is not limiting growth. These areas are often overseeded with annual ryegrass (not included in production curves). Response to N is often poor in spring because of low rainfall.

Ryegrass + N. Late March to early April sown Italian ryegrass (e.g. Tetila) on moderate fertility country, usually sown into renovated or suppressed summer pasture. Also surface sown into soybean cropped areas without fertiliser ('Beef 'n Beans' system). They are intensively managed with moderate to high stock pressure. P,S and K applied at sowing with 20–30 N/ha and 20–30 kg N/ha applied during season (only when not sown into soybeans).

Setaria/rhodes grass. Established on moderate fertility country. Setaria and rhodes grasses are fairly dominant with some carpet grass and introduced clover (10–15%) present. Fertilised at sowing and occasionally with P, S and K. They are managed semi intensively at moderate stocking pressure.

Oats + N. Late March to early April sown on moderate fertility country, usually into renovated or suppressed summer pasture. Also can be surface sown into soybean cropped areas without fertiliser ('Beef 'n Beans' system). Pastures are intensively managed with moderate to high stock pressure. Crops are grazed out in early spring. P, S and K is applied at sowing with 20–30 N/ha and 20–30 kg N/ha applied during season (only when not sown into soybeans).

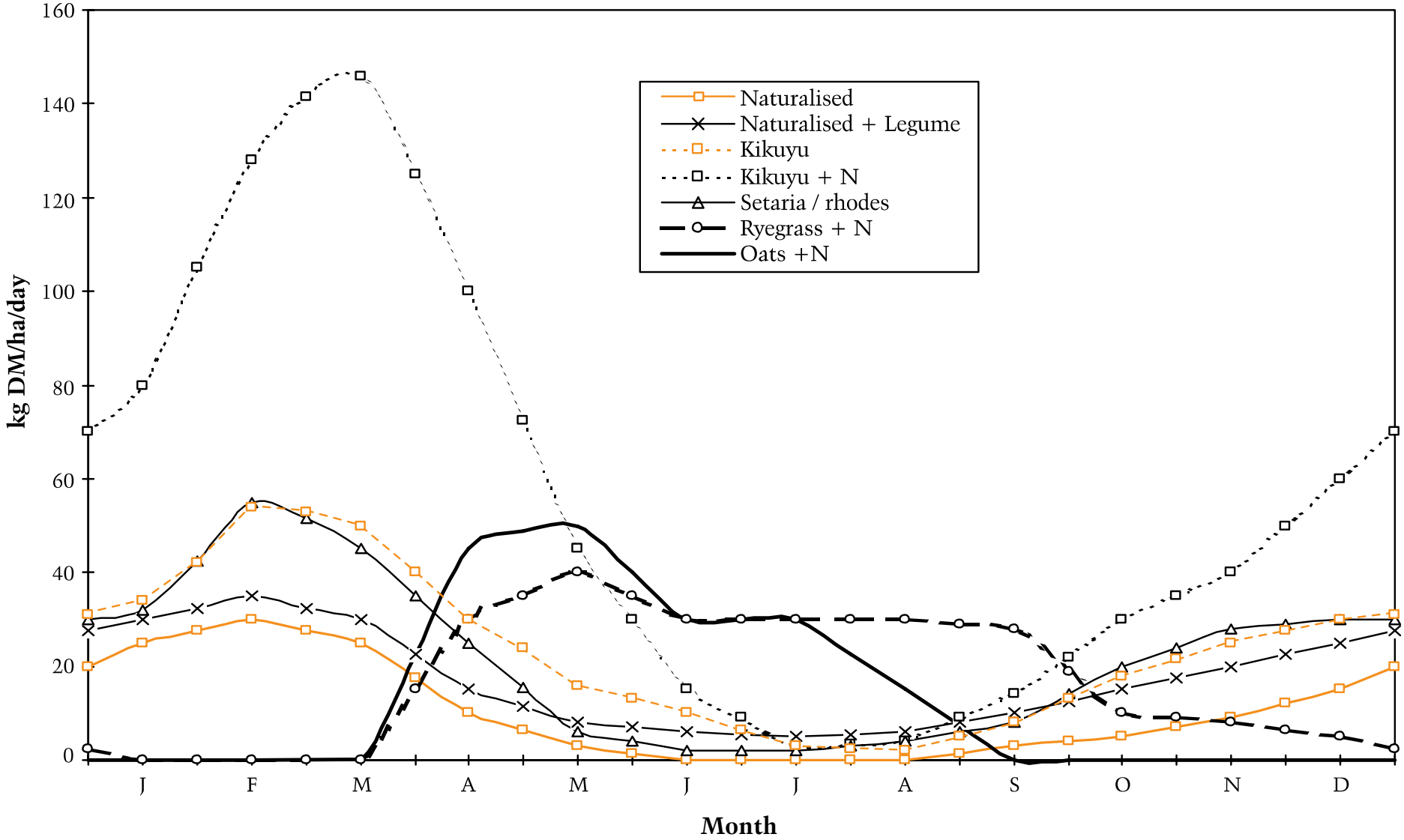
Estimated pasture growth rate (mid month) of specific pasture types (kg DM/ha/day) – for areas similar to Grafton.

	J	F	M	A	M	J	J	A	S	O	N	D
Naturalised	25	30	25	10	3	0	0	0	3	5	9	15
Naturalised + Legume	30	35	30	15	8	6	5	6	10	15	20	25
Kikuyu	34	54	50	30	16	10	3	2	8	18	25	30
Kikuyu + N	80	128	146	100	45	15	3	4	14	30	40	60
Setaria/rhodes grass	30	55	45	25	6	2	2	4	8	20	28	30
Ryegrass + N	0	0	0	30	40	30	30	30	28	10	8	5
Oats + N	0	0	0	45	50	30	30	15	0	0	0	0

Note: The wide variation in pasture growth that occurs between years needs to be remembered. For example, using the CSIRO model GrassGro®, to examine long term meteorological records for Grafton, the predictions for growth rate could vary as follows (using ryegrass and red grass as indicator pastures and 10/90 percentiles compared to the median):

	Good growing conditions	Poor growing conditions
Spring	70 per cent above	60 per cent below
Summer	60 per cent above	60 per cent below
Autumn	120 per cent above	90 per cent below
Winter	150 per cent above	70 per cent below

Estimated growth rate of dryland pastures - North Coast



A guide to the periods in which pastures and/or forage crops are capable of supporting a cow and calf (e.g. calf growing at 1 kg/day) given best practice management of pastures and livestock — North Coast

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
Naturalised		■	■	■	■																			
Naturalised/legume	■	■	■	■	■	■	■	■												■	■	■	■	■
Setaria/rhodes grass	■	■	■	■	■	■	■														■	■	■	■
Kikuyu	■	■	■	■	■	■	■	■	■												■	■	■	■
Kikuyu + N	■	■	■	■	■	■	■	■	■												■	■	■	■
Forage Crops																								
Jap/shirhoe millet	■	■																			■	■	■	■
Oats										■	■	■	■	■	■	■	■							
Forage sorghums	■	■	■	■	■	■																	■	■
Lab lab				■	■	■	■	■	■	■	■												■	■
Soybeans			■	■	■																			
Cowpeas	■	■	■	■	■	■																		
Annual ryegrass + N											■	■	■	■	■	■	■	■	■					

Key:

■ Feed of adequate quality to support a cattle breeding enterprise.

Feed inadequate in quantity and or quality to reliably provide for high livestock growth rates.

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 appropiate 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 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 on pastures*
(e.g. 13 month old steer growing at 0.9 kg/day) given best practice management of pastures and livestock — North Coast**

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
Naturalised																								
Naturalised/legume																					■	■	■	■
Setaria/rhodes grass	■	■																			■	■	■	■
Kikuyu	■	■	■																		■	■	■	■
Kikuyu + N	■	■	■	■															■	■	■	■	■	■
Forage Crops																								
Forage sorghum	■																						■	■
Jap/shirhoe millet	■	■																					■	■
Soybean				■	■	■																		
Oats + N										■	■	■	■	■	■	■	■							
Lab lab				■	■	■	■																	
Cowpeas		■	■	■	■	■																		
Annual ryegrass + N											■	■	■	■	■	■	■	■	■					

Key:

■ High quality cattle feed, capable of achieving at least 75% of potential liveweight gain on pasture

Feed inadequate in quality and or quantity to reliably provide for high growth rates in 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 appropiate 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 for benchmarks on feed availability requirements for various levels of liveweight gain.

Mid North Coast/Lower Hunter

Pasture types used in estimates (dryland pastures only):

Naturalised pasture. Dominated by carpet grass on lower slopes with no introduced legumes present. The pasture has patches of blady grass, with minor areas of red grass, pitted blue grass, wire grass, traces of paspalum. On drier sites forbs and Parramatta grass present depending on locality. Pastures are on low fertility, low pH soil, with no recent fertiliser history. Occasionally burnt.

Naturalised pasture/legume. Pasture as above but a greater proportion of introduced legume (5–10%) and paspalum present especially on lower slopes.

Management consists of top dressing with superphosphate or equivalent. White clover seed has been added in the past. Maintenance fertiliser is below requirements with an average of the equivalent of 250 kg superphosphate spread over 5 years (adequate to maintain low levels of legume in pastures). Potential growth rates greater with fertiliser rates closer to optimum.

Kikuyu. On moderately fertile soils, kikuyu is dominant with minor proportions of clover and paspalum. Management consists of intensive stocking at moderate stock pressure. Fertiliser is applied occasionally (P & S), at levels adequate to maintain some legume in the pasture. Nitrogenous fertiliser is applied when oversowing with ryegrass. Pasture growth rate potential is greater with increased fertility and grazing pressure.

Paspalum. On moderate fertility country, dominated by paspalum, with some white clover content (commonly around 5% in autumn rising to 12–15% in spring). Pastures are managed at a moderate stocking pressure. They are occasionally topdressed with superphosphate or equivalent only. The potential growth rates are greater with increased fertiliser and management input.

Setaria. Established on low to moderate fertility country. Setaria is dominant with some carpet grass and introduced legume (up to 10% rising to 15% maximum in spring) present. They are fertilised at sowing and occasionally topdressed with P, S and K. Pastures are managed semi intensively at moderate stocking pressure. There is potential for higher growth rates with increasing fertility/fertiliser rates, and improved grazing management.

Ryegrass + N. This pasture consists of Italian ryegrass (e.g. Tetila) sown in late March to early April on moderate to high fertility country. They are usually sown into renovated or suppressed summer pasture.

Pastures are intensively managed with moderate to high stock pressure. Phosphorus (P), sulphur (S) are applied at sowing with 20–45 kg N/ha and 20–45 kg N/ha applied during the season. They are responsive to increasing rates of N. Potassium (K) is topdressed where deficient

Oats + N. This is sown as a crop in late March to early April, on moderate fertility country and usually sown into renovated or suppressed summer pasture.

It is intensively managed with moderate to high stock pressure. The crop is grazed out in early spring. P, S, K are applied at sowing with 20–45 kg N/ha and 20–45 kg N/ha applied during season.

Estimated pasture growth rate (mid month) of specific pasture types (kg DM/ha/day) – for areas similar to Taree/Paterson.

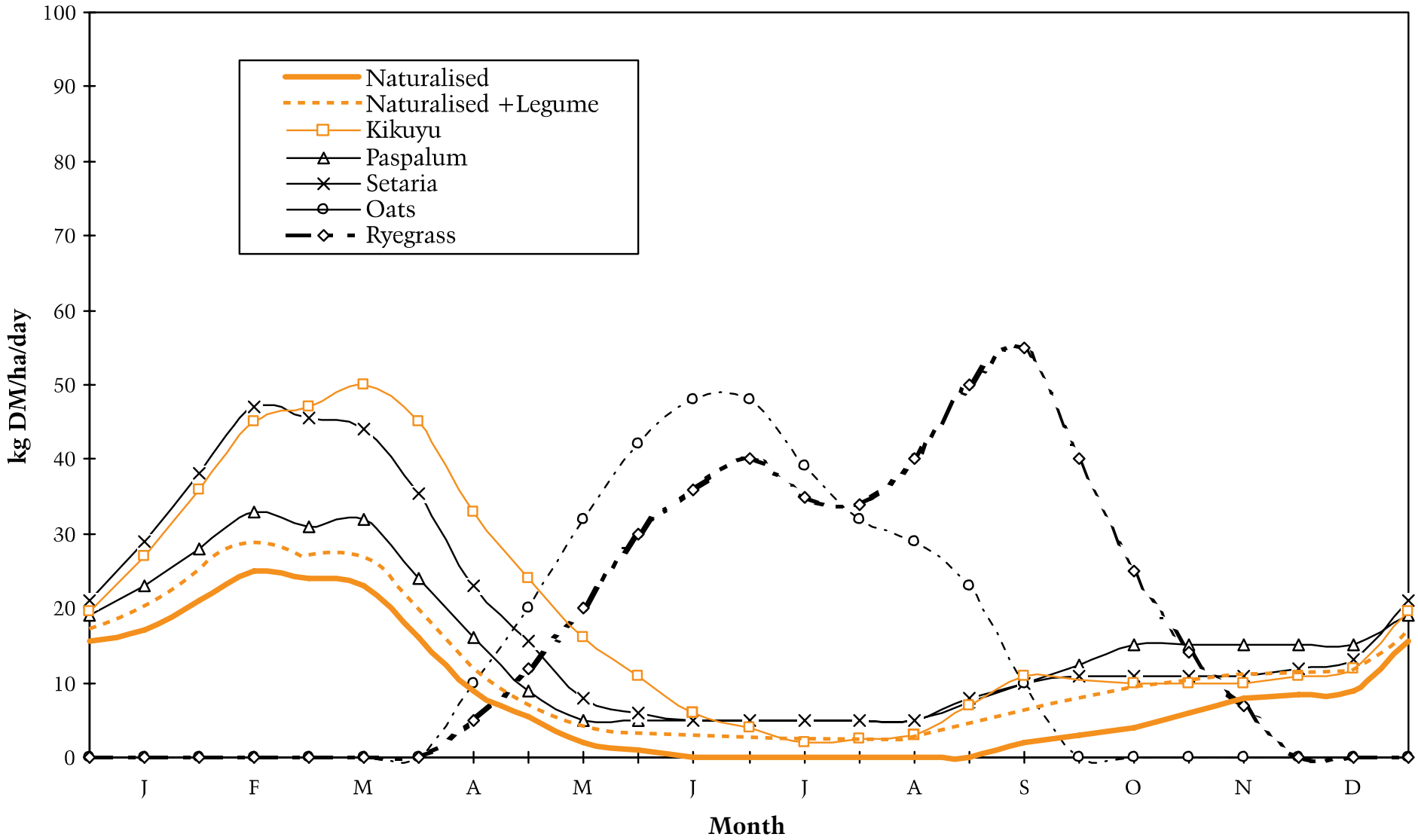
	J	F	M	A	M	J	J	A	S	O	N	D
Naturalised	17	25	23	9	2	0	0	0	2	4	8	9
Naturalised + Legume	20	29	27	12	4	2.5	2.5	2.5	6	9.5	12	12
Kikuyu	27	45	50	33	16	6	2	3	11	10	10	12
Paspalum	23	33	32	16	5	5	5	5	10	15	15	15
Setaria	29	38	44	23	8	5	5	5	10	11	11	13
Ryegrass + N	0	0	0	5	20	36	35	40	40	25	0	0
Oats + N	0	0	0	10	32	48	39	29	10	0	0	0

Note: The wide variation in pasture growth that occurs between years needs to be remembered. For example, using the CSIRO model GrassGro®, to examine long term meteorological records for Paterson, the predictions for seasonal growth rate could vary as follows (using ryegrass and red grass as indicator pastures for temperate and tropical plants respectively) and 10/90 percentiles compared to the median.

	Good growing conditions	Poor growing conditions
Spring	145 per cent above	73 per cent below
Summer	114 per cent above	46 per cent below
Autumn	70 per cent above	80 per cent below
Winter	89 per cent above	67 per cent below

This variability reflects the difference in plant types and seasons only. Other variables such as soil fertility, soil depth and type, grazing management etc. can increase or decrease this variability.

Estimated growth rate of dryland pastures - Mid North Coast and Lower Hunter



A guide to pastures and forage crops capable of achieving at least 75% of maximum liveweight gain on pastures* (e.g. 13 month old steer growing at 0.9 kg/day) given best practice management of pastures and livestock — Mid North Coast and Lower Hunter

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
Naturalised																								
Naturalised + legume																								
Paspalum																								
Setaria grass																								
Lucerne																								
Kikuyu																								
Kikuyu + N																								
Forage Crops																								
Forage sorghum																								
Jap./shirhoe millet																								
Annual ryegrass + N																								
Oats + N																								
Lab lab																								
Cowpeas																								
Turnips																								
Annual Legume forage																								

Key:

	High quality cattle feed, capable of achieving at least 75% of potential liveweight gain on pasture
	Feed inadequate in quantity and or quality to reliably provide for high livestock growth rates in 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 appropiate 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 for benchmarks on feed availability requirements for various levels of liveweight gain.

South Coast

Pasture types used in estimates:

Kikuyu. A kikuyu dominant pasture. Grazed rotationally at the 4½ leaf stage and top-dressed after each grazing over the growing period with 40 kg N/ha (90 kg urea or 120 kg ammonium nitrate/ha). Nutrition not limiting. Superphosphate applied at 20 kg P/ha/year, with any other nutrients applied as required. Paddocks are strategically mulched (approximately 3 times) over summer to reduce the build up of old runners (low digestibility). The legume content ranges from 5–10%. Management is intensive.

Forage sorghums. Sown when temperatures are sufficiently high usually in late October/early November. Sown with recommended rates of N, P and K. Top-dressed after each grazing with 50 kg N/ha. Grazing management is intensive with heavy stocking rates or harvested for fodder.

Oats. Sown in early February with recommended rates of N, P and K. Rotationally grazed every 4 to 5 weeks. Top-dressed with 40 kg N/ha after each grazing. Grazing is intensive.

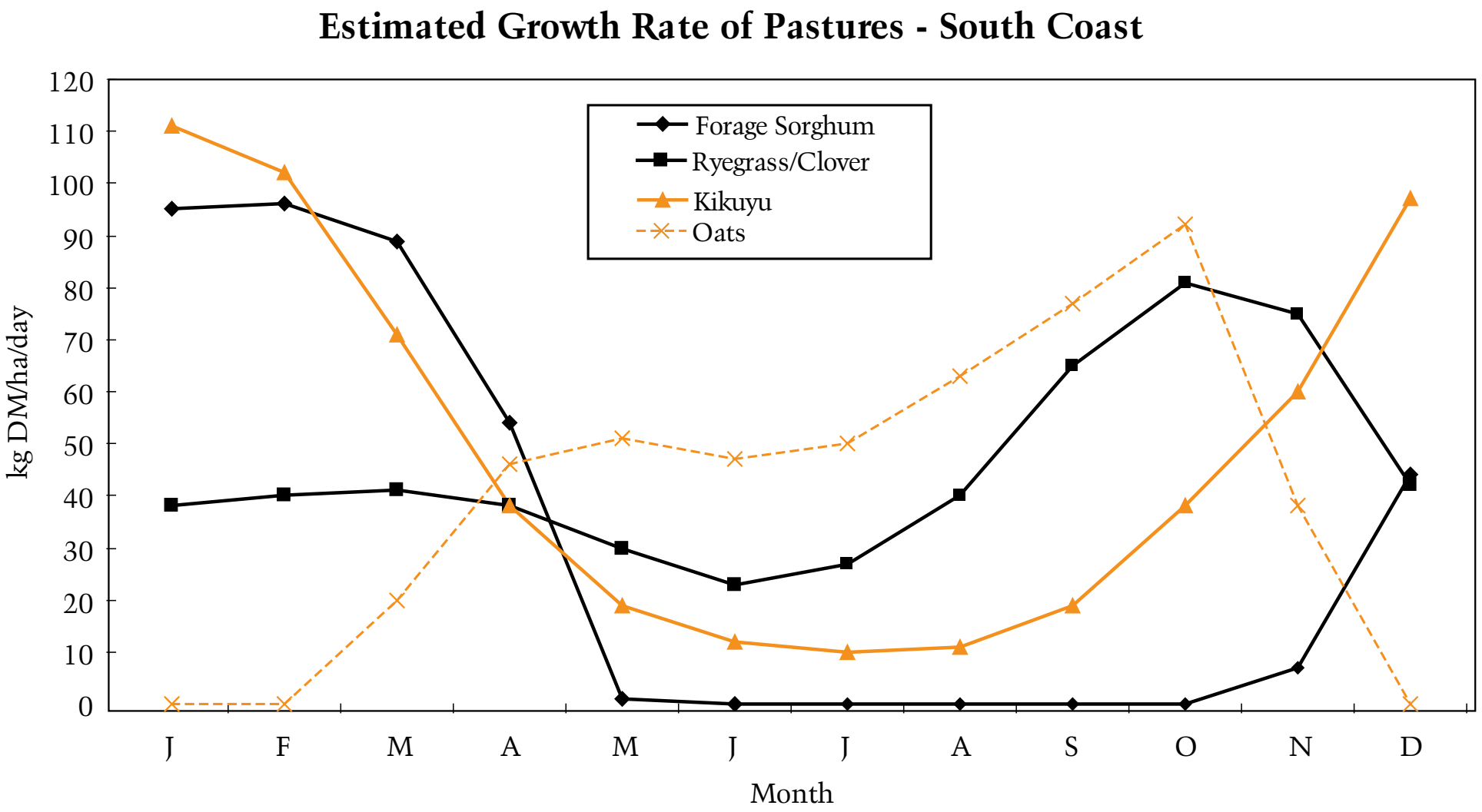
Perennial ryegrass/white clover. Perennial ryegrass with 10 to 30% white clover content. Rotationally grazed 2½ to 3 leaf stage (grazing interval of 18 to 20 days in the spring months, 35 to 40 days in the winter and at least 30 days in the summer). Top-dressed strategically during the autumn, late winter and spring with 40 kg N/ha (after each grazing). Paddocks are intensively grazed and fertilised with P, S, Mo and K as required.

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
Forage sorghum	95	96	89	54	1	–	–	–	–	–	7	44
Ryegrass/clover	38	40	41	38	30	23	27	40	65	81	75	42
Kikuyu	111	102	71	38	19	12	10	11	19	38	60	97
Oats	–	–	20	46	51	47	50	63	77	92	38	0

Note: The wide variation in pasture growth that occurs between years has to be considered. For example, the computer growth model (GrassGro) predicts growth rate could vary as follows (in relation to the median – using a native grass* and ryegrass# as representatives of warm season and cool season species):

	Good growing conditions	Poor growing conditions
Spring#	113 per cent above	92 per cent below
Summer*	77 per cent above	19 per cent below
Autumn*	32 per cent above	57 per cent below
Winter#	16 per cent above	74 per cent below


Estimated Growth Rate of Pastures - South Coast
kg DM/ha/day
120
110
100
90
80
70
60
50
40
30
20
10
0
Forage Sorghum
Ryegrass/Clover
Kikuyu
Oats
J
F
M
A
M
J
J
A
S
O
N
D
Month

Far South Coast

Pasture types used in estimates:

Kikuyu. A kikuyu dominant pasture. Grazed rotationally at the 4½ leaf stage and top-dressed after each grazing over the growing period with 40 kg N/ha (90 kg urea or 120 kg ammonium nitrate/ha). Nutrition is not limiting with 20 kg P/ha/year applied with other nutrients applied as required. Strategically mulched (approximately 3 times) over summer to reduce the build up of old runners (low digestibility). The legume content varies from 5–10%. Paddocks are intensively grazed.

Forage sorghums. Sown in late October/early November once temperatures are sufficiently high. Sown with recommended rates of N, P and K. Top-dressed after each grazing with 50 kg N/ha. Grazing management is intensive with heavy stocking rates or harvested for fodder.

Oats. Sown in early February with recommended rates of N, P and K. Rotationally grazed every 4–5 weeks. Top dressed with 40 kg N/ha after each grazing. Grazing is intensive.

Perennial ryegrass/white clover. Perennial ryegrass with 10 to 30% white clover content. Rotationally grazed 2½ to 3 leaf stage (grazing interval of 18 to 20 days in spring, 35 to 40 days in the winter and at least 30 days in the summer). Top-dressed strategically during the autumn, late winter and spring with 40 kg N/ha after each grazing, with fertiliser applied so that nutrition is not limiting.

Japanese millet. Sown at the end of September into early October with recommended rates of nutrients. They are intensively grazed at high stocking rates.

Native pasture. These pastures consist of weeping grass (*Microlaena stipoides*), love grass (*Eragrostis curvula*), with lesser amounts of annual grasses and broadleaved weeds. Legume content 5–10% consisting mainly of *Glycine* and *Desmodium* species. Nutrition is less than adequate with around 62.5 kg superphosphate/ha (or equivalent) at 1 to 2 year intervals. Fertiliser history is sporadic. Paddocks have low stocking rates relative to carrying capacity.

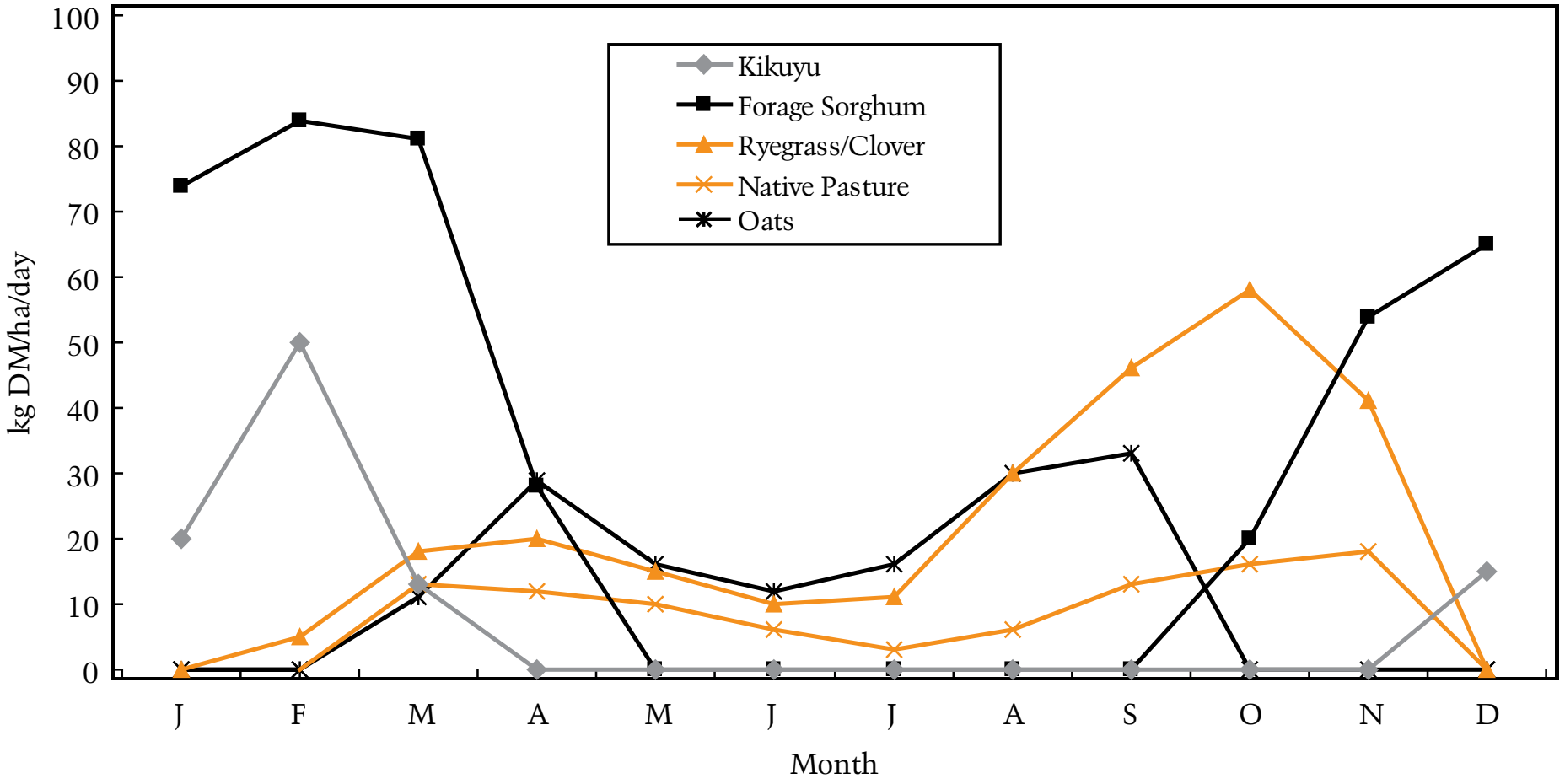
Estimated pasture growth rate (mid month) of specific pasture types (kg DM/ha/day)

	J	F	M	A	M	J	J	A	S	O	N	D
Kikuyu	20	50	13	0	0	0	0	0	0	0	0	15
Forage sorghum	74	84	81	28	0	0	0	0	0	20	54	65
Ryegrass/clover	0	5	18	20	15	10	11	30	46	58	41	0
Native pasture	0	0	13	12	10	6	3	6	13	16	18	0
Oats	0	0	11	29	16	12	16	30	33	0	0	0

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 information rate information on pastures indicate the following variability in seasonal production based on using perennial ryegrass* 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. Seasonal growth could vary as follows:

	Good growing conditions	Poor growing conditions
Spring*	108 per cent above	79 per cent below
Summer#	43 per cent above	65 per cent below
Autumn#	43 per cent above	26 per cent below
Winter*	71 per cent above	66 per cent below

Estimated Growth Rate of Pastures - Far South Coast



Riverine Plain (South West Plains)

Pasture types used in estimates:

Dryland

Annual pasture. Consisting of sub clover and invaded by significant annual ryegrass, barley grass, some vulpia and broadleaved weeds. The subterranean 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&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 & 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/subterranean clover. A similar pasture to the pasture above, except that it is sown with an additional 3.5 kg/ha of subterranean 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 are 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

Annual ryegrass/subterranean clover. High producing pasture, sown with late maturing subterranean clover at 10 kg/ha. With 250kg/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 once established. First irrigation taking place 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 per cent 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.

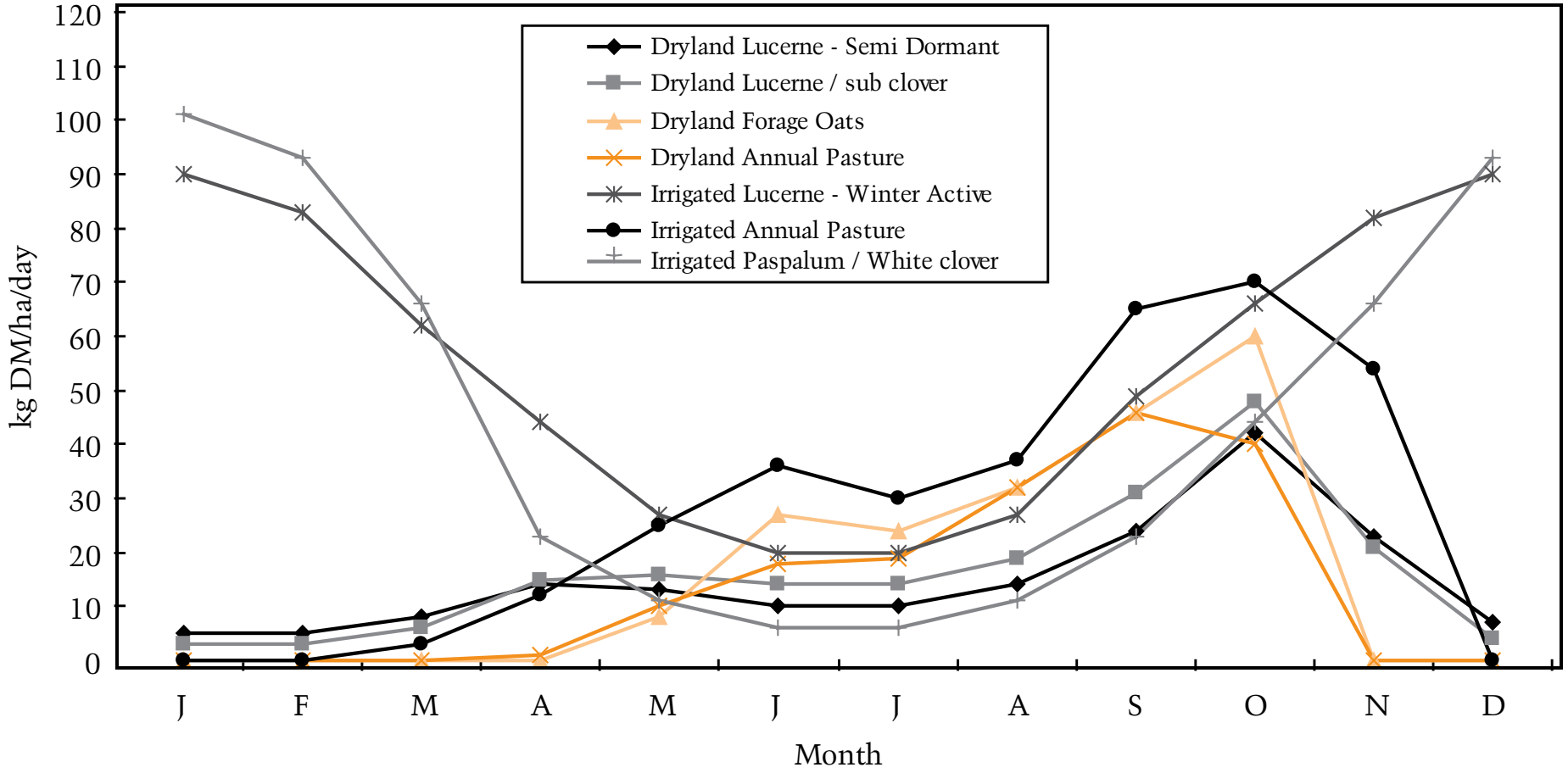
Estimated pasture growth rate (mid month) of specific pasture types (kg DM/ha/day)

	J	F	M	A	M	J	J	A	S	O	N	D
Dryland												
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												
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

Note: The wide variation in pasture growth which occurs between years needs to be remembered. For example, the computer growth model used to help generate these median values predicts the growth rate could vary as follows:

	Good growing season	Poor growing season
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

Estimated Growth Rate of Pastures - South West Plains



North West Plains Cropping Belt

Estimates of daily growth of pastures as shown on the accompanying graphic are based on the following descriptions of typical pastures for the North West Plains cropping zone. They are based on clay soils at Narrabri, using long term average rainfall records. Models such as GrassGro and Growest have been used as well as research results of Mr T Launders to construct basic curves. Additionally the experience of agronomists and producers in the area have been used to modify curves to reflect likely responses of typical pasture mixes used in the area (see acknowledgements).

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&S levels moderate only.

Medic dominant. Main species present burr medic but also a range of winter growing grasses (eg 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 & 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 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&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

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	1	2	2	5	10	17	25	37	31	14	2	1
Native grass/a 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

Variation in feed supply

Note: The wide variation in pasture growth that occurs between years has to be considered. For example, the computer growth model (GrassGro) used to help generate these values predicts the growth could vary as follows (in relation to the median – using a native grass* and medic# as representatives of warm season and cool season species respectively):

	Good growing conditions	Poor growing conditions
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

Note: Due to the variation described above, it is extremely important that these estimates be used only as a guide to pasture and fodder crop growth rates. On individual properties, modification must be made for differences in soils and rainfall to those used in these estimates as well as the differences in pasture composition, nutrition, grazing management and stocking rate.

Acknowledgements

This information has been compiled by W McDonald, Technical Specialist (Pastures), Tamworth. Thanks are expressed to the following people for information provided and for on-going feedback and assistance:

- T Launders 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 Moree, and
- B Clarke, R Everly, C Burchell, L Serifin, C Cole and A Bowman – former agronomists working on the NW Plains.

Estimated Growth Rate of Pastures - NW Plains Cropping Belt