Mowanjum Irrigation Trial

Alternative fodder options for irrigated pasture

While the most common pasture for 'Stand and Graze' in the Kimberley and Pilbara is Rhodes grass, in part due its resilience and robustness, alternative fodder options with high energy and protein exist which have the potential for increased feed conversion.

Rhodes grass

Rhodes grass is the most common commercially grown perennial tropical (C4) grass, particularly on Pindan soils. High hay or silage production with growth rates of at least 100kg Dry Matter (DM) per ha per day can be achieved (Table 1). With high rates of nitrogen application, daily growth rates of >150kg DM/ha are achievable. Nutritional value is heavily influenced by the stage of growth, the rate and timing of defoliation (by cutting or grazing), plant nutrition and the season.

There is a substantial trade-off between biomass production and quality. The greatest biomass production is achieved as plants move into the flowering stage. This comes at the expense of much lower nutritional value (Table 2), as stem is significantly lower in quality than leaf (5-15% units lower in digestibility) and 2-3 Megajoules (MJ)/kg/DM lower in Metabolisable Energy (ME). At early flowering, the forage may only be about 60% leaf. Hay cut after 35-40 days has relatively low feed quality and is less suitable for growing animals unless used as part of a mixed ration with an energy and protein source.

Stand and Graze systems require specialist management to achieve daily growth rates above 0.5kg/head/day. ME needs to be > 9.5 MJ/kg DM to achieve 0.7kg/head/day which Mowanjum is currently achieving. Sward management strategies need to be designed to maximise the amount of leaf produced relative to stem. Optimal management is likely to require shorter rotational grazing periods and high grazing pressures. Otherwise, the result is that some areas are left un-grazed or under-grazed which leads to rank growth with low palatability and the need to mow the pasture.

Crude protein of the leaf fraction can be nearly double that of the stem fraction. There is little accumulation of water soluble carbohydrates in Rhodes grass, unlike forage sorghum. High temperatures increase lignin content, reducing palatability and feed intake. In the cooler months, plant growth is lower but feed quality tend to be higher (up to 1 MJ/kg DM).

Species	Cultivar	t/ha 14d	GR (kg/ha/d)	t/ha 13d	GR (kg/ha/d)	t/ha 27d	GR (kg/ha/d)
Rhodes grass (tetraploid)	Callide	0.93	67	0.79	61	2.74	102
Rhodes grass (diploid)	Reclaimer	1.00	71	0.70	54	2.73	101
Panic grass	Megamax059	1.09	78	0.62	48	2.29	85

Table 1. Two week and four week growth rates for perennial grasses (July-Aug 2017) in Broome (Pindan soil with N supplied @ 1 kg N/ha/d. Plots cut 3 Aug (14d) and 16 Aug (13 and 27d) at 8-9 cm height – regrowth from 20 July.

The impact of cooler (night) temperatures that restrict plant growth is likely to be higher in inland areas than coastal environments. Rhodes grass can be grown on clay soils but establishment can be more difficult and plants are intolerant of extended flooding (>15 days) or inundation.

OTHER FODDER OPTIONS

Feed quality of direct grazing systems could be lifted with the inclusion of; legume forage as a companion to Rhodes grass; by using alternative fodder species; or by adding feed supplements. Legume options are limited. Lucerne and cowpea have had limited success, but even where growth has been acceptable, their persistence is compromised by selective grazing. Selective grazing can be avoided if the plant material is cut as hay.

Lucerne (*Medicago sativa*) is the most widely grown perennial legume under irrigation worldwide. Lucerne is less suited to the extreme temperatures in the Kimberley from October to April. In humid environments it is susceptible to diseases and pests leading to a short stand life (e.g. 2-3 years in Northern Territory).

Lablab and cowpea are options suitable for irrigation, especially during the dry season. A number of other legumes are currently not approved for use on pastoral leases due to their weed status, for example siratro, Leucaena and butterfly pea. A project to develop a 'sterile' or seedless Leucaena is currently underway, however it will be well into the next decade before a commercially available sterile Leucaena would be available.

Annual forage sorghums tend to be well adapted and can be of higher feed quality but require frequent re-sowing and grazing management to avoid prussic acid toxicity. Perennial sorghum (cv. Jaffa) has high growth rates, but the feed quality is comparatively low and its best role may be as a pioneer crop on newly cleared land as its vigorous growth will compete strongly with regrowth. Pearl millets can avoid the problem of prussic acid but tend to be more rapid in their development and are a shorter term proposition.

Cultivar	NDF (%)	ADF (%)	CP (%)	ASH (%)	OM (%)	DMD (%)	DOMD (%)	ME MJ/kg DM	WSC (%)
Panic grass (73d)									
Mmax 059	59.5	31.5	18.1	12.0	88.0	61.5	59.0	9.0	<4.0
Mmax 059 leaf	60.5	29.5	21.5	12.0	88.0	65.5	62.0	9.7	<4.0
Mmax 059 stem	70.0	39.5	10.0	10.0	90.0	51.0	49.5	7.1	<4.0
Rhodes grass (73d)									
Callide	61.0	36.0	15.2	11.0	89.0	57.5	55.5	8.3	<4.0
Callide leaf	57.5	33.5	18.4	13.0	87.5	60.0	57.5	8.7	<4.0
Callide stem	65.5	40.5	11.9	10.0	90.0	50.0	49.5	7.0	<4.0
Reclaimer 30d regrowth 30cm *(Wallal)*	62	30	10.6	10	90	65	62	9.5	8.3
Sorghum									
61 days									
Finerdan	58.5	30.0	16.0	9.0	91.0	65.5	62.5	9.7	7.1
Sugargraze	58	28	13.1	9	91	68	65	10.1	10.4
73 days									
Finerdan	62.0	31.5	14.7	9.0	91.0	62.0	59.5	9.1	8.1
Sugargraze	62	30	13.5	8	93	64	61	9.5	7.0
Sweet Jumbo leaf	60	26	17.6	9	91	66	63	9.8	<4.0
Sweet Jumbo stem	56	30	9.6	12	89	61	59	8.9	11.6
102 days (seed fill)									
Finerdan	49.5	28.5	11.2	5.5	95.0	63.5	60.5	9.3	12.6
Sugargraze	50	26	8.9	5	95	68	65	10.1	16.4
BMR Octane	55	26	7.5	6	94	71	67	10.6	15.2
Finerdan regrowth (30d)	62	30	18.3	9	91	65	62	9.5	4.1
Lucerne *(Pardoo)*	42	29	22.9	12	88	74	70	11.1	5.6

Table 2. Examples of feed quality from Kilto field trials (2016)

Note: *NDF – Neutral Detergent Fibre, ADF – Acid Detergent Fibre, CP – Crude Protein, OM – Organic Matter, DMD – Dry Matter Digestibility, DOMD – Dry Organic Matter Digestibility, ME – Metabolisable Energy, WSC – Water Soluble Carbohydrates, GR – Growth Rate.*

An alternative perennial grass option is panic grass (*Megathyrsus maximus*) which is a tufted, leafy bunch grass. Most varieties are reasonably drought tolerant but are intolerant of waterlogging or flooding. Panic grass tends to be of higher feed quality than Rhodes grass, with higher fertiliser requirements and typically less biomass production. The new variety of panic grass Mmax 059 has consistently been 5% units higher in digestibility and 1 MJ/kg DM higher in metabolisable energy (Table 2).

Other perennial grass options that have been tested have comparatively low biomass production or problematic establishment including Bambatsi panic (suited to cracking clay soils but low biomass production), Jarra grass and Premier digit grass.

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