Productive and profitable dual purpose winter wheats for tablelands and slopes

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Abstract. Dual purpose winter wheats return gross margins of over $580/ha, and beyond $1000/ha. Typical grazing dry-matter production is 4000 kg/ha plus 2.5-5.0 t/ha grain (up to 7.0 t/ha). Grain yield is typically 90 percent of grain only crops, but is often 100 percent in wetter areas and/or years. Deeper rooting is a possible reason for the good yields. High yields are only achieved if crop production standard is high. Choice of variety is an important consideration. Marombi is a standout slopes variety. Mackellar is probably the best tablelands variety, except for very cold areas where Tennant is probably more suitable.

Economics

Grazing production

Typical grazing production, given good management, is around 60-120 days at 25 dse a hectare for slopes and tableland districts. A crop sown early March, with one (or more) follow up rain event (to ensure adequate secondary root development), can be ready for grazing from early May onwards. Grazing can take place until around early August (inner slopes) to early September (tablelands), with minimal impact on grain recovery. Typically grazing production over this period is 3000- 5000 kg/ha drymatter. These utilisation levels allow for wastage (trampling). Better utilisation is achievable with careful management.

Grazing quality and live-weight gains

Winter wheats, given good soil fertility, generally have high grazing quality. In the vegetative stage nutrient levels are normally protein 20-25 % (drymatter basis), dry matterdigestibility 70-75 %, and energy 10.5-11.2 ML/kg. Moisture content of green material is generally 80-85%, good for animal performance. CSIRO research showed lambs on average grew 23% faster on winter wheat (Tennant, Gordon) than on oats (Blackbutt). Farmers regularly claim prime lamb growth rates of up to 320 grams/lamb/day and beef of up to 1.5 kg/day/beast.

A typical tableland grazing duration is 100 days at 25 dse/ha (or 2.5 beasts/ha). In a steer fattening enterprise, with gains of 1.0 kg/day, valued at $2.00/kg, gross return is $500/ha. Some farmers

Table 1. Grazing production (gross $/ha), steers, from winter wheat

Stocking rate, steers/ha	Weight gain/day(kg)	Value $2.00 kg		
		120 days	80 days	100 days
2.0	1.0	$480	$320	$400
2.5	1.0	$600	$400	$500
3.0	1.0	$720	$480	$600
2.0	1.1	$528	$352	$440
2.5	1.1	$660	$440	$550
3.0	1.1	$792	$528	$660

achieve higher stocking rates by carefully rationing available feed (for example the use of electric fencing) and better weight gains.

Grain return

Grain yield following grazing is typically 90 percent of grain only crops sown at more traditional times (eg May). The good grain yield following grazing is believed to be partly because early sown crops root deeper, and are able to secure more moisture and nutrients.

Winter wheats range in grain quality from Australia Prime Hard (Wedgetail in southern NSW), Australia Hard (Wylah), Australian Standard White (ASW) (Whistler, Marombi) and feed grade (Mackellar). While varieties with higher grades often offer increased marketing options, many growers achieve feed grade prices similar to ASW grade. Feedlots, poultry and dairy farms often forward buy feed grains at ASW prices.

Grain yield is commonly 2.0-5.5 t/ha, and can be higher than 7.0 t/ha in very good years. At prices of around $160/t (farm basis) grain returns from dual purpose wheats typically can return $320 (2.0 t/ha) to $800/ha (5.0 t/ha).

Gross margin per ha

Grazing and grain can partly substitute for one another. Returns from fattening may be high but grain values low. It may pay to extend the grazing period at the expense of grain recovery. Conversely livestock returns can be low but grain prices high. Restricted grazing can add to grain prospects, especially in a drier year.

From tables 1 and 2 it is clear that dual purpose winter wheat can be extremely profitable, with gross returns of over $1000/ha possible. Gross margin costs (see DPI internet site) are around $260/ha. Gross margin return of $400-$800/ha are commonly achieved.

Paddock selection

Soils

Winter wheats do well on a wide range of soil types. Deep well-drained soils are ideal as they maximise the opportunity to store sub soil moisture. Early sown wheat can root to two metres, given suitable soil conditions. Winter wheats can tolerate waterlogging for short periods, although with reduced production. Triticale tolerates lengthy water logged better than wheat.

Acid soils

Generally winter wheats perform best where the surface and sub-soil pH is 4.8 or higher, and with little or no soluble aluminium. There is a range of variety tolerance to low pH. Oats and triticale are better in extremely acid soils. Where soil acidity is an issue, lime application is generally a more than profitable option.

Weed control

Winter wheat crops require a very high standard of weed control, otherwise often scarce moisture, nutrients and sunlight are wasted. Management should aim to reduce weed numbers and keep them low as part of an ongoing program. It is advisable to begin weed control in at least the year prior to cropping. For example if the paddock is coming from pasture totally prevent weeds such as ryegrass, from seeding in the spring prior to cropping.

Winter wheat is generally sown on the first late summer/autumn rain and there is often no chance

Table 2. Grain production returns ($/ha) from dual purpose winter wheat crops

Grain Yield (t/ha)	Grain return ($ tonne)				
	$120	$140	$160	$200	$220
1.5	$180	$210	$240	$300	$330
2.0	$240	$280	$320	$400	$440
2.5	$300	$350	$400	$500	$550
3.0	$360	$420	$480	$600	$660
4.0	$480	$560	$640	$800	$880
5.0	$600	$700	$800	$1000	$1100
6.0	$720	$840	$960	$1200	$1320

Table 3. Suggested sowing times for dual purpose grazing and grain (slopes)

	February				March				April			
Weeks	1	2	3	4	1	2	3	4	1	2	3	4
Variety												
Marombi			>	>	*	*	*	*	*	*	<	<
Rudd, Mackellar, Dennis, Brennan			>	>	*	*	*	*	<	<	<	
Wedgetail, Wylah, Whistler, Sunsoft 98, Currawong, Rosella, Pardolote, Lorikeet, Thornbill			>	>	*	*	*	*	*	*	<	<

to control winter weeds prior to sowing. Many winter weeds don't normally begin germinating until well into autumn, long after the crop should have been sown. Good summer weed control is important for disease control and conserving sub soil moisture.

Herbicide withholding periods (before grazing)

Some herbicides have a withholding period before stock can graze the crop (eg 70 days).

Sowing time

For winter wheat to provide good grazing plus good grain yield, it must be sown early (see Table 3). Later sowing results in poor total winter production, although grain recovery can still be very good.

Grazing season growth rates from early sowing can average 30-60 kg/ha/drymatter/day when crops are sown early, when conditions are good and management sound. Pastures in contrast often only grows at 5-10 kg/ha/day. Growth from late sown wheat is generally poor.

Sowing time depends on the district. February is commonly the time to aim for on the tablelands. On the inner slopes late February/early March is more suitable. Very hot conditions can cause poor germination. For any district the early sowing window generally extends for four to six weeks.

Timing opportunities

Most areas often experience low and erratic rainfall through the desirable sowing time. It is important to be ready to sow on the first suitable opportunity (eg the first feasible rain event) within the sowing "window". A missed sowing opportunity in commonly a missed opportunity of plentiful winter feed from the winter wheat.

Storing sub-soil moisture

Stored sub-soil moisture increases the probability of successful early sowing and survival should a dry autumn follow. Paddocks with suitable soils that have good moisture storage ensure high reliability of winter forage and grain production. Every mm of stored available moisture can be worth 10 to 20 kg/ha of forage or/and grain. Stored soil moisture of 150 mm can therefore be worth an additional 3000 kg/ha of drymatter/grain, especially in a dry year.

Choosing varieties

Varieties are chosen on attributes such as climate (rainfall, temperature), soil type (especially acidity), grain quality, tolerance to diseases and climate risks (eg grain pre harvest sprouting tolerance), straw strength, head type (bearded, non-bearded), and performance (see Table 4). No variety has all the desirable attributes and choice depends on balancing risk factors.

Maturity

Varieties with late maturity and a long cold requirement are suited to areas with long cold winters (e.g. Monaro). Varieties with quick maturity and a low cold requirement suit warmer areas (slopes districts). There is a range of varieties between the contrasting slow and quick maturing types. Varieties like Marombi tend to have ideal winter habit and maturity for slopes areas. Varieties with a longer winter habit than Marombi (eg Mackellar), but not as long as Tennant, suit many typical tableland areas.

Wet weather tolerance of grain

Red wheats generally have inherent superior grain tolerance to wet weather.

Figure 1.

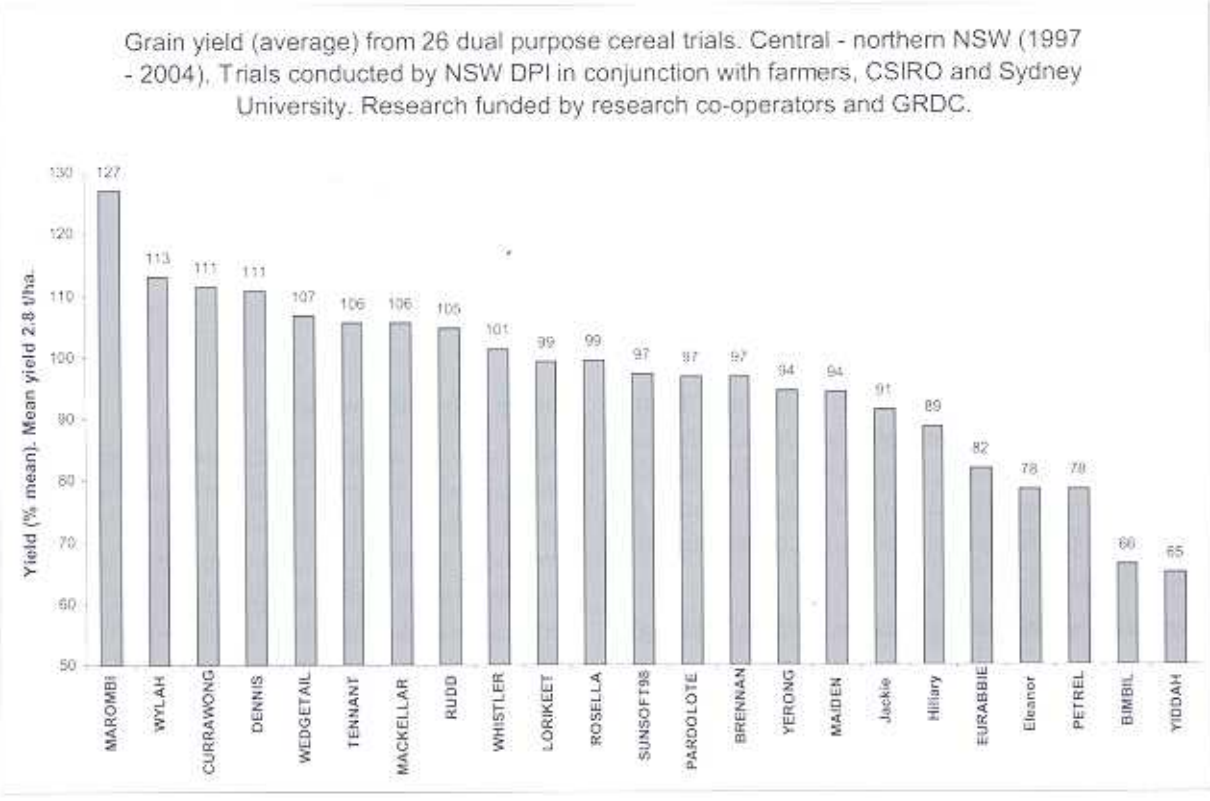

Table 4. Characteristics of current winter wheat varieties

Variety	Maturity	Quality grade and grain colour	Stripe Rust	Septoria tritici blotch	Yellow leaf spot	BYDV resist-ance	Bearded/ Non bearded (awns)	Pre-harvest sprout tol	Acid soils tol-	Year reg'ed
Brennan *	mid-late	Feed. W	8 (6)	-	-	-	NB	-	-	1998
Currawong	mid-early	Feed. W	5	6	5	-	B	2	7	1994
Lorikeet*	mid-early	ASW-N. W	3	7	2	-	B	2	2	2001
Mackellar *	mid-late	Feed. R	6	-		R	NB	T	MT	2003
Wedgetail	mid-early	PH. W	5	6	-	-	B	2	7	2002
Pardalote *	mid-early	APW. W	5	6	-	-	B	-	6	2000
Rosella	mid-early	ASW-N. W	5	5	2	-	B	3	2	1985
Rudd *	mid-late	Feed. R	8 (6)	R	R	T	NB	T	MT	2002
Marombi	mid	ASW. W	8 (5)	-	4	-	NB	MT	-	2001
Sunsoft 98 *	mid-early	ASWN. W	2	5	4	-	B	2	2	1998
Tennant *	Late	Feed. R	6	MR	6	T	NB	VT	-	1998
Thornbill *1	mid-early	Bis. W	5	5	2	-	B	2	2	2000
Whistler *	mid-early	ASW. W	4	5	-	-	B	2	7	1998
Wylah *	mid-early	AH. W	4	6	5	-	B	2	3	1999

Scoring. = insufficient data, 1 = poor, 9 = good. VT = very tolerant, T = tolerant, MT = moderately tolerant, Mse = moderately sensitive, Se = sensitive, R = resistant, MR = moderately resistant, MS = moderately susceptible, S = susceptible, NB = non-bearded, B = bearded, Bis = biscuit wheat, provided stringent quality requirements met (usually means only growing under contract). ASW-N = noodle. W = white grain, R = red grain.

Bearded verse non-bearded

Non-bearded can be an advantage in a dry spring or drought when crops may be grazed out. If a crop is spring frosted non-bearded crops better suit should they be fed off or cut for hay.

Other variety features

Barley yellow dwarf virus can be devastating. Varieties with resistance overcome this risk. There is considerable variety variability to factors like soil acidity, grain quality, herbicide tolerance, and relative performance (see Figure 1).

Sowing rate

High sowing rates generally increase grazing production, especially in the first 6-14 weeks after sowing. High rates normally have no negative effect on grain yield or quality. Suggested sowing rate for slopes is 90 kg/ha (160 plants sq m) and for tablelands 100-120 kg/ha.

Crop nutrition

Productive winter wheat crops require high soil fertility. Table 5 indicates the amount of the major nutrients required for a crop at various grazing/grain yield levels. While total nutrient requirement is high, a lot is recycled via urine, dung, and trampled plant material rotting back into the soil. However in the main these will not be re-available for the current crop. Recycled nutrients, especially from dung and urine, will not be evenly re-distributed across a paddock.

Table 6 is for monitoring long term paddock nutrient balances. Nitrogen is re-cycled quickly, often well in time for the next crop, but nutrients like phosphorus may re-cycle slowly. Potash and sulphur generally recycle moderately quickly. Potash and sulphur are more important to dual-purpose cereal crops and need monitoring.

Grazing management

Crops can be grazed once plants can't be pulled out by stock, generally being after the development of the secondary root system. Grazing can commence

Table 5. Nutrients required for growing a winter wheat crop

Grazing yield + grain yield		Kgs			
t/ha/drymatter	t/ha/grain	Nitrogen	Phosphorus	Potash	Sulphur
2	2	112	11	44	6.4
2	4	154	16	52	10
2	6	196	22	62	13.6
4	2	182	16	80	9.2
4	4	224	22	88	12.8
4	6	266	27	96	16.4
6	2	252	22	116	12
6	4	294	27	124	15.6
6	6	336	32	132	19.2

Table 6. Nutrient removed by a winter wheat crop

Grazing yield + grain yield		Kgs			
t/ha/drymatter	t/ha/grain	Nitrogen	Phosphorus	Potash	Sulphur
2	2	55	6.8	8.4	3.8
2	4	101	12.8	16.4	6.8
2	6	147	18.8	24.4	9.8
4	2	64	7.6	8.8	4.6
4	4	110	13.6	16.8	7.6
4	6	156	19.6	24.8	10.6
6	2	73	8.4	9.2	5.4
6	4	119	14.4	17.2	8.4
6	6	165	20.4	25.2	11.4

6-8 weeks after emergence in good growing conditions.

If crops are grazed too early, even if anchored, growth rates will be slower. Maximum growth generally occur when plants are around 15cm tall (depends on varieties) and dry-matter levels are around 1500-4000 kg/ha. If any greater, plants tend to be inefficient because of shading and senescence of lower leaves. Sometimes earlier than desirable grazing is required (eg feed is desperately required). Provided plants are well anchored early grazing is not harmful to the crop, but the penalty is slower regrowth.

Plants should be grazed back to 6-10 cm height or about 1000-1500 kg/ha dry-matter to ensure maximum speed of regrowth. Crops will regrow if bared off (provided still in the winter habit stage with the growing point at ground level) but it will be much slower.

Depending on variety, winter habit runs out around the second half of July (quicker maturing winter wheats) to late August (slower maturing varieties). Once winter habit runs out the growing point rises up the stem and the plant behaves as a spring wheat. If grazing removes the growing point the tiller dies. Sometimes new growing points can form from the base of the plant, but these are generally weaker and smaller tillers, and develop much later than is desirable for good grain recovery. If conditions are dry re-tillering is almost always poor.

Ideally grazing should end when winter habit has ended. If grazing is to continue the crop should be monitored carefully and grazing pressure regulated so that grazing does not remove plant material below the growing point. Once the winter habit stage has ended, crops quickly grow to where it is no longer possible to restrict grazing to above the growing point. It is relatively easy to monitor plants to determine if the growing point is moving up the stem and if therefore winter habit has ended.

Disease and pest control

Winter wheats should be sown as part of an integrated cropping/pasture program to minimise risks from root and crown rot diseases, as well as leaf diseases. The same diseases and pests that confront spring wheat production are also relevant to winter wheat production.

Further reading

Winter Crop Variety Sowing Guide 2005 Productive Dual Purpose Winter Wheats