QUALITY WHEAT
CRC PROJECT REPORT

Current Australian Wheat Varieties
Grain Quality Data

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Current Australian Wheat Varieties: Grain Quality Data

This report lists information about a large number of Australian cultivars of wheat, providing one-page summaries of each. Also provided in a series of tables are data relevant to grain quality and their suitability for specific aspects of marketing and processing. The choice of varieties for inclusion was based on varietal recommendations by AWB Ltd for the 2001/02 season, as indicated in Table 1.

The one-page summaries are taken from annual reports by Bob Cracknell (AWB Ltd) to the Cereal Chemistry Division of the Royal Australian Chemical Institute, in his position as Convenor of its Cereal Varieties Subcommittee. Table 1 lists the dates of the reports from which this information was taken, and also grade acceptability for many varieties in the 2001/2002 harvest. Further information about the relative performance of varieties has been provided, often at the time of release; this information has been collated by Di Miskelly. It is important to realise that these reports were prepared at the time of release of the varieties, and they therefore do not reflect the track records that have since been established for them.

Details are also summarised in Table 2 for hardness, glutenin alleles, waxy genes and polyphenol oxidase activities. Indications of the popularity of the top 50 varieties are provided in Table 3, as the ranking of varieties according to volume of delivery in the 1998/99 harvest, Australia-wide.

The pedigree charts (Figures 1 and 2) are reproduced from "Pedigrees of top Australian wheat varieties - Appendix III" in 'Review of Program 1. New Wheats and Breeding Aids', Report No 36 of the Quality Wheat Cooperative Research Centre, Sydney. This CRC Report provides further information about Australian wheat varieties, as a reproduction of a chapter by O'Brien, L., Morell, M., Wrigley, C., and Appels, R., entitled "The genetic pool of Australian wheats" in "The World Wheat Book" (O'Brien *et al.*, 2001).

The subunit composition of the glutenin protein of Australian wheats

In recent years, there has been an increasing awareness of the value of knowing the glutenin alleles of wheat varieties. Recent blending research of the Quality Wheat CRC is an example of the general significance of this information (Bekes *et al.*, 1998). The subunit details are of particular value in selecting for dough properties in wheat breeding, as has been described by Cornish *et al.* in several reports (e.g. Cornish *et al.*, 1993-2001).

A better understanding of the functional properties of the glutenin protein of dough is provided by considering their allelic constitution of the subunits. About half of the proteins making up the gluten of dough are gliadins - smaller monomeric proteins that appear to act as lubricants in dough. The other half of the protein is glutenin – a collection of disulfide-crosslinked polypeptides with a range of sizes, measuring up to tens of thousands of Daltons in molecular weight. They probably include some of the largest protein molecules in nature. The individual polypeptides ("subunits" or protein chains) that make up glutenin are divided into two classes ...

- **the high-molecular-weight (HMW) subunits,**
  - numbered as subunits 1, 2, 3,...,
  - making up about one quarter of glutenin,
  - synthesised under the control of the *Glu-1* genes, which are denoted by lower-case letters (*a*, *b*, *c*, ...). These are the letters shown in Table 4.
- **the low-molecular-weight (LMW) subunits,**
  - not with numbered subunits,
  - making up about three quarters of glutenin,
  - synthesised under the control of the *Glu-3* genes, which are also indicated by lower-case letters (*a*, *b*, *c*, ...). See Table 4.

Table 1. Grade acceptances (for 2001/2)[1] and sources of information about Australian wheat varieties in RACI Reports[2]

Variety	Acceptability for Prime Hard in 2001/2 [1]	Acceptability, Aust Hard (AH) 2001/2[1]	Acceptability, Aust Premium White (APW)[1]	Acceptability, other grades in 2001/2[1]	RACI reports[2]
Ajana				ASW-WA	1999
Amery		AH-WA			1994
Anlace				Soft -SNSW, SA	1999
Arnhem					1997
Arrino				Noodle-WA	1997, 98
Arrivato				Durum [NZ]	2000
Babbler					2001
Banks		AH-Vic			1979
Barunga		AH-SA			1994
Batavia	PH-Q, N/SthNSW				1991
Baxter	PH-Q, N/SthNSW				1999
Bculah					1994
Blade		AH-SA,WA			1985
Bowerbird					2001
Bowie				Soft-NSW,Vic,SA	
Braewood					2001
Brennan				Feed-all states	1999
Brookton					1997
BT Schomburgk		AH-SA			1992
Buckley				Soft-SA	
Calingiri					1997, 98
Camm			APW-SA,WA		1999
Carnamah		AH-WA			1997
Cadoux				Noodle-WA	1993
Cascades		AH-WA	APWT-WA		1995
Chara	PH-SNSW	AH-Vic			2000
Chough					1998
Clearfield JNZ					2001
Clearfield STL					2001
Cocamba		AH-Vic			1985
Condor		AH-Vic			1974
Corrigin				Soft-WA	1990
Cunderdin					1997
Cunningham	PH-Q, N/SNSW				1990
Currawong				Feed-all states	1995
Darter					1994
Datatine				Soft-WA	1995
Dennis				Feed	2000

Table 1 (continued). Grade acceptances (for 2001/2)[1] and sources of information about Australian wheat varieties in RACI Reports[2]

Variety	Acceptability for Prime Hard in 2001/2 [1]	Acceptability, Aust Hard (AH) 2001/2[1]	Acceptability, Aust Premium White (APW)[1]	Acceptability, other grades in 2001/2[1]	RACI reports[2]
Diamondbird		AH-SNSW,Vic			1998
Dollarbird		AH-SNSW,Vic			1988
Drysdale					2001
Eradu				Noodle-WA	1982
Excalibur					1991
Frame			APW-SA, Vic		1995
Goroke					1994
Giles	PH-Q, NthNSW				2000
Glover					2001
Goldmark		AH-Vic			1997
Gordon				Feed -Vic,SA	
H45,Galaxy		AH-SthNSW			1999
Gunderoi				Durum-SA	
Halberd			APWT-WA		1969
Hartog	PH-Q, N/SNSW				1982
Hybrid Apollo	PH-N/SthNSW				1996
Hybrid Gemini					1996
Hybrid Mercury	PH-Q, NthNSW				1996
Hybrid Meteor	PH-Q, NthNSW				1988
Hybrid Pulsar					1993
Janz	PH-Q, N/SthNSW	AH-Vic,SA,WA			1989
Kalannie		AH-WA			1997
Kamilaroi				Durum-Q,NSW,WA	
Karlgarin			APW-WA		2000
Kennedy	PH-Q, NthNSW				2000
Lorikeet					2001
Krichauff				ASW-SA	1997
Kukri		AH-SA			2000
Lang	PH-Q, NthNSW				2000
Leichhardt		AH-Q, NthNSW			1996
Machete		AH-SA,WA			1985
Mawson					1997
Meering		AH-Vic			1985
Mira			APW-Vic		2000

Table 1 (continued). Grade acceptances (for 2001/2)[1] and sources of information about Australian wheat varieties in RACI Reports[2]

Mitre		AH-Vic			2000
Mulgara					2001
Nyabing			APWT-WA		1997, 98
Ouyen		AH-Vic			1994
Pardalote					2001
Pelsart	PH– Qld				1993
Perenjori			APW-WA		1997
Petrie	PH-Q,NthNSW				2000
Rosella				Noodle-SNSW, Vic, ASW-SNSW,Vic	1986
Rowan					1993
Rudd					2001
Silverstar		AH-SthNSW,SA			1997
Snipe				Soft-SthNSW	1998
Stiletto			APW-WA		1994
Stretton			APW-WA		1994
Strzelecki	PH-Q,NthNSW				2001
Sunbri	PH-Q,N/SthNSW				1991
Sunbrook	PH-Q,NthNSW	AH-SthNSW			1996
Sunco	PH-Q,N/SthNSW				1987
Sunland					1993
Sunlin	PH-Q,NthNSW				1997
Sunmist	PH-Nth/SthNSW				1993
Sunsoft 98				NoodleSthNSW	1999
Sunstate	PH-Q,NthNSW				1993
Sunvale	PH-Q,N/SthNSW				1994
Swift					1994
Tailorbird		AH-SthNSW			1997
Tamaroi				Durum-SA,WA	1998
Tasman					1994
Tatiara				Soft-Vic,SA	1987
Tennant				Feed-all states	1999
Thornbill					2001
Tincurrin				Soft-WA	1978
Trident					1994
Triller					1995
Vectis					1994
Warbler				Feed-all states	1994
Wellstead					1994
Westonia			APW-WA		1997
Whistler				ASW-SthNSW	1999

Table 1 (continued). Grade acceptances (for 2001/2)[1] and sources of information about Australian wheat varieties in RACI Reports[2]

Wilgoyne		AH-WA			1988
Wollaroi				Durum-Q,NSW,WA	1994
Worrakata				ASW-SA	1998
Wylah		AH-SthNSW			2000
Wyuna				Soft-Vic	1985
Yallaroi				Durum-all states	1988
Yanac					1996
Yitpi		AH-Vic,SA			2000

[1] From "Preferred Wheat Varieties" Leaflet published by Grower Services Centre, AWB Ltd, Melbourne. This listing should serve as a general guide to variety preferences, but further advice should be obtained before making decisions e.g. about sowing or buying. Grade acceptability depends on other factors too, such as protein content.

[2] From reports in Annual Conference Handbooks of the Cereal Chemistry Division of the Royal Australian Chemical Institute. Variety sheets are not appended for Cascades, Gordon, Gunderoi and Kamilaroi.

Table 2. Quality-related attributes and genes in Australian wheat varieties

Variety	Hardness	HMW alleles [1]	LMW alleles [1]	*Wx-B1* [2]	PPO [3]
Ajana	Soft	bia	bhb	a	M
Amery	Hard	bic	bbb	a	L
Anlace	Soft	aca	cbc	b	
Arnhem	Hard	aia	bdb	b	
Arrino	Soft	bia	ab b,c	b	M
Arrivato	Durum				
Babbler	Hard	aia	bbc		
Banks	Hard	bba	bbc	a	L
Barunga	Hard	abd	cbc	b	
Batavia	Hard	aba	cbc	b	L
Baxter	Hard	afa	bha	a	M
Beulah	Hard	bba	cbb		
Blade	Hard	bia	bbb	b	M
Bowerbird	Hard				
Bowie	Soft	aca	b,c b c	b	
Braewood	Hard	aba	cbb		
Brennan	Feed			a	
Brookton	Hard	bia	cha	a	H
BT Schomburgk	Hard	a b,c a,d	cbc	b	M
Buckley	Soft	aca	cbc		

Table 2. (continued) Quality-related attributes and genes in Australian wheat varieties

Variety	Hardness	HMW alleles [1]	LMW alleles [1]	*Wx-B1* [2]	PPO [3]
Calingiri	Soft	bfa	dda		
Camm	Hard	acd	bhc	b	M
Carnamah	Hard	bca	cdc	b	M
Cadoux	Soft	bia	bba	b	M
Cascades	Hard	ac a,d	cba	b	L
Chara	Hard	bba	bbb	a+b	
Chough	Soft	bba	bbb	b	
Clearfield JNZ	Hard				
Clearfield STL	Hard				
Cocamba	Hard	bba	bbb	a	M
Condor	Hard	b,c ba	b,c bb	a	M
Corrigin	Soft	bba	bga	a	M
Cunderdin	Hard	bia	cda	a	M
Cunningham	Hard	aba	cbb	a	M
Currawong	Hard	aca	cbb		
Darter	Hard	bia	dbb		
Datatine	Soft	bba	ebb	a	L
Dennis	Feed				
Diamondbird	Hard	aid	bhb	b	
Dollarbird	Hard	aid	bhb	a	M
Drysdale	Hard				
Eradu	Soft	aia	cbb		
Excalibur	Hard	b,a b,i a	c,b b a		
Frame	Hard	abd	chc	b	M
Goroke	Hard	cba	bbb		
Giles	Hard	aia	bbc	a	?L
Glover	Hard				
Goldmark	Hard	aia	chb	a+b	M?
H45 (Galaxy)	Hard	aba	chb	a	
Gunderoi	Durum				
Halberd	Hard	a c,e d	ecc	b	
Hartog	Hard	aid	bhb	b	H
Hybrid Apollo	Hard	bbd	c b,g b	a	
Hybrid Gemini	Hard	caa	cgb	a	
Hybrid Mercury	Hard	bdd	ebc	a	
Hybrid Meteor	Hard	a,b b,i a,b	b,e bb		
Hybrid Pulsar	Hard			a	

Table 2 (continued). Quality-related attributes and genes in Australian wheat varieties

Janz	Hard	aba	bbb	a	M
Kalannie	Hard	b c d,a	b,c b c,b	b	M
Kamilaroi	Durum	ce	??		
Karlgarin	Hard				
Kennedy	Hard	aid	bhb	b	H
Krichauff	Hard	acd	cba	b	L
Kukri	Hard	abd	dhb		
Lang	Hard				L
Leichhardt	Hard	aid	ehb	b	H
Lorikeet	Soft	bba	bbc		
Machete	Hard	bia	bbb	b	M
Mawson	Feed/Hay			a	
Meering	Hard	bba	bbb	a	M
Mira	Hard	bba	bbb	b	
Mitre	Hard	bba	cbb	a	
Mulgara	Hard	abd	bbb		
Nyabing	Hard	a,b ed	d b,h b,c	b	M
Ouyen	Hard	bba	cbb	a	M
Pardalote	Hard	abd	cbc		
Pelsart	Hard	aba	cbb	a	M
Perenjori	Hard	bic	dba	b	H
Petric	Hard				?L
Rosella	Soft	bba	bbb	b	M
Rowan	Hard	aid	chb	b	H
Rudd	Feed				
Silverstar	Hard	a b,i a,d	b,c hb	b	M?
Snipe	Soft	cba	cbb	a	
Stiletto	Hard	acd	chc		
Stretton	Hard	bia	cbc		
Strzelecki	Hard				
Sunbri	Hard	aba	bbb	a	M
Sunbrook	Hard	aid	b,d h b	b	H
Sunco	Hard	aba	bbb	a	L
Sunland	Hard	aba	cbb	a	M
Sunlin	Hard	bia	dbb	b	M
Summist	Hard	aia	bbb	a	M-H
Sunsoft 98	Soft	bba	bbb	b	
Sunstate	Hard	aid	bhb	b	H
Sunvale	Hard	aba	bbb	a	H
Swift	Hard	bba	bbb		
Tailorbird	Hard	aid	bhb	b	
Tamaroi	Durum	cd			L
Tasman	Hard	bbd	bda		

Table 2 (continued). Quality-related attributes and genes in Australian wheat varieties

Tatiara	Soft	aca	cbc	b	M
Tennant	Feed			a	
Thornbill	Soft	cba	c,b b a		
Tincurrin	Soft				
Trident	Hard	acd	ehc		
Triller	Soft	b,c ba	bjb	a	
Vectis	Soft	aba	cba		
Warbler	Feed	bba	bjb		
Wellstead	Soft	bia	cbc		
Westonia	Hard	bia	chc	b	M
Whistler	Hard	bba	cbb	a	
Wilgoyne	Hard	bid	dhb	a	H
Wollaroi	Durum	cb			
Worrakata	Hard	acd	cbc	b	L
Wylah	Hard				
Wyuna	Soft	bia	chc	a	
Yallaroi	Durum	cf			
Yanac	Hard	bea	bbb	b	
Yitpi	Hard	abd	chc		

[1] Details provided by Geoff Cornish (SARDI, Adelaide). Further details in text.
[2] Details provided by Peter Sharp (Sydney University). Further details in text.
[3] Details provided by Daryl Mares (Sydney University). Further details in text.

The HMW subunits often appear as pairs (e.g. 5 with 10, 2 +12, and 17 + 18), because their synthesis is controlled by corresponding pairs of genes at the *Glu-1* locus. This is indicated in Tables 4, which lists the correspondence between the subunit numbers and the gene designations (alleles). For example, subunit 1 is synthesised under the control of allele *a* (also designated as *Glu-A1a*), and subunits 5 and 10, under the control of the allele *Glu-D1d*.

Further studies have provided estimates of the relative contributions of the various HMW subunits of glutenin to dough properties. These contributions are indicated in Table 4 as score numbers. The total score for a variety is based on the set of its three HMW subunits as the sum of the contribution from each subunit (one for each of the three genomes of wheat – A, B and D). For example, a score of 10 (highest possible) would be obtained for alleles *a*, *i*, and *d* (in each of the A, B and D genomes, corresponding to protein subunits 1, 17+18, and 5+10), derived from individual scores of 3, 3 and 4, respectively, according to Table 4.

Starch properties and the waxy genes

Important information about the suitability of wheat varieties for the manufacture of white-salted (udon) noodles is indicated by the presence or absence of the gene *Wx-B1* for the presence of the granule-bound starch synthase enzymes (GBSS). The synthesis of amylose by GBSS1 is determined by the presence (or absence) of three homoalleles on chromosomes 7As, 4AL and 7DS. Many Australian wheat varieties are 'null' for the second of these, giving them advantages in their starch properties for noodle production. This characteristic has been referred to as the 'Null-4A' gene, or more correctly, the '*Wx-B1b*' allele; the presence of this gene being '*Wx-B1a*'. This characteristic is listed in Table 2 for most varieties.

Table 3. Popularity rankings of varieties, based on delivery volumes (in tonnes) for the 1998/99 season (data provided by AWB Ltd in confidence).

Variety	Delivery for Australia (tonnes)	Breeding Program
Janz	2,326	Qld
Frame	1,282	Waite
Spear	1,026	Roseworthy
Stiletto	823	Roseworthy
Amery	784	Ag WA
Machete	721	Roseworthy
Eradu	684	Ag WA
Krichauff	468	Waite
Dollarbird	464	NSW
Carnamah	455	Ag WA
Cascades	447	Ag WA
Halberd	432	Roseworthy
Cunningham	417	Qld
Cunderdin	392	Ag WA
Cadoux	391	Ag WA
Sunstate	317	Sydney Univ
Excalibur	297	Roseworthy
Hartog	277	Qld
Perenjori	263	Ag WA
Blade	229	Roseworthy
Meering	222	Vic
Tincurrin	182	Ag WA
Sunbrook	175	Sydney Univ
Barunga	168	Waite
Wilgoyne	159	Waite
Kalannie	148	Ag WA
Ouyen	120	Vic
Batavia	119	Qld
Rosella	114	NSW
Datatine	111	Ag WA
Sunco	110	Sydney Univ
Aroona	109	Waite
Sunvale	103	Sydney Univ
Dagger	100	Roseworthy

Table 4. *Glu-1* dough quality scores assigned to HMW-glutenin subunits and corresponding alleles, according to Payne (1987). A high score (maximum of 10) indicates a prediction of strong dough properties.

Glu-1	*Glu-A1*		*Glu-B1*		*Glu-D1*	
Score	**Allele**	**Subunit**	**Allele**	**Subunit**	**Allele**	**Subunit**
4					*d*	5+10
3	*a*	1	*i*	17+18		
3	*b*	2*	*b*	7+8		
3			*f*	13+16		
2			*c*	7+9	*a*	2+12
2					*b*	3+12
1	*c*	Null	*a*	7	*c*	4+12
1			*d*	6+8		
1			*e*	20		

Polyphenol oxidase (PPO) activity

Colour and colour stability are important criteria of Asian noodle quality and they play a significant role in determining the acceptance of noodle products by consumers (Mares and Panozzo, 1999). The appearance of noodles as perceived by the human eye, or as quantified by visible-light reflectance instruments, depends on a number of genetically controlled factors, as well as on the growth environment, the milling process, the particular recipe and ingredients used and on preparation conditions used in the manufacture of the noodles. The genetically controlled factors that can be manipulated by wheat breeders include: the brightness of the flour, the initial brightness of the noodle sheet, the degree of bran and germ contamination of the flour, the rate of darkening caused by polyphenol oxidase (and other enzymic and/or chemical processes following noodle preparation), and the xanthophyll and flavonoid content of the flour. In addition, there is a possibility of interactions occurring between these factors or with ingredients added during noodle preparation.

Polyphenol oxidase is implicated in the darkening that occurs in noodles following preparation. Darkening, a major part of colour stability, is particularly relevant to yellow alkaline noodles (YAN), since a significant proportion of these noodles are sold in the raw or fresh form and may not cooked for up to 2 or 3 days after manufacture. PPO, located in the seed coat of wheat grains, is an enzyme that catalyses the oxidation of some phenolic compounds leading to the production of black or dark brown pigments. Since a small proportion of this PPO is carried through into the flour during milling (Hatcher and Kruger, 1993), it would be expected to contribute to the darkening that occurs in raw Asian noodles and in any other end-product where the dough is left to stand for several hours or more before cooking.

The PPO characteristics of Australian wheat varieties are shown in Table 2. The levels of PPO were determined on 20 individual grains of the variety, based on the method of Bernier and Howes (1994). Levels of PPO activity are ranked as low (L), medium (M) or high (H).

PPO, as measured by the whole-grain assay, plays a significant role in determining the extent of noodle darkening that occurs during the 1- or 2-day period after preparation, and is responsible for a considerable component of the variation in darkening between genotypes. In addition, the dark pigments produced mask or obscure the creamy or yellow colours desirable in white, salted (WSN) and yellow, alkaline (YAN) noodles respectively. The PPO component can be inhibited by a range of specific and non-specific inhibitors or by heat. PPO darkening is additive with the other component of darkening that is due to non-PPO reactions. PPO-activity rankings are maintained across environments and appear to be highly heritable.

Pedigrees of current Australian Wheat Varieties

The lists of varieties in the following pages show their individual pedigrees, but it is useful to understand the genetic relationships between varieties. These are illustrated for many of the varieties described in the charts of Figures 1 and 2.

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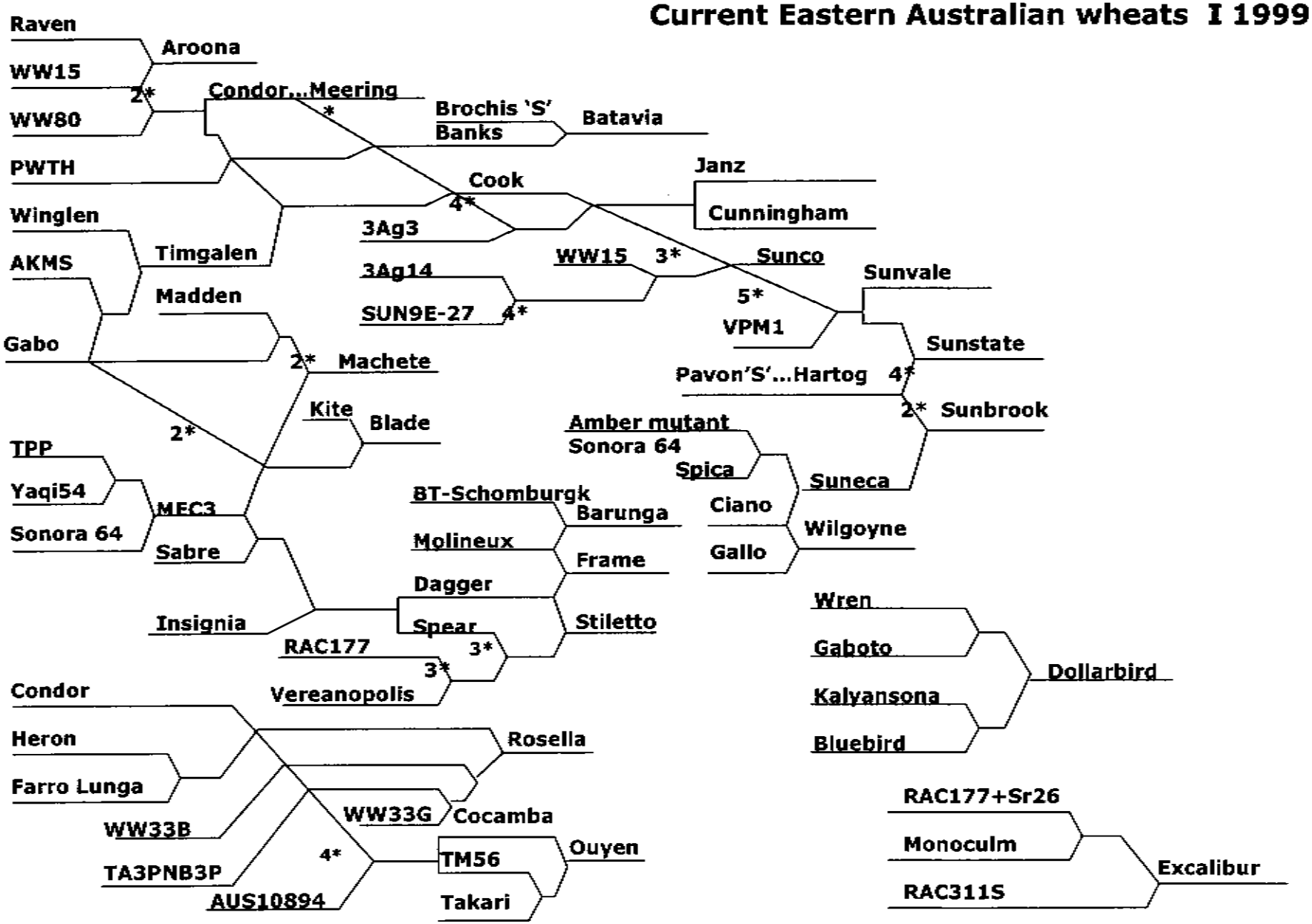
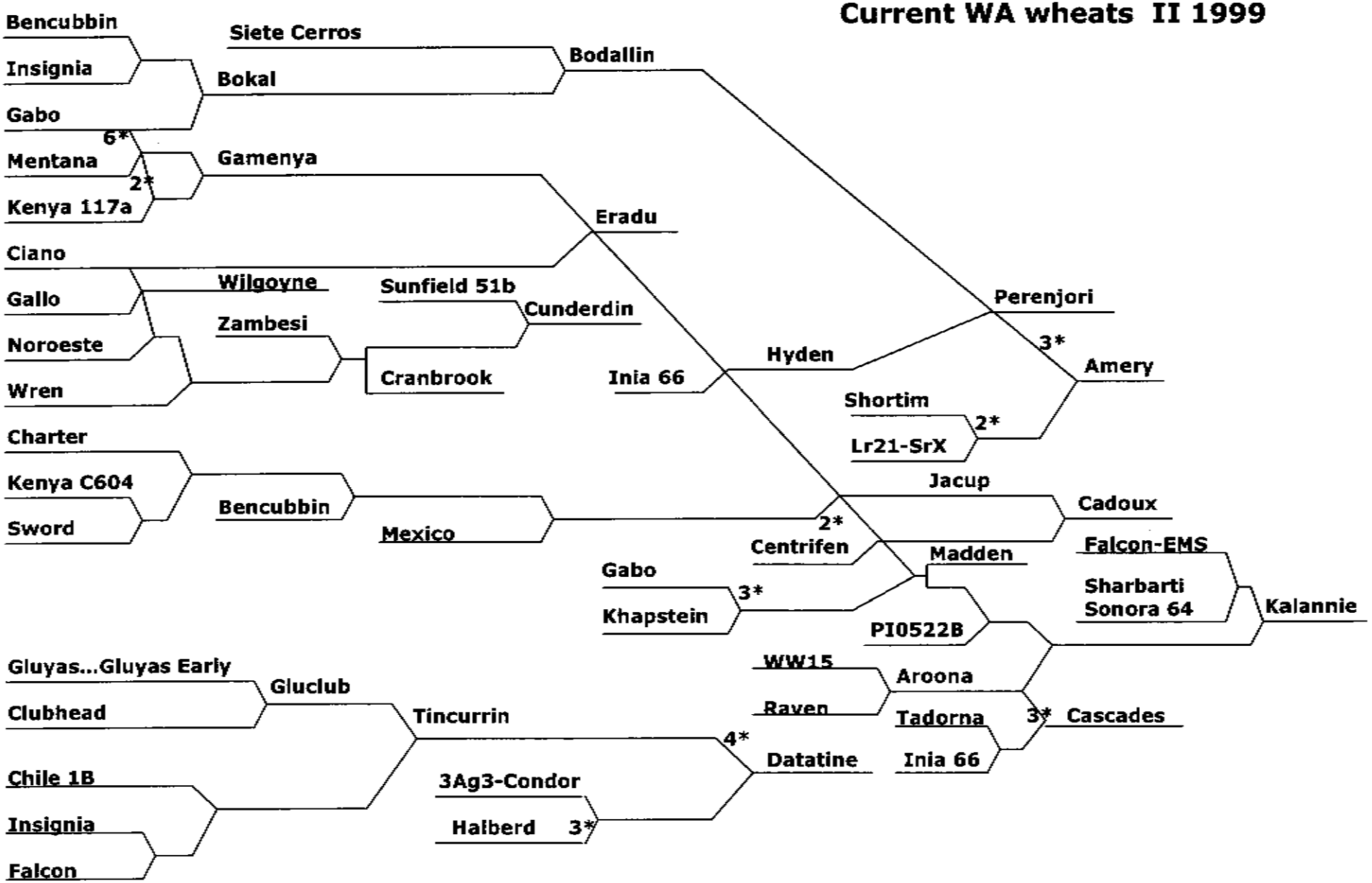
Current Eastern Australian wheats I 1999




Current WA wheats II 1999
Bencubbin
Insignia
Gabo
6*
Mentana
2*
Kenya 117a
Siete Cerros
Bokal
Gamenya
Bodallin
Eradu
Ciano
Wilgoyne
Gallo
Noroeste
Wren
Zambesi
Sunfield 51b
Cunderdin
Cranbrook
Inia 66
Hyden
Perenjori
3*
Amery
Shortim
2*
Lr21-SrX
Charter
Kenya C604
Sword
Bencubbin
Mexico
2*
Centrifen
Jacup
Cadoux
Madden
Gabo
3*
Khapstein
Falcon-EMS
Sharbarti
Sonora 64
Kalannie
PI0522B
Gluyas...Gluyas Early
Clubhead
Gluclub
Tincurrin
WW15
Raven
Aroona
Tadorna
Inia 66
3*
Cascades
4*
Datatine
Chile 1B
Insignia
Falcon
3Ag3-Condor
Halberd
3*

AJANA

Pedigree	Blade / 2*Kulin
Synonyms	Wheat 2127, WAWHT2127, WA8845
Breeder	Robin Wilson
Issued by	Agriculture Western Australia 1998

Quality Characteristics

Ajana was initially proposed as an APW wheat but concerns about its soft grain, low water absorption and relatively poor milling quality, subsequently confirmed by tests performed under the auspices of the National Wheat Quality Evaluation Program, NWQEP, finally resulted in an ASW classification being awarded.

It should be noted however that Ajana has excellent physical dough properties which together with its high Minolta L and low Minolta b values, resulted in steamed products of exceptional quality in the NWQEP tests.

The following data was provided by Agriculture Western Australia and compares Ajana with the Western Region APW variety, Spear.

	TWT	KWt	Hard	Wheat Protein	Flour Yield	Minolta L*	Minolta b*	WA	Ext	Rmax	Loaf Vol
	kg/hl	G	PSI	%	%			%	cm	BU	cc
Ajana	80.5	36.6	19	11.3	73.6	92.1	8.5	59.8	23.2	385	776
Spear	82.1	37.5	15	11.7	74.5	91.6	11.2	63.7	20.3	284	783
Comparison	*38*	*38*	*14*	*14*	*14*	*14*	*14*	*14*	*14*	*14*	*5*

Yield Data

Ajana has similar yields to Westonia and Brookton when grown under similar conditions in Western Australia. It has a similar maturity to Westonia.

AMERY

Pedigree	Lr21-Sr X/2*Shortim//3*Bodallin
Synonym	81Y:971, 81Y29-5-27
Registered	August 1993. Dept of Agriculture, W.A.
Breeder	D The, IR Barclay, AA Rosielle
Resistance	Flag smut
Quality type	ASW
Growth site	W.A.

VEGETATIVE STAGE		**FLOWERING STAGE**	
Development type	spring	Flowers 2 days earlier than Aroona	
Habit	erect	Top auricle height	
Auricle type	hairy	Flag leaf length	long
Auricle colour	white	Flag leaf width	narrow
Leaf length	long		
Leaf width	narrow		
Leaf pubescence	light		

MATURITY STAGE

Crop height	equal to Aroona
Straw strength	strong

HEAD CHARACTERS		**GRAIN CHARACTERS**	
Glume colour	white	Hardness	hard
Awns	fullyawned	Brush length	medium
Head cross section	flattened	Grain colour	medium
Head side view	tapering	Grain texture	vitreous
Head density	lax		
Glume beak length	long		

Amery is derived from backcrossing of Bodallin at the national rust control programme. However, the highest yielding lines, including Amery, were rust susceptible. Amery is a high yielding hard ASW wheat and will have general application in the medium and low rainfall areas of W.A., particularly for later sowings and will mainly replace Kulin in the ASW. More data from samples with protein content greater than 11.5% are required to determine if it will be acceptable into Australian hard.

Physiological characteristics

Amery is insensitive to applied gibberellin.

Quality characteristics

Amery is a hard-grained white wheat with potential for Aust. hard. Compared with Gutha, Amery has similar hectolitre weight, grain weight, grain plumpness, grain hardness, milling quality and farinograph water absorption. It also has stronger and less extensible dough properties than Gutha. The lower extensibility could be partly attributed to a lower protein content for Amery. In limited baking tests, Amery has produced loaves of similar volume but better overall quality rating than Spear.

Yield Data

Amery generally outyields all alternative A.Hard varieties and is equal to or better than the highest yielding ASW varieties, Kulin and Spear.

ANLACE

Pedigree	Amigo / 4*Tatiara
Synonym	RAC779
Breeder	Gil Hollamby
Selected by	Gil Hollamby and NCRCP (Uni.Sydney)
Issued by	University of Adelaide (Roseworthy) 1999

Quality Characteristics

Anlace's quality is similar to that of Tatiara, with the exception that Anlace has slightly whiter flour and higher dough strength. It should provide a viable alternative to Tatiara, Bowie and Buckley.

The following data was provided by SARDI and compares Anlace to the Southern Region soft wheat biscuit variety Tatiara.

	TWT	Hard	Flour Yield	Flour Prot	Minolta L*	Minolta B*	WA.	DDT	Ext	Rmax	Cookie Sprd
	kg/hl	PSI	%	%			%	min.	cm	BU	
Anlace	81.4	26.1	74.1	9.2	92.2	9.5	55.6	2.3	19.3	156	4.7
Tatiara	80.5	25.7	74.5	9.4	92.1	9.8	56.0	2.2	19.5	125	5.2
Comparisons	*9*	*29*	*29*	*29*	*19*	*19*	*29*	*29*	*29*	*29*	*2*

Yield Data

Agronomically, Anlace is almost indistinguishable from its relatives Tatiara, Bowie and Buckley. It has application for South Australia, Victoria and irrigated areas of New South Wales. At this time, there is no yield data from other states, but it is expected that Whistler will outperform Anlace in Whistler's adapted regions. Anlace will add to the diversity of stem rust resistance.

Synonyms	QT4299
Breeder	P S Brennan
Selected by	P S Brennan, D J Martin, J A Sheppard, D The, G J Platz, P J Keys, L R Mason R W Eubergang, B G Stewart, P J Agius, G Brown.
Issued by	Department of Primary Industries, Queensland, July 1996

Quality Characteristics

Although a derivative of Hartog, Arnhem has much lower dough strength and mixing requirement and was specifically released for the domestic market for which it was classified by the Northern Wheat Improvement Committee as Prime Hard Domestic. Unfortunately, weak dough properties and a tendency to give low water absorptions mean that Arnhem will have a maximum classification of AHard for the export market. Early indications based on dough sheet colour development and stability suggested suitability for yellow alkaline noodles, but subsequent noodle tests produced noodles that were too soft in texture.

The following comparisons were provided by QWRI, from the 1995 season.

	T WT Kg/hl	PSI	Grain Prot%	Flour Yield %	Minolta col L-b	Farin abs %	Ext cm	Rmax BU	Loaf vol cc	Bake score [50]
Arnhem	83.5	16	13.1	76.2	80.62	60.8	23.3	355	705	31
Kite	83.0	11	14.3	73.6	80.64	63.2	20.7	453	755	33
Banks	82.5	14	14.3	75.8	80.73	61.2	23.8	395	785	35
Hartog	83.5	11	13.7	76.0	80.32	61.4	22.8	510	815	37

Yield Data

Extensive testing over five years in Queensland indicates that *Arnhem* is similar in yield to *Sunstate* and *Tasman*, superior to *Kite* and *Banks*, and inferior to *Hartog*. Limited data suggests *Arnhem* will be substantially inferior to *Banks*, *Hartog* and *Sunstate* when grown in New South Wales.

ARRINO

Pedigree	Complex pedigree (77W660) / Eradu
Synonym	WAWHT1493, 86Z:1493
Breeder	R E Wilson
Issued by	Agriculture Western Australia, August 1997

Quality Characteristics

Arrino is a soft-grained wheat suitable for white-salted noodles. In straight-run milling evaluations it has given similar flour yield to Cadoux and Eradu, and at 60% extraction has produced flour with ash levels similar to that of Cadoux and Eradu. Yellow pigment levels are intermediate between Eradu and Cadoux, and it has high swelling starch properties. Noodle tests carried out at the Grain Products Laboratory, AgWA have shown Arrino in a favourable light, with ratings for noodle colour on both raw and boiled noodles intermediate between Eradu and Cadoux, and a similar noodle texture to both varieties. At the time of writing, final evaluations were not complete, but it is hoped that Arrino will complement the existing noodle varieties segregated in Western Australia.

Yield Data

Arrino clearly outyields Cadoux and Eradu in the medium and low rainfall areas. It is similar to Spear in the medium rainfall area but superior in the low rainfall area.

ARRINO - [supplementary report] 1998

Synonyms	WAWHT1493; 86Z:1493
Pedigree	Complex pedigree [77W660] / Eradu
Selected by	R E Wilson
Issued by	Agriculture Western Australia, August 1997

Last year's report described Arrino's quality as that of a soft-grained wheat suitable for white salted noodles, with its key noodle making parameters all falling in the "ball-park" described by the then current ASW[N] varieties Cadoux and Eradu. Subsequent noodle evaluations undertaken by the Japanese Flour Millers Association, Wheat Flour Institute, confirmed these results, and Arrino was added to the list of acceptable ASW[N] varieties for the 1997/98 season.

The following data provided by Agriculture Western Australia compares *Arrino* with *Cadoux* from the 1994, '95 and '96 seasons. Flour quality data is all based on 60% extraction flours.

	TWT Kg/hl	PSI	Flour Prot %	Flour Yield %	Minolta col L	Min col b	Farin abs %	Ext cm	Rmax BU	Amylo peak vis AU
Arrino	81.9	32	9.1	72.2	92.6	7.9	51.2	19.2	397	810
Cadoux	81.0	31	8.9	71.9	92.7	8.5	53.0	19.4	379	666
No. trials	34	15	13	15	13	13	13	11	11	7

Quality Characteristics

Arrivato is a white-grained durum wheat with similar grain hardness to the main Australian varieties Tamaroi and Yallaroi. The average kernel weight of Arrivato is very high, significantly above that of Tamaroi and Yallaroi.

In semolina milling trials conducted against Tamaroi and Yallaroi controls, Arrivato produced a higher semolina yield with coarser granularity and lower ash than either of the controls. The farinograph water absorption of Arrivato was equal to that of Yallaroi and higher than Tamaroi. The dough strength of Arrivato, as indicated by the farinogram was similar to that of Tamaroi and greater than Yallaroi. Wet gluten recovery for Arrivato against the controls provided an indication of relatively high gluten content in proportion to the total protein. All these characteristics indicate Arrivato has good dough properties for making pasta.

	KWt	Hard	Wht Prtn	Flour Yield	Flour Ash	Flour Minolta L*	Flour Minolta b*	WA	Gluten Index	Granularity	
	G	PSI	%	%	%			%		+8N	+10N
Arrivato	**52.2**	**10**	**14.6**	**69.5**	**0.56**	**86.6**	**22.2**	**62.9**	**59**	**78.0**	**16.8**
Tamaroi	47.6	11	15.6	68.9	0.67	85.9	25.0	61.6	77	72.4	22.0
Yallaroi	45.9	9	14.4	68.2	0.54	86.4	26.5	62.9	65	72.9	20.6

Source Agrifood Technology

End-product tests undertaken by collaborative customers in Italy confirmed Arrivato's suitability for pasta manufacture. Arrivato is classified as Australian Durum.

Yield Data and Disease Comment

Arrivato is best suited to regions of medium rainfall in Victoria, New South Wales or South Australia. Based on yield trials conducted at Howlong New South Wales, Arrivato had lower screening levels and higher yields than Yallaroi (+17%) and Tamaroi (+25%).

Arrivato has very good resistance to all 3 forms of rust. In addition, it is resistant to Cereal Cyst Nematode and has moderate resistance to *Septoria tritici* but is susceptible to Yellow Spot.

Babbler

Synonyms **WW2455**
Pedigree **Janz/Lark**
Bred & Selected by **J.A. Fisher, B. Ballantyne, P. Martin, H. Allen & Z. Tomes**
Issued by **NSW Agriculture in 2000**

Quality Characteristics

Babbler is a white-grained, hard variety developed initially for southern NSW. It has performed well for most quality measures, and at higher protein levels has been shown to be equivalent to, or better than Janz. Babbler has white, bright flour, good water absorption levels and strong balanced dough properties, and these combine to produce acceptable pan bread and yellow alkaline noodles. The latter were generally bright and yellow, showing good colour stability, a reflection of Babbler's PPO level, which is similar to that of Janz. Based on this quality profile Babbler was classified Prime Hard in southern NSW.

Data obtained on samples sourced from Queensland showed Babbler to have milling performance equivalent to Hartog. This was combined with good water absorption and balanced dough properties, although for Queensland these were a little on the weak side. Babbler had good baking water absorption and excellent rapid, fermented and sponge and dough baking performance. Yellow alkaline noodle quality was only marginal; however on balance an extension of the Prime Hard classification already applying in southern NSW was warranted for the northern growing region.

Variety	Test weight	1000 Kernel Weight	Wheat protein	PSI	Extraction Rate	Flour Ash	Colour Grade	Minolta		Viscograph	Farinograph				Extensograph (45min)		
								Flour		Peak	Water Abs.	DDT	Stab.	Break.	Extens.	Max. Height	Area
	(kg/hl)	(g)	(Nx5.7 11%mb)		(%)	(% 14% mb)	(KJ)	L	b	(BU)	(%)	(min)	(min)	(BU)	(cm)	(BU)	(cm^2)
Janz	82.5	38.9	12.3	17	76.1	0.39	-2.6	93.2	8.1	290	62.7	5.7	12	20	23.3	425	125
Banks	81.5	37.6	13.0	15	76.5	0.45	-2.3	93.2	8.5	390	64.8	4.3	7	45	20.0	400	118
Dollarbird	82.5	40.1	12.4	13	76.2	0.39	-1.7	92.9	8.5	800	67.7	5.0	10.5	40	20.6	485	139
WW2455	82.0	38.0	12.6	16	75.6	0.45	-2.1	93.3	7.9	380	67.7	5.7	16	25	19.7	465	129
Samples from NSW Ag 1999 UQT Silo Group South Main Series, Quality results from Agrifood Technology																	

End Products	WW2455	Janz	Banks	Dollarbird
Pan Bread – Rapid				
Average Volume (cc)	888	915	930	855
Total Score (100)	72	71	69	79
Pan Bread – Fermented				
Average Volume (cc)	763	813	840	850
Total Score (100)	60	62	63	69
Yellow Alkaline Noodles				
Sensory Score %	64.6	65.2	68.2	65.2
Minolta L (1/2hr)	76.80	77.63	78.14	76.78
Minolta b (1/2hrs)	28.60	27.86	29.42	27.91
△ Minolta L (24hrs)	7.22	6.06	5.25	7.75
Source National Wheat Quality Evaluation Program National Report 1999 - NSW 13% Silo Group South Main				

BANKS

Pedigree PWTH/Condor sib//2* Condor

Synonym QT 4081

Quality Characteristics

Banks is a hard wheat with high test weight and exceptional milling quality. Although its water absorption, dough-mixing requirement and general dough strength are all marginal for a good hard wheat, baking quality using conventional breadmaking procedures is excellent. Banks tends to be low in protein, being consistenty lower than Gatcher, a variety renowed for its low protein content compared with other Prime Hard wheats. Provisionally it has been placed on the approved Prime Hard list for Queensland for 1980/81, pending satisfactory performance in 1979/80; however, it will definitely be acceptable in the No. 1 Hard.

BARUNGA

Pedigree	((Halberd*Aroona)*Schomburgk#3)/2/3*Molincux#)8/3Halberd/Aroona//3 *Schomburgk/3/2*Molineux
Synonym	(H*Sch#4)*Mx#)/8/3; WIO34
Registered	September 1993, Waite Agricultural Research Institute, University of Adelaide
Bred/selected	AJ Rathjen, J Lewis, GA Palmer, JG Lewis, SP Jefferies, H Wallwork, AJ Dube, CJ Stone, MI Kroehn, GB Cornish, DB Moody, JG Paull
Resistances	Cereal cyst nematode [resistant and moderately tolerant], bunt
Quality type	Hard
Growth site	SA

VEGETATIVE STAGE		**FLOWERING STAGE**	
Development type	spring	Flowers 6 days earlier than Molineux	
Habit	intermediate to erect	Top auricle height	medium
Auricle type	hairy	Flag leaf length	medium
Auricle colour	white	Flag leaf width	medium
Leaf length	medium	Leaf width	medium
Leaf pubescence	light		

MATURITY STAGE 2 days earlier than Molineux

Crop height	5cm shorter than Molineux
Straw strength	strong

HEAD CHARACTERS		**GRAIN CHARACTERS**	
Glume colour	white	Hardness	hard
Awns	fully awned	Brush length	medium
Head cross section	flattened	Grain colour	medium
Head side view	tapering	Grain texture	vitreous
Head density	medium		
Glume beak length	long		

BARUNGA is being released as a higher yielding, earlier maturing replacement for the hard wheat Molineux. Its tolerance of high levels of soil boron and early maturity will make this variety more acceptable to growers in the lower rainfall districts of the SA wheat belt where there are few options for the control of CCN.

Physiological characteristics: BARUNGA is rated moderately tolerant to high levels of soil boron. Vernalisation and photoperiodic reactions are very low or absent. Barunga is more sensitive to manganese deficiency than related varieties Warigal, Aroona and Schomburgk. Barunga, like Molineux is susceptible to yellowing and early death of the lower leaves. This may reflect intolerance to root lesion nematodes *[Pratylenchus neglectus]*.

Quality characteristics: BARUNGA has similar quality characteristics to other good quality Hard wheats suchas BT-Schomburgk and Janz. However it is slightly inferior to Molineux in three aspects, namely, milling extraction, dough extensibility, and protein concentration. It is superior to the most widely grown Hard wheat in SA., Machete.

Yield Data: BARUNGA has consistently outyielded Molineux and has had about the same yield as the widely grown Machete in 1991 and 1992. Machete, Schomburgk and BT-Schomburgk were all severely affected by rusts and or other diseases in the wet spring of 1992. Under these conditions, the yield of Janz was outstanding. In 1991, Barunga as well as Warigal, Molineux and to a lesser extent the Schomburgk types, performed relatively poorly associated with a relatively high level of yellowing of the lower leaves in these varieties.

BAXTER

Pedigree	Derived from a complex cross of wheat including Cook, Timgalen, Gamut and Mexican lines
Synonym	QT6258
Issued by	Queensland DPI Farming Systems Institute, Leslie Research Centre (Formerly QWRI)

Quality Characteristics

As can be seen from the data below, Baxter has superior milling quality and dough extensibility when compared to Hartog, which is the definitive APH minimum standard for these parameters. It also produces extremely bright, white flour, which together with its excellent dough properties, results in steamed products of exceptional quality. Baxter's only real shortcoming is in its low Farinograph water absorption. However, commercial baking trials undertaken by the Queensland industry confirmed that baking absorption was much higher than that predicted by laboratory data. In testing undertaken as part of the National Wheat Quality Evaluation Program, NWQEP, three different bake test methods gave acceptable results, as were those for Yellow Alkaline Noodles.

The following data were taken from the 1998 NWQEP Report, and the samples were composites taken from eight sites, in the 1997 slow maturing series conducted in Queensland. These results are similar to those obtained by the Leslie Research Centre, Toowoomba, and Agrifood Technology, Werribee.

	TWT	Hard	WProt	Flr Yld	Flr Ash	Minolta L-b	WA	DDT	Ext	Rmax	YAN	Std Brd (Nth style)
	kg/hl	PSI	%	%	%		%	min.	cm	BU	Total Score	Total Score
Baxter	81.3	13	13.7	76.7	0.47	83.3	59.4	9.1	25.8	525	74.6	81
Hartog	82.2	12	12.8	76.0	0.52	80.4	62.7	7.2	22.7	435	68.4	74
Cunningham	82.0	12	13.8	77.0	0.49	81.5	62.2	6.6	23.2	370	79.2	73

Yield Data

Baxter is taller than Cunningham and Sunvale, and slightly inferior to Cunningham for lodging in very high yielding situations. Baxter has out yielded Cunningham and Sunvale in trials grown at many locations over several years.

This variety has the very important combination of very high tolerance to root lesion nematodes and partial resistance (equal to Sunco) to crown rot. Baxter is also resistance to stem rust, leaf rust, stripe rust and flag smut.

Bluebird/5/Banks

Synonym	QT4097
Registered	May, 1991; Queensland Wheat Research Institute
Breeder	P.S. Brennan
Resistances	Stem, stripe and leaf rust, *Septoria tritici* blotch, flag smut
Quality type	Prime Hard
Growth sites	Queensland

VEGETATIVE STAGE

Auricle Type	Smooth
Auricle Colour	Purple
Leaf Length	Medium
Leaf width	Medium
Leaf Pubescence	Medium

FLOWERING STAGE

Top Auricle Height	Medium
Flag Leaf Length	Short
Flag Leaf Width	Narrow

Flowers one day later than Flinders

MATURITY STAGE

Matures one day later than Flinders
Height 4 cm shorter than Hartog
Straw Strength Strong

HEAD CHARACTERS

Glume Colour	White
Awns	Fullyawned
Head Cross Section	Square
Head Side View	Tapering
Density	Medium
Glume Beak	Long

GRAIN CHARACTERS

Hardness	Hard
Brush Length	Short
Grain Colour	Light
Grain Texture	Vitreous

Batavia is being released as a replacement for the currently recommended early sowing varieties Suneca and Flinders. Batavia is seen as an improvement in yield, lodging and disease resistance over those two varieties.

Physiological characters

From observations on F2 populations of crosses of Batavia with varieties whose dwarfing gene is known, it seems certain that Batavia has Rht1. The longer period from planting to flowering is probably due to a vernalization requirement.

Quality Characteristics

Batavia is a prime hard wheat of Banks strength but with greater extensibility. It is a good milling and baking wheat with higher protein achievement than either Banks or Hartog, and it is similar to Kite in Queensland.

Yield Data

Batavia has been evaluated for yield in 75 trials over three years and in all major wheat growing areas of Queensland in each year. In all years (1988,89, 90), Batavia has given higher yields than contemporary Queensland wheat varieties of similar maturity.

Pedigree	COOK*2/Millewa//TM30
Synonym	EDO86
Registered	August 1993, Dept of Agriculture, Victoria.
Breeder	P Martin, R Christie, J Davies, B Whan, R Young, J Panozzo and K McCormick
Resistances	Stem rust, stripe rust [moderate], cereal cyst nematode, flag smut
Quality type	ASW
Growth sites	Silo groups A & B [the Mallee] Vic.

VEGETATIVE STAGE	
Development type	spring
Habit	erect
Auricle type	hairy
Auricle colour	white
Leaf length	medium
Leaf width	medium
Leaf pubescence	light

FLOWERING STAGE	
Flowers 1 day later than Meering	
Top auricle height	
Flag leaf length	medium
Flag leaf width	medium

MATURITY STAGE	
Crop height	
Straw strength	medium

HEAD CHARACTERS	
Glume colour	white
Awns	fully awned
Head cross section	flattened
Head side view	tapering
Head density	medium
Glume beak length	long

GRAIN CHARACTERS	
Hardness	hard
Brush length	short
Grain colour	medium
Grain texture	intermediate

Beulah is being released as a stem rust, stripe rust and cereal cyst nematode resistant ASW quality wheat for the Mallee region of Victoria.

Quality characteristics

Beulah has been accepted for receival as an ASW quality wheat. Average flour yields and average Minolta "b*" values are higher than Meering [the later indicating higher yellow pigmentation]. Water absorption is lower; mixing properties and dough strength are all similar to Meering. Dough of Goroke is on average more extensible than that of Meering.

Yield Data

Beulah has outyielded Meering 2 times, been equal to Meeting 58 times and been outyielded by Meeting 3 times in trials conducted throughout Victoria.

Quality Characteristics

RAC434-12 is a good bread-baking quality wheat for the South Australian Hard category.

Bowerbird

Synonyms **K3057**
Pedigree **K1056/M3348//Cook/3/Dollarbird**
Bred & Selected by **M.A. Khan, H. Allen, K. Taylor & R. Munroe**
Issued by **NSW Agriculture in 2001**

Quality Characteristics

Bowerbird is a hard-grained variety, with acceptable milling quality, better than average flour water absorption, and balanced dough properties. Initial testing in southern NSW showed that its baking and yellow alkaline noodle making capacity did not meet Prime Hard standards and a Hard classification was awarded. Subsequent testing of Queensland sourced samples showed Bowerbird to have marginal milling quality, inextensible doughs, and confirmed its baking and yellow alkaline noodles quality to below that required for Prime Hard. Thus its southern classification of Hard was extended to both Queensland and northern NSW.

Variety	Test weight	1000 Kernel Weight	Wheat Protein	PSI	Extraction Rate	Flour Ash	Colour Grade	Minolta		Viscograph	Farinograph				Extensograph (45min)		
								Flour		Peak	Water Abs.	DDT	Stab.	Break.	Extens.	Max. Height	Area
	(kg/hl)	(g)	(Nx5.7 11%mb)		(%)	(%14% mb)	(KJ)	L	b	(BU)	(%)	(min)	(min)	(BU)	(cm)	(BU)	(cm^2)
Banks	80.5	36.2	12.9	16	77.4	0.46	-2.4	92.3	9.0	430	61.1	4.0	7.0	65	24.3	235	86
Dollarbird	80.0	38.3	12.6	16	77.4	0.42	-1.4	92.8	8.8	790	63.3	4.7	8.0	45	22.1	330	106
Janz	80.0	34.0	12.7	16	77.4	0.52	-1.7	92.6	8.4	460	62.9	4.5	6.5	45	23.2	310	104
Chara	81.0	36.0	12.7	15	78.3	0.47	-1.8	92.8	9.5	330	61.7	5.2	7.5	65	>26.0	400	>152
K3057	79.5	37.8	12.7	16	77.5	0.41	-1.6	92.2	9.3	350	63.2	4.2	5.8	60	23.1	260	90
Samples from NSW Ag 2000 UQT Silo Group South Main Series, Quality results from Agrifood Technology																	

End Products	K3057	Banks	Dollarbird	Janz
Pan Bread – Rapid				
Average Volume (cc)	828	833	853	813
Total Score (100)	70	66	77	70
Pan Bread – Fermented				
Average Volume (cc)	760	760	760	725
Total Score (100)	60	62	64	58
Pan Bread – Sponge & Dough				
Average Volume (cc)	1813	1831	1838	1794
Total Score (100)	58	59	60	58
Yellow Alkaline Noodles				
Sensory Score %	69.2	69.2	64.3	64.9
Minolta L (1/2hr)	80.45	79.91	79.29	79.13
Minolta b (1/2hrs)	27.18	27.22	24.93	24.86
△ Minolta L (24hrs)	8.73	7.07	10.27	9.48
Source National Wheat Quality Evaluation Program National Report 2000 – NSW South Main 13% Series				

BOWIE

Pedigree Cook*5/VPM1//3*Tatiara
Synonyms RAC696; DT54491

Bowie is a midseason-maturing, white chaffed, awnless soft wheat that is almost indistinguishable from Tatiara. It is about one day earlier than Tatiara. It has the same height as Tatiara and is about 15 cm taller than Wyuna.

Quality Characteristics

Bowie is almost identical in quality to Tatiara, so a change from Tatiara to Bowie will go almost unnoticed by millers and biscuit makers. It is inferior to Bindawarra. In general, the grain of Bowie is very slightly harder than Tatiara, but still well within the soft wheat range. The milling properties are good. The dough of Bowie is stronger than Tatiara, particularly at the weak end of the range, which probably accounts for its slightly better bread-baking performance. It is as extensible as Tatiara.

Braewood

Synonyms	**SUN140i**
Pedigree	**Sunbri sib (3*Cook/VPM/2*Cook)**
Bred & Selected by	**F. Ellison, C. Brown & D. Mares**
Issued by	**University of Sydney**

Quality Characteristics

Braewood was originally classified in 1993 based on Uniform Quality Testing results. However, the University of Sydney became aware that Braewood had mixed genotypes for a Low Molecular Weight glutenin component, and elected to reselect it. After extensive comparisons using mixograph data, a homogeneous Braewood re-entered quality testing where it was shown to have a lower mixing time, which attracted interest from the domestic milling and baking industries. Subsequently, more extensive testing showed that Braewood had relatively low dough strength coupled with good extensibility.

Its milling quality, flour colour and brightness are all acceptable, however flour water absorption was low, and pan bread quality by several methods, were all well behind the Prime Hard controls. Yellow alkaline noodle quality, was also below par, so Braewood was awarded a Hard classification in northern NSW and Queensland.

Variety	Test weight	1000 Kernel Weight	Wheat Protein	PSI	Extraction Rate	Flour Ash	Colour Grade	Minolta		Viscograph	Farinograph				Extensograph (45min)		
								Flour		Peak	Water Abs.	DDT	Stab.	Break.	Extens.	Max. Height	Area
	(kg/hl)	(g)	(Nx5.7 11%mb)		(%)	(% 14% mb)	(KJ)	L	b	(BU)	(%)	(min)	(min)	(BU)	(cm)	(BU)	(cm^2)
Hartog	80.5	33.7	13.2	12	77.2	0.47	-2.1	90.4	10.6	690	63.1	6.6	12.0	40	22.8	470	148
Sunco	82.5	32.3	14.5	18	77.8	0.45	-3.0	92.4	9.0	660	63.5	8.3	15.0	10	25.1	390	135
Cunningham	82.0	32.4	14.3	17	77.2	0.44	-2.7	92.2	8.9	460	63.3	5.2	11.0	35	23.9	330	114
Batavia	81.0	31.4	14.8	15	76.0	0.45	-2.2	91.8	10.7	980	63.1	6.7	13.0	30	25.4	355	126
Sunvale	82.5	30.2	14.9	17	76.6	0.44	-2.1	92.4	9.1	570	62.9	8.5	10.5	20	>26.0	415	>152
Suneca	82.5	36.2	15.7	16	78.2	0.47	-1.5	92.3	9.8	440	60.8	7.7	15.0	40	24.3	430	147
SUN140I	81.0	31.2	14.9	16	77.0	0.46	-2.5	91.7	9.1	440	60.4	6.0	11.5	30	22.3	370	114

Samples from 2001 DPI Queensland Early Series, Quality results from Agrifood Technology

End Products	SUN140I	Sunco	Cunningham	Batavia	Sunvale
Pan Bread – Rapid					
Average Volume (cc)	850	865	865	918	895
Total Score (100)	68	70	69	78	72
Pan Bread – Fermented					
Average Volume (cc)	768	820	845	788	870
Total Score (100)	57	63	66	63	72
Pan Bread – Sponge & Dough					
Average Volume (cc)	1908	1975	1900	2067	2031
Total Score (100)	61	69	64	70	71
Yellow Alk. Noodles					
Sensory Score %	60.4	72.8	62.2	61.7	60.0
Minolta L (1/2hr)	77.81	81.21	79.48	77.98	77.50
Minolta b (1/2hrs)	27.47	27.62	26.00	30.85	26.91
△ Minolta L (24hrs)	7.73	6.07	9.67	6.96	9.36

Source National Wheat Quality Evaluation Program 2001 Northern Region Interim Report – Early Series

Breeder Dr. Jim Davidson
Issued by CSIRO, AWB Limited and GRDC

Quality Characteristics
Brennan is a white-grained wheat.
Brennan's processing characteristics render it unsuitable as a milling wheat; therefore it is currently classed as an Australian Winter Wheat. Where separate segregation is not available, Brennan will be received as Australian Feed.

Yield Data
Brennan is best adapted to the shorter season regions of the high rainfall zone. This area includes the slopes of NSW, irrigated areas, the driers parts of the long growing season area in Victoria and South Australia, and the temperate areas of southwest Western Australia. On average, when compared to other CSIRO winter wheats, Brennan yields better than Gordon, is on par with Lawson and behind Paterson.

Quality Characteristics

Brookton is a hard-grained cultivar with a tendency to produce grain of low protein content and flour with a lower than desirable water absorption. Its dough strength is adequate and extensibility superior to most other APW and AH varieties currently available in Western Australia, giving it acceptable breadmaking quality. Subsequent additional end-product evaluations undertaken at the AGT Werribee, confirmed that an APW classification was warranted.

The following data provided by AgWA compares Brookton with Spear, currently the most popular variety in Western Australia, from the 1992-1995 seasons.

	T WT Kg/hl	PSI	Wheat Prot %	Flour Yield %	Minolta col L	Min col b	Farin abs %	Ext cm	Rmax BU	Loaf vol cc	FSV ml/g
Brookton	81.5	16	10.4	74.1	91.8	10.3	59.4	21.4	361	740	13.5
Spear	82.1	15	11.3	73.9	91.5	10.6	63.3	18.5	301	745	15.2

Yield Data

Brookton is broadly adapted with yields approaching those of Tammin, especially in the higher rainfall areas. Overall, it outyields Spear by about 9%.

S.P.Jefferies, J.W.Lingwidden, C.J.Stone, R.Wallwork, M.J.Kroehn, G.B.Cornish, and J.G.Paull

Resistances	Stem rust, Flag smut, Bunt
Quality Type	Australian Hard
Growth Sites	Zones 1 and 3 of SA

VEGETATIVE STAGE

Auricle Type	Hairy
Auricle Colour	White
Leaf Length	Short-medium
Leaf width	Narrow
Leaf Pubescence	Light

FLOWERING STAGE

Top Auricle Height	Short
Flag Leaf Length	Short
Flag Leaf Width	Narrow

Flowers same as Schomburgk

MATURITY STAGE

Matures	Same as Schomburgk
Height	Same as Schomburgk
Straw Strength	Strong

HEAD CHARACTERS

Glume Colour	White
Awns	Fully Awned
Head Cross Section	Flattened
Head Side View	Tapering
Density	Medium
Glume Beak	Long

GRAIN CHARACTERS

Hardness	Hard
Brush Length	Medium
Grain Colour	Medium
Grain Texture	Vitreous

BT-Schomburgk is a hard, spring wheat being released for its superior grain yield to Schomburgk on soils with high levels of boron. It is likely to replace Aroona and Schomburgk and possibly Halberd and Spear on these soil types.

Physiological Characters

The major difference between BT-Schomburgk and its recurrent parent is in respect of the incorporation of the *Bo1* allele from Halberd giving the linE the genetic constitution *Bo1, Bo2, Bo3*. The new variety carrief the same dwarfing allele as Schomburgk (*Rht1*) and its vernalisation and photoperiodic reactions are at a very low level or absent. As far as it is known, the line is identical to its recurrent parent.

Quality Characteristics

BT-Schomburgk is a hard-grained wheat suitable for the Australian Hard class. It is of very similar quality to Schomburgk.

Yield Data

Tentative data from replicated trials over three years (1989-91) has shown BT-Schomburgk to out yield Schomburgk.

BUCKLEY

Pedigree...

Pitic62/Festiguay//Warimba/3/Mexico120/Quadrat/2/Kloka/Pitic62//Bayonet/4/3*Tatiara

Synonyms	EC9/6; (PFWb*WqKPBay)*Tatiara#3/EC9/6
Breeders	A.J.Rathjen, C.J.Stone, M.C.Kroehn and G.A.Palmer
Selected by	T.D.Potter, J.G.Lewis, C.Edmondson, H.Wallwork, J.Lewis, G.B.Cornish, S.P.Jefferies and R.D.Wheeler
Issued by	Waite Agricultural Research Institute, The University of Adelaide.

VEGETATIVE STAGE		**FLOWERING STAGE**	
Development type	spring	Flowers equal to Tatiara	
Habit	erect	Top auricle height	short to medium
Auricle type	variable	Flag leaf length	short
Auricle colour	white	Flag leaf width	narrow to medium
Leaf length	medium		
Leaf width	medium		
Leaf pubescence	light		

MATURITY STAGE

Crop height	equal to Tatiara
Straw strength	strong

HEAD CHARACTERS		**GRAIN CHARACTERS**	
Glume colour	white	Hardness	soft
Awns	tip awned	Brush length	medium
Head cross section	square	Grain colour	light
Head side view	oblong	Grain texture	opaque
Head density	medium		
Glume beak length	short		

Register	August, 1992 WA Department of Agriculture
Breeder	I R Barclay and J Reeves
Resistance	None
Quality Type	Australian Noodle and ASW
Growth Sites	All rainfall zones of WA except H5, Ll & L5

VEGETATIVE STAGE

Auricle Type	Smooth
Auricle Colour	White
Leaf Length	Medium
Leaf Width	Wide
Leaf Pubescence	Light-medium

MATURITY STAGE

Matures	Two days later than Aroona
Height	Five cm taller than Aroona
Straw Strength	Strong

HEAD CHARACTERS

Glume Colour	White
Awns	Fully awned
Head X Section	Flattened
Head Side View	Oblong-tapering
Density	Dense-medium
Glume Beak	Long

FLOWERING STAGE

Top Auricle Height	NIA
Flag Leaf Length	Long
Flag Leaf Width	Narrow-medium

Flowers 2 days later than Aroona

GRAIN CHARACTERS

Hardness	Soft
Brush Length	Long
Grain Colour	Light-medium
Grain Texture	Opaque

CADOUX is a high quality Japanese white salted noodle wheat with application in most areas of Western Australia. It will be most important in the medium and high rainfall areas, but will also have a role in low rainfall areas, particularly for early sowings on light soils. With a preference for early sowings, it will complement the current varieties in the noodle wheat segregation, Eradu and Gamenya. Its hectolitre weight advantage over Gamenya, and lower level of black point affected grain than Eradu, will be of great benefit to growers.

Physiological Characters: CADOUX is insensitive to applied gibberellin.

Quality Characteristics: CADOUX is a soft, spring wheat suitable for inclusion in the Australian Noodle segregation of WA. Assessments both in WA and Japan have indicated that noodles produced from Cadoux have a good balance of properties due to their bright, creamy colour and good texture. Overall, the noodle making quality of Cadoux is at least as high as Gamenya and slightly superior to Eradu.

Yield Data: CADOUX generally outyields Eradu and Gamenya in the medium and high rainfall areas of WA but is lower yielding than the highest yielding ASW varieties, Kulin and Spear. Intermediate in maturity between Spear and Aroona, Cadoux responds well to early sowings and outyields Eradu and Gamenya in May and early June sowings. Cadoux has a strong interaction with soil type performing relatively better on light soils. It is outyielded by Eradu and Gamenya on heavy soils.

Breeder I R Barclay
Issued by Agriculture Western Australia, August 1997

Quality Characteristics

Calingiri is a soft-grained wheat suitable for white salted noodles. In straight-run milling evaluations it has proved to be exceptional for a soft wheat, outyielding Cadoux and Eradu by more than 2%, and at 60% extraction has produced flour with ash levels similar to that of Cadoux and Eradu. Yellow pigment levels are intermediate between Eradu and Cadoux, and it has high swelling starch properties. Noodle tests carried out at the Grain Products Laboratory, AgWA also showed Calingiri in a favourable light, with ratings for noodle colour on both raw and boiled noodles intermediate between Eradu and Cadoux, and a similar noodle texture to both varieties. At the time of writing, final evaluations were not complete, but it is hoped that Calingiri will complement the existing noodle varieties segregated in Western Australia.

Yield Data

Calingiri clearly outyields Cadoux and Eradu in all areas. It outyields or is similar to Spear. It is superior to Arrino in the high rainfall areas.

CALINGIRI - [supplementary report] 1998

Synonyms WAWHT2024, W386373
Pedigree Chino / Kulin // Reeves
Selected by I R Barclay
Issued by Agriculture Western Australia, August 1997

As was the case with Arrino, last year's report described Calingiri's quality as that of a soft-grained wheat suitable for white salted noodles, with its key noodle making parameters all falling in the "ball-park" described by the then current ASW[N] varieties Cadoux and Eradu. The report also highlighted its exceptional milling quality, with straight-run milling yields 2% higher than those of Eradu and Cadoux at comparable flour ash levels.

However, subsequent udon noodle evaluations undertaken by the Japanese Flour Millers Association, Wheat Flour Institute [JFMA], raised some concerns about elasticity, an important component of the eating quality of udon noodles. Further tests undertaken by the JFMA in mid-1998 confirmed that whilst not quite achieving the very high standards set by the existing ASW[N] varieties Cadoux, Eradu and now Arrino, Calingiri showed a measurable improvement over the current ASW blend being supplied to Japan. It has agronomic features which should prove attractive to growers and assist in stabilising the supply of noodle wheat from WA, and thus should prove to be a useful addition to the list of acceptable ASW[N] varieties for the 1998/99 season.

The following data provided by Agriculture Western Australia compares Calingiri with Cadoux from the 1995 and '96 seasons. Flour quality data is all based on 60% extraction flours.

	T WT Kg/hl	PSI	Flour Prot %	Flour Yield %	Minolta col L	Min col b	Farin Abs %	Ext Cm	Rma x BU	Amylo peak vis AU
Calingiri	82.4	30	9.0	74.7	92.8	7.0	52.3	19.7	344	745
Cadoux	80.7	32	8.7	72.0	92.7	8.5	52.5	19.6	368	635
No. trials	16	10	8	10	7	7	8	6	6	1

CAMM

Pedigree	VPM1.5*Cook / 4*Spear
Synonym	Wheat 2088, WAWHT2088, W48538
Breeder	Robin Wilson, Iain Barclay & Robyn McLean
Selected by	Agriculture Western Australia Wheat Breeding Team & Dante The from the National Rust Control Program
Issued by	Agriculture Western Australia 1998

Quality Characteristics

Camm has average quality for an APW wheat. Although exhibiting excellent dough properties, Camm's flour yield and water absorption are marginal. In addition, its yellow pigment (as indicated by the Minolta b* value) is at the upper level of acceptability for a multi-purpose APW wheat, where some end products, are sensitive to excessive yellowness.

	TWT	KWt	Hard	WProt	Flr Yld	Minolta L*	Minolta b*	W A.	DDT	Ext	Rmax	LVol
	Kg/hl	g	PSI	%	%			%	min.	cm	BU	cc
Camm	82.3	34.6	16	11.7	74.2	91.4	11.3	61.2	6.4	22.1	375	818
Spear	81.5	37.5	15	11.5	74.6	91.3	10.8	62.7	5.0	19.7	294	753
Comparisons	*26*	*25*	*12*	*11*	*11*	*11*	*11*	*11*	*11*	*11*	*11*	*2*

Yield Data

In Western Australia, Camm has similar yields to Stiletto and Spear. The best yields are produced in the southern areas of the State.

Camm has also performed well in trials in Victoria and South Australia.

Camm has effective resistance to all three rusts across all Australian wheat producing regions.

Quality Characteristics

Carnamah is a hard-grained cultivar with useful levels of resistance to *Septoria nodorum* blotch, yellow spot and three rusts. Its quality is similar to that of Gutha, Machete and Amery, but with better test weight, dough extensibility, and pan bread performance. Lacklustre milling performance and lower than desirable flour water absorption were issues of concern, but on balance, it was felt that an AHard classification was warranted.

The following comparison of Carnamah with Amery, the leading AHard variety in Western Australia, was drawn from ten comparisons from the 1994/95 seasons.

	T WT Kg/hl	PSI	Wheat Prot %	Flour Yield %	Minolta col L	Min col b	Farin Abs %	Ext cm	Rmax BU	Loaf vol cc	FSV ml/g
Carnamah	81.4	15	12.0	73.3	91.3	10.3	63.7	22.1	323	785	16.0
Amery	80.1	16	11.1	73.1	91.6	8.7	63.9	19.9	386	726	13.9

Yield Data

Over all trials in Western Australia, Carnamah outyields all presently grown Australian Hard and APW cultivars in the high and medium rainfall areas, being similar in yield to Tammin, the highest yielding cultivar in Western Australia.

CHARA

Pedigree BD225/CD87 (=Beulah sib//Pavon'S'/Condor)
Synonyms VI341
Breeder Agriculture Victoria
Issued by Agriculture Victoria Services in 1999

Quality Characteristics

Chara is a hard, white-grained variety with greater dough strength and dough extensibility than the Victorian control variety Meering. Extensive testing indicates that Chara is a balanced variety across a range of protein levels with good milling, baking and end product properties. Chara has been shown to make yellow alkaline noodles with good colour stability. Flour water absorption is moderate and similar to Meering at equivalent proteins.

	TWT	KWt	Hard	WProt	Flour Yield	Paste Minolta L*	Paste Minolta b*	WA	Ext	Rmax	Flour Paste Visco
	kg/hl	G	PSI	%	%			%	cm	BU	BU
Chara	82.2	38.1	18.8	11.6	77.9	74.9	10.1	63.1	23.4	431	464
Meering	82.8	36.1	18.2	11.5	78.3	75.0	9.2	63.8	20.5	244	379
Comparisons	*19*	*22*	*17*	*21*	*22*	*22*	*22*	*22*	*22*	*22*	*22*
Source Victorian Institute for Dryland Agriculture Wheat Quality Report 2000											

When tested at high protein the NWQEP reported that Chara had exceptional flour yield with intermediate water absorption and dough development time was longer than controls. Dough extensibility and strength were significantly better than the controls. These characteristics resulted in relatively poor baking results but this attributed to the sample being under mixed, as standard Australian test bake methods are not suited to Chara's extra strength.

With its unique dough properties Chara already has an Australian Prime Hard classification in Southern New South Wales. In Victoria it is classified as Australian Hard. Further quality evaluation both domestically and by overseas customers will determine the long term potential of this high strength style wheat.

Yield Data and Disease Comment

In comparative field trials, Chara has shown excellent performance across Southern New South Wales and Northern Victoria where it has averaged 103-106% of Janz and 102-104% of Diamondbird over several years of testing.

Chara has good resistance to Stem, Leaf and Stripe Rust, and has moderate resistance to *Septoria tritici.* Initial indicators have shown Chara to have some tolerance to black point.

CHOUGH

Pedigree	M2293 / Quarrion//Rosella, [M2293= WW15 / M1238-2/Kite/3WW15]
Synonym	M5428
Breeder	R Martin
Selected by	L Penrose, K Walsh, R Martin,, J Oliver and H Allen
Issued by	NSW Agriculture, 1997

Quality Characteristics

Chough is a soft-grained wheat with similar grain characteristics to Rosella. Its milling quality although somewhat variable, is similar, as are its Farinograph water absorption, dough development time, extensibility and starch pasting properties. Chough's main area of difference from Rosella is its exceptional whiteness, rendering it unsuitable for white-salted noodle manufacture, but at the same time, ideal for steamed buns and cakes.

The following data provided by NSW Agriculture, and drawn from the Registration details, compares Chough with Rosella, but unfortunately at a higher than desirable protein level.

	T WT Kg/hl	1000 K Wt gm	PSI	Grn Prot %	Flour Yield %	Minolta col L-b	Farin abs %	Ext cm	Rmax BU	RVA pk	Loaf vol cc
Chough	80.9	39.2	28.6	12.1	72.1	61.0	59.5	23.6	281.4	149	575
Rosella	80.7	36.2	23.5	12.2	72.5	58.5	58.7	24.0	263.5	155	586

Yield Data

Average yields of Chough in southern NSW are slightly higher than Shrike, but lower than those of Rosella. Given the difficulties in attracting growers to deliver to Rosella-based noodle segregations and the limited applications of an exceptionally white cultivar like Chough, NSW Agriculture elected not to release it commercially, but to register it as a breeder's line, with qualities particularly suited to steamed bun manufacture.

Clearfield JNZ

Synonyms **WAWHT2339**
Pedigree **Herbicide resistant Janz backcross**
Bred & Selected by **Agriculture WA**
Issued by **BASF Australia Ltd. in 2001**

Quality Characteristics

This was the first of what is likely to be a series of herbicide tolerant versions of popular established varieties. Given its parentage, Clearfield JNZ was compared directly with Janz. Interestingly, over a wide range of environments, Clearfield JNZ was shown to have larger grain size, better milling performance, slightly whiter, and brighter flour, and higher starch pasting characteristics. Farinograph water absorption and corresponding development times and dough stabilities were similar, as were dough properties as measured by the extensograph.

Bread and noodle evaluations also showed that Clearfield JNZ and Janz were very similar, particularly in terms of yellow alkaline noodle brightness and colour stability.

On the basis of these results, Clearfield JNZ was awarded a Hard classification in WA, SA, Victoria and southern NSW.

Variety	Test weight	1000 Kernel Weight	Wheat Protein	PSI	Extraction Rate	Flour Ash	Colour Grade	Minolta		Viscograph	Farinograph				Extensograph (45min)		
								Flour		Peak	Water Abs.	DDT	Stab.	Break.	Extens.	Max. Height	Area
	(kg/hl)	(g)	(Nx5.7 11%mb)		(%)	(%, 14% mb	(KJ)	L	b	(BU)	(%)	(min)	(min)	(BU)	(cm)	(BU)	(cm^2)
Janz	79.9	33.2	12.5	16	76.1	0.46	-2.0	92.5	9.0	395	62.3	4.3	6.1	58	21.2	323	100
Clearfield JNZ	79.0	35.3	12.3	16	76.5	0.47	-2.4	92.6	8.9	420	62.6	4.4	6.4	59	21.7	314	98

Samples from 2000/2001 BASF Trials in NSW, Victoria, South Australia & Western Australia, Average quality results from Agrifood Technology

End Products	Clearfield JNZ	Janz	Reference Flour
Pan Bread – Fermented			
Volume	29.15	28.95	28.00
Appearance	17.00	16.90	18.50
Texture	24.70	24.80	25.00
Colour	9.45	9.52	8.77
Total Bread Score	80.30	80.17	80
Yellow Alkaline Noodles			
Minolta L (24hr)	69.7	69.4	71.2
Minolta b (24hrs)	24.9	24.8	24.0
△ Minolta L (24hrs)	13.1	13.2	11.5

Source Agrifood Technology 2000/2001 BASF Trials

Clearfield STL

Synonyms	**WAWHT2344**
Pedigree	**Herbicide resistant Stiletto backcross**
Bred & Selected by	**Agriculture WA**
Issued by	**BASF Australia Ltd. in 2001**

Quality Characteristics

This is another of a series of herbicide tolerant versions of popular established varieties. Given the parentage of Clearfield STL, quality comparisons were made directly with Stiletto. In this regard Clearfield STL had slightly smaller grain size, better milling extraction levels and similar yellow flour to Stiletto. The flour colour is nearing the upper limit of acceptability. This variety had excellent starch pasting characteristics, higher than those of Stiletto. Farinograph and extensograph data showed Clearfield STL to be very similar to Stiletto, with acceptable water absorption and dough properties.

The baking performance of Clearfield STL was good, being better than Stiletto and in some instances better than the baker's control. Yellow alkaline noodle assessment showed Clearfield STL to be less bright and have poorer colour stability than reference varieties used as controls.

Based on these quality attributes, a classification of Premium White was awarded to Clearfield STL for WA, SA and Victoria.

Variety	Test weight	1000 Kernel Weight	Wheat Protein	PSI	Extraction Rate	Flour Ash	Colour Grade	Minolta		Viscograph	Farinograph				Extensograph (45min)		
								Flour		Peak	Water Abs.	DDT	Stab.	Break.	Extens.	Max. Height	Area
	(kg/hl)	(g)	(Nx5.7 11%mb)		(%)	(%14%mb)	(KJ)	L	B	(BU)	(%)	(min)	(min)	(BU)	(cm)	(BU)	(cm^2)
Stiletto	81.7	37.9	13.3	14	76.1	0.51	-2.6	92.3	11.3	643	65.1	4.5	9.8	45	18.9	302	82
ClearfieldSTL	82.3	33.7	13.5	14	76.5	0.50	-2.6	92.1	11.6	743	65.1	4.5	10.7	38	19.5	293	82

Samples from 2000/2001 BASF Trials in Victoria, South Australia & Western Australia, Average quality results from Agrifood Technology

End Products	Clearfield STL	Stiletto	Reference Flour
Pan Bread - Fermented			
Volume	29.58	28.50	28.00
Appearance	18.17	17.33	18.50
Texture	25.67	25.67	25.00
Colour	8.51	8.72	8.77
Total Bread Score	81.93	80.22	80
Yellow Alkaline Noodles			
Minolta L (24hr)	69.7	69.9	71.2
Minolta b (24hrs)	26.8	26.8	24.0
△ Minolta L (24hrs)	13.5	13.3	11.5

Source Agrifood Technology 2001/2001 BASF Trials

COCAMBA

Pedigree AUS 10894 / 4* Condor
Synonym TM58

Quality Characteristics

Cocamba (TM58) is resistant to cereal cyst nematode (CCN) which affects Victorian wheat production yearly (in the order of 15 – 20% losses). TM58 is a hard-grained wheat with breadmaking quality comparable to Condor and Oxley, but superior to Millewa.

CONDOR

Pedigree WW80/2* WW15
WW15 and WW80 are introductions from CIMMYT, Mexico;
WW15: Lermo Rojo/Norin 10-Brevor14/3* Andes
WW80: Penjamo 62/4* Gabo 56/Tesznos Pinto Precose/Nainari 60.

Synonyms WW31, UQ115, 7147

Quality Characteristics

Condor exhibits a very desirable level of grain hardness, somewhat softer than that of Eagle and is markedly superior in milling quality.

Condor is also at least equal to Eagle in terms of test weight, protein content and baking performance. By replacing existing earlier maturing varieties such as Robin, Gamenya and Heron, it is envisaged that Condor will have a pronounced beneficial effect on the overall quality of Central and Southern N.S.W. Wheat. Higher protein samples should be acceptable for delivery into the N.S.W. Hard grade.

CORRIGIN

Pedigree	Tincurrin *2//Gamenya/Iassul
Synonym	77Z:832, 77Z379-100-9*2
Register	11.9.89 Western Australian Dept of Agriculture
Breeder	A. Rosielle
Resistances	Septoria tritici blotch, Septoria nodorum blotch, Flag smut
Quality type	Australian soft
Growth sites	Soft wheat area of Western Australia

VEGETATIVE STAGE

Auricle type	Smooth
Auricle colour	White
Leaf length	Medium
Leaf width	Medium
Leaf pubescence	Light

MATURITY STAGE

Crop height	1 day later than Tincurrin
Straw strength	4cm shorter than Tincurrin
	Strong

HEAD CHARACTERS

Glume colour	White
Awns	Fully awned
Head cross section	Lat. Flattened
Head side view	Oval
Head density	Dense
Glume beak length	Long

FLOWERING STAGE

Top auricle height	Medium
Flag leaf length	Medium
Flag leaf width	Medium

Flowers one day later than Tincurrin

GRAIN CHARACTERS

Hardness	Soft
Brush length	Short
Grain colour	Light
Grain texture	Opaque

Corrigin is being released as a replacement for Tincurrin in the Australian Soft wheat area of WA. It is slightly higher yielding than Tincurrin with advantages in disease resistance and some quality characteristics.

Physiological Characters

Corrigin is insensitive to applied gibberellin. It is assumed that it carries the Rht2 gene from Tincurrin.

Quality Characteristics

Corrigin is soft grained with quality attributes acceptable for the A. Soft class. It offers marginal advantages over Tincurrin in hectolitre weight, grain plumpness, milling quality and dough extensibility. Flour water absorption is slightly higher than that of Tincurrin but appears to be acceptable to both domestic and overseas buyers.

Yield Data

In all soft-wheat areas where Corrigin was tested it is equal to or slightly higher yielding than Tincurrin.

Pedigree	Cranbrook sib (9thIBWSN322,Flicker'S')/(SUN95H) Sunfield sib
Synonyms	WAWHT1379; 85Z:1379
Selected by	R E Wilson, G B Crosbie, R Loughman, G Brown, W Lambe, W Anderson and staff
Issued by	Agriculture Western Australia, August 1996

Quality Characteristic

Cunderdin was released as a hard-grained multi-purpose wheat for sowing in Western Australia. Its milling quality is superior to that of Gutha, Machete and Spear, but lower than desirable flour water absorption precluded its acceptability for AHard, resulting in an APW classification.

The following data was provided by AgWA of comparisons of Cunderdin with Spear, from the 1992/3/4 seasons, and with Amery from the 1993/4 seasons, the leading APW and AH varieties in Western Australia respectively.

	T WT Kg/hl	PSI	Wheat Prot %	Flour Yield %	Minolta col L	Min col b	Farin abs %	Ext cm	Rmax BU	Loaf vol cc	FSV ml/g
Cunderdin	81.1	16	10.7	74.3	91.8	9.0	58.9	21.5	387	731	14.2
Spear	81.3	14	11.5	73.8	91.4	10.8	62.6	19.6	327	752	15.3

	T WT Kg/hl	PSI	Wheat Prot %	Flour Yield %	Minolta col L	Min col b	Farin abs %	Ext cm	Rmax BU	Loaf vol cc	FSV ml/g
Cunderdin	81.2	16	10.7	74.2	91.8	9.2	59.2	21.7	386	726	14.1
Amery	79.7	15	10.8	73.2	91.7	8.8	62.1	19.8	408	726	13.9

Yield Data

Cunderdin has similar yield potential to Tammin, the highest yielding cultivar in Western Australia, particularly in lower rainfall areas.

CUNNINGHAM

Pedigree	3Ag3/4*Condor//Cook
Synonym	QT3826
Registered	1990 Queensland Department of Primary Industries
Breeder	P.S.Brennan
Resistances	Stem, Stripe and Leaf Rust, *Septoria tritici* blotch and Flag Smut
Quality type	Prime Hard
Growth sites	Queensland

VEGETATIVE STAGE

Auricle Type	Variable
Auricle colour	White
Leaf length	Medium
Leaf width	Medium
Leaf pubescence	Medium

FLOWERING STAGE

Top auricle height	Medium
Flag leaf length	Medium
Flag leaf width	Medium

Flowers 3 days later than Janz

MATURITY STAGE

Matures	Three days later than Janz
Height	Five centimetres shorter than Hartog
Straw strength	Medium

HEAD CHARACTERS

Glume colour	White
Awns	Fully awned
Head cross section	Flattened
Head side view	Tapering
Density	Medium
Glume beak	Long

GRAIN CHARACTERS

Hardness	Hard
Brush length	Short
Grain colour	Light
Grain texture	Vitreous

Cunningham is a hard-grained wheat of Prime Hard quality which will fit a planting time that is not occupied by any current commercial cultivar in Queensland – that is between quick varieties such as Janz and mid season varieties such as Vasco.

Physiological Characters

Cunningham most likely has the Rht1 dwarfing gene as two of its parents have this gene. Cunningham is rated as intolerant of toxic levels of soil boron.

Quality Characteristics

Cunningham has very good milling quality, similar to Banks. Protein achievement is similar to banks but better than Hartog. Farinograph development time is greater than that of the two checks. Its dough strength is between Hartog and Banks with extensibility similar to Hartog. Baking scores are similar to Hartog but inferior to Banks.

Yield Data

Cunningham, on average, yielded the same as Hartog in 54 trials over 3 years, better than Vasco in 31 trials over 2 years and better than Janz in 23 trials in 1989.

CURRAWONG

Pedigree	Veery 'S'/Quarrion
Synonym	M4997
Registered	NSW Agriculture, September, 1994
Bred/Selected	NSW Ag, Temora AR & AS. R.H. Martin, L.D.J. Penrose, J. Oliver, D The
Resistances	Stem rust, Stripe rust, Leaf rust [MR-MS], *Septoria tritici* blotch, Yellow spot [M], Bunt
Quality type	Livestock wheat
Growth sites	NSW Silo groups 3,4,5 & 6

VEGETATIVE STAGE		**FLOWERING STAGE**	
Development type	Winter	Flowers	Same as Rosella
Habit	Prostrate-Intermediate		
Auricle	Hairy	Top auricle height	Medium
Auricle colour	White	Flag leaf length	Medium
Leaf length	Short-medium	Flag leaf width	Medium
Leaf width	Narrow-medium		
Leaf pubescence	Not specified		

MATURITY STAGE Similar to Rosella

Crop height	10cm taller than Rosella
Straw strength	Medium

HEAD CHARACTERS		**GRAIN CHARACTERS**	
Glume colour	White	Hardness	Hard
Awns	Fully awned	Brush length	Medium
Head cross section	Flattened	Grain colour	Medium
Head side view	Tapering	Grain texture	Opaque to inter
Head density	Medium-lax		
Glume beak length	Medium-long		

Currawong is released as a livestock wheat. It is suited to early sowing, has high yield potential and is tolerant of acid soils. There are no other cultivars currently in this niche. The only other cultivar with similar high yield potential is Lawson. However, Lawson is susceptible to stem rust, lacks acid soil tolerance and is too late for the main wheat belt.

Physiological characteristics

Currawong has a stronger winter habit than Rosella, but is not strongly winter by international standards. Currawong is not strongly responsive to photoperiod and is tolerant of acid soils, in part due to Al^{3+} exclusion at root tips.

Quality characteristics

Currawong grain is harder than grain of Osprey or Darter. Water absorption is higher than for Osprey. Grain weight is higher than for Osprey and equal to Darter. Grain protein, and thus extensibility and baking quality are slightly inferior to Osprey. Grain protein may be lower due to the high yield of Currawong. Starch paste viscosity is inferior to Darter. Currawong is considered too hard a wheat for the ASW grade, and is thus is acceptable only as livestock wheat.

Yield Data

Currawong out yields the highest yielding winter cultivar, Rosella, by 10-22%.

DARTER

Pedigree	M2293//Flech D'or/3*Kite; WW15/M1238-2//Kite/3/WW15/4/Fleche D'or/3*Kite
Synonym	M5075
Registered	October, 1993; NSW Agriculture
Breeder	R Martin and L Penrose
Resistances	Stem rust, stripe rust, *Septoria tritici* blotch [moderate], flag smut
Quality type	Hard
Growth sites	Southern NSW

VEGETATIVE STAGE

Development type	spring
Habit	intermediate
Auricle type	hairy
Auricle colour	white
Leaf length	short-medium
Leaf width	narrow-medium
Leaf pubescence	medium

MATURITY STAGE equal to Osprey

Crop height	equal to Osprey
Straw strength	medium-strong

HEAD CHARACTERS

Glume colour	white
Awns	tip awned
Head cross section	square
Head side view	tapering
Head density	medium-lax
Glume beak length	medium

FLOWERING STAGE

Flowers equal to Osprey [late April sowing]

Top auricle height	medium
Flag leaf length	medium
Flag leaf width	medium

GRAIN CHARACTERS

Hardness	hard
Brush length	medium
Grain colour	medium
Grain texture	vitreous

Darter will fit environments in southern NSW that require a rust resistant wheat, suitable for early sowings that is acceptable into the southern hard classification. Currently Sunbri fits these criteria, but this wheat is not widely grown, the rust susceptible Osprey is grown in preference. Darter has the added advantages of being resistant to *Septoria tritici* and of being stronger stawed than either Sunbri or Osprey, characters particularly useful in early sown crops. Darter has a more flexible sowing range than Sunbri, but lacks a winter habit and therefore is not as flexible as Osprey.

Physiological characteristics

Darter is a photoperiod sensitive spring wheat with little response to vernalisation. Darter has appeared somewhat less intolerant of acid soils than Strike and Osprey.

Quality characteristics

Darter is a hard-grained wheat with plump grain size and similar quality to Osprey, though slightly inferior on milling yield. Farinograph mixing time is longer than Osprey, but test bake mixing only slightly so. Farinograph water absorption and dough strength are slightly greater than Osprey, and extensibility slightly less at low protein and slightly more at high protein. Baking quality is similar to Osprey. Darter has good peak height paste viscosity, superior to Osprey. Overall, Darter has qualities suitable for the Australian hard grade for the export market.

Yield Data

Darter has overall yields similar to Osprey, Shrike and Sunbri in trials conducted between 1989 and 1992.

DATATINE (*Triticum aestivum, ssp. compactum*)

Pedigree	3Ag3/3* Halberd//4*TINCURRIN
Synonym	84W:1147, RY-TN-989-84D8*2
Register	Western Australian Dept of Agriculture, August 1994
Breeder	D.The, B.R.Whan
Resistances	Stem rust, Leaf rust, Septoria Tritici blotch (MR-MS)
Quality type	Australian Soft
Growth sites	WA

VEGETATIVE STAGE

Development type	Spring
Habit	Erect
Auricle	Smooth and variable
Auricle colour	White
Leaf length	Medium-long
Leaf width	Medium
Leaf pubescence	Medium

MATURITY STAGE

Crop height	1cm shorter than Tincurrin
Straw strength	Strong

HEAD CHARACTERS

Glume colour	Very light brown
Awns	Fully awned
Head cross section	Laterally flattened
Head side view	Oval
Head density	Dense
Glume beak length	Long

FLOWERING STAGE

Flowers	2 days later than Tincurrin
Top auricle height	Medium
Flag leaf length	Medium
Flag leaf width	Medium

GRAIN CHARACTERS

Hardness	Soft
Brush length	Medium
Grain colour	Light
Grain texture	Opaque

Datatine will provide insurance against stem and leaf rust not currently available in the Australian Soft grade in WA. It will add stability of production to this grade by reducing the risk of light-weight grain due to the rusts.

Physiological characteristics

Datatine is a semi-dwarf cultivar likely to have the Rht2 gene as in the recurrent parent Tincurrin. It is moderately intolerant of toxic levels of boron.

Quality characteristics

Datatine is a soft grained wheat considered suitable in quality for the Australian Soft grade in WA. It is a Tincurrin backcross line and similar to Tincurrin in quality. In comparison to Tincurrin, Datatine has slightly higher test weight and similar milling quality, water absorption and dough strength. The dough extensibility of Datatine appears slightly higher than Tincurrin and similar to Corrigan. Cookie spread ratio is slightly lower than Tincurrin and the same as Corrigan.

Yield Data

Datatine was similar in yield or slightly lower than Tincurrin over all trials. It was out-yielded by Corrigan. Compared to the ASW cultivars Aroona and Spear, it was marginally superior or equal in yield. Datatine gives its best yields in the high rainfall areas and with early sowings.

Quality Characteristics

Dennis produces grain that is white in colour, but which lacks the required milling and dough properties to qualify it for classification as a milling wheat variety. Consequently it is classified as Australian Winter Wheat. Where separate winter-wheat segregations are not available, winter wheat will be received as feed and binned with down-graded milling wheat varieties.

Yield Data and Disease Comment

Dennis is best adapted to the shorter season regions of the high rainfall zone. This area includes the slopes of New South Wales, irrigated areas, the drier parts of the long growing season area in Victoria and South Australia, and the temperate areas of southwest Western Australia.

Dennis has very good resistance to all three forms of rust. Dennis carries the gene Sr24/Lr 24 for Stem and Leaf Rust resistance. Dennis is moderately resistant to *Septoria tritici* and is susceptible to Yellow Spot. All current winter wheat varieties are susceptible to Barley Yellow Dwarf Virus and are intolerant of Cereal Cyst Nematode.

DIAMONDBIRD

Pedigree	Vicam/Ciano/7C/3/KAL/BB
Synonym	K2011-5
Breeder	Akram Khan
Originators	Akram Khan, Helen Allen, Kerry Taylor, and Ritchie Munro
Issued by	NSW Agriculture, 1997

Quality Characteristics

Diamondbird is a hard-grained wheat with grain characteristics and strong-dough properties, not dissimilar to those of Dollarbird. It has good starch-pasting characteristics, acceptable flour water absorption, dough extensibility and resultant baking quality.

However, the release of Diamondbird was unusual in that it was initially classified only as GP as a result of some variable, and in some cases, very poor, milling results obtained by collaborators in the NSW UQT process. The situation was further complicated by some very positive results obtained by the SARDI laboratories on samples from the Southern Wheat Improvement trials. These showed that K2011-5 was equal to, or superior to some of the popular control varieties in SA, and if released there, it would almost certainly be classified as A Hard.

Given its excellent yield potential in southern NSW, it was essential that its classification be clarified, and two separate approaches were taken. Firstly all of the many milling results from the WWAI Wagga, the NSW FMCA, BRI and the AGT were put in the hands of the NSW Agriculture statisticians for detailed evaluation. Secondly, under the auspices of the Quality Wheat CRC Pilot Milling Program, commercial lots of Dollarbird and K2011-5 were obtained and subjected to a full-scale milling evaluation by BRI and AWB milling specialists, using the BRI Pilot Mill.

The outcomes were that from a statistical standpoint, the questionable results from the UQT were all sufficiently different from the majority, that they were deemed to be inadmissible. Once these were excluded, the average milling yield for K2011-5 was less than 1% behind that for Dollarbird. Furthermore, the pilot milling trials showed a similar result with no specific processing problems being encountered, even though changes to the standard milling protocol failed to gain an improvement. As a result, Diamondbird was classified A Hard, on the proviso that Dollarbird remained the minimum milling standard for Hard wheat in southern NSW.

The following data from NSW Agriculture, compares Dollarbird and Diamondbird from 21 sites from the 1993, '94, '95, and '96 seasons:

	1000 Kwt gm	Hd	Wheat protein %	Farino W Abs %	DDT min	Ext cm	Ext Ht BU	Loaf Vol. cc
Diamondbird	39.7	56.2	12.2	64.6	4.3	20.5	420.2	634.8
Dollarbird	37.1	54.8	12.5	65.1	4.6	21.7	445.8	627.0

Yield Data

Diamondbird consistently outyields Dollarbird and Janz, particularly on acid soils. Detailed trial results from 1993-96 showed that in Silo Group South, Diamondbird yielded 106% and 104% of Janz in the east and west respectively.

DOLLARBIRD

Parentage Wren/Gabato//Kalyansona/Bluebird
Synonym K2012

Quality Characteristics

Dollarbird is a good milling wheat equal to Banks and Osprey. It has a lower protein achievement and short development time in comparison to Kite and Osprey. It has an intermediate extensibility and slightly lower bake score when compared to Kite and Osprey. Dollarbird is a hard grained, stem, stripe and leaf rust resistant wheat issued by the NSW Department of Agriculture. It is a high yielding wheat which is expected to replace Banks, Sundor and Millewa. It has acceptable quality for the Southern Hard category in silo groups 3 – 6.

ERADU

Pedigree	Ciano/Gamenya
Synonyms	69W05-5, 69W/155

Quality Characteristics

Eradu has superior test weight and milling quality to Gamenya, and similar dough extensibility. Its grain hardness and dough strength appear unbalanced, in that it has softer grain, lower water absorption and stronger dough properties than Gamenya. Overall, Eradu is of acceptable quality for receival into the ASW.

GILES

Pedigree Janz/Vulcan
Synonym QT6581
Breeder P.S. Brennan & P.M. Banks
Selected by P.M. Banks et al
Issued by Department of Primary Industries Queensland in 1999

Quality Characteristics

Giles is a hard, white-grained milling wheat with milling, physical dough properties and noodle sheet colour characteristics that make it suitable for the production of Yellow Alkaline Noodles. A strong feature of its quality profile is its flour whiteness. This attribute helps with producing stable noodle sheet brightness that was superior to Hartog, but inferior to the benchmark varieties Sunco and Batavia. In addition Giles has dough strength and extensibility characteristics that make it suitable for pan bread manufacture.

	TWT	KWt	Hard	WProt	Flour Yield	Flour Minolta L*	Flour Minolta b*	WA	Ext	Rmax	Noodle Sheet Colour (2-24hr)	
	kg/hl	G	PSI	%	%			%	cm	BU	ΔL*	Δb*
Giles	79.3	24.4	16	12.5	73.7	90.4	9.5	61.4	22.8	348	5.3	2.6
Hartog	80.0	29.7	16	13.5	74.7	90.1	10.3	61.3	23.5	360	7.9	2.9
Sunco	80.0	24.5	17	13.9	74.0	90.1	10.2	62.8	22.1	398	3.3	1.7
Cunningham	82.0	26.4	16	12.7	76.1	90.2	10.4	62.4	21.3	285	5.5	3.0
Batavia	76.0	23.5	13	14.3	72.9	89.9	12.1	63.0	24.6	328	3.2	1.5
Sunvale	82.3	23.7	15	13.9	74.7	90.0	10.3	61.6	21.1	358	6.9	3.6
Source DPI Queensland quality results for slow maturing 1998 Queensland harvest series samples												

When tested at high protein in the NWQEP Giles had high flour yield and good ash content, colour grade and Minolta values that indicated it was brighter than the controls. In yellow alkaline noodle tests at 60% flour extraction Giles had equivalent texture and appearance scores to Sunco. Bread and steamed bread scores were mixed and below the controls.

Giles is classified Australian Prime Hard in Queensland and Northern New South Wales.

Yield Data and Disease Comment

Giles is a slow maturing variety that has had average higher yields than Sunvale (+6.4%) and Batavia (+17.3%) in Queensland based on trials from 1995-1999. In limited New South Wales early sown trials Giles' yield was below Currawong, equivalent to Sunbrook and greater than Sunbri, Sunlin, Batavia and Suneca.

Giles has resistance to the 3 rusts and Flag Smut. It is susceptible to common Root Rot and very susceptible to Yellow Spot and Crown Rot.

GOLDMARK

Pedigree	PAVON 'S'/TM56
Synonyms	VF508, VF508*25
Breeder	L O'Brien, A O'Connor
Selected by	P Martin, A O'Connor, J Panozzo, R Trethowan, K McCormick
Issued by	Agriculture Victoria, August 1996

Quality Characteristics

Goldmark has similar grain quality, milling, and dough processing characteristics to Meering. Other attractive characteristics are high flour water absorption, high amylograph peak viscosity, and good baking quality. After careful consideration, Victorian Flour Millers classified Goldmark as APW, as did the AWB, whereas in Southern New South Wales, all agreed that an Australian Hard classification was warranted. Goldmark has proven to have excellent colour development and stability for alkaline noodles, and has performed admirably in instant noodle tests.

The following comparisons for Goldmark at over 10% protein were provided by Agriculture Victoria, averaged over three locations from trials sown in 1995

	T WT Kg/hl	PSI	Flour Prot %	Flour Yield %	Minolta col L	Min col b	Farin abs %	Ext cm	Rmax BU	Loaf vol cc
Goldmark	83.0	14.8	10.9	77.5	74.5	10.2	67.6	20.4	230	1581
Meering	83.2	16.1	11.8	79.2	74.9	9.0	66.6	22.2	207	1542
Ouyen	83.7	10.3	10.3	75.0	74.6	8.3	68.0	19.5	260	1500

The following are similar comparisons, but at flour protein levels of below 10%.

	T WT Kg/hl	PSI	Flour Prot %	Flour Yield %	Minolta col L	Min col b	Farin abs %	Ext cm	Rmax BU	Amylo peak vis AU
Goldmark	83.9	15.4	9.7	77.6	75.1	9.9	66.7	18.5	218	710
Meering	84.4	16.7	9.9	78.5	75.7	9.0	63.5	19.9	192	332
Rosella	82.3	23.6	9.6	78.6	75.4	11.3	57.6	19.3	177	835

Yield Data

Goldmark was higher yielding than Meering in Silo Groups A, C and E, and equivalent to Meering in Groups B and D in 1995.

GOROKE

Pedigree	TM56*2/AUSEN4-21//77-702D [77-702D = 3Ag3/4*Condor]
Synonym	ED089
Registered	August, 1993; Dept of Agriculture, Victoria.
Breeder	P Martin, R Christie, J Davies, B Whan, R Young, J Panozzo and K McCormick
Resistances	Stem rust, stripe rust [moderate], leaf rust, cereal cyst nematode, flag smut
Quality type	ASW
Growth sites	Silo groups B & C [Wimmera region] Vic.

VEGETATIVE STAGE

Development type	spring
Habit	intermediate
Auricle type	smooth
Auricle colour	coloured [some anthocyanin]
Leaf length	medium
Leaf width	medium
Leaf pubescence	light

FLOWERING STAGE

Flowers 3 days later than Meering

Top auricle height	short
Flag leaf length	medium
Flag leaf width	medium

MATURITY STAGE

Crop height	5 cm taller than Meering
Straw strength	strong

HEAD CHARACTERS

Glume colour	white
Awns	fully awned
Head cross section	square
Head side view	oblong
Head density	dense
Glume beak length	long

GRAIN CHARACTERS

Hardness	hard
Brush length	medium
Grain colour	light
Grain texture	intermed.

Goroke is being released because of the combination of rust and cereal cyst nematode resistance. It will be recommended for growing as an ASW-quality wheat in the Wimmera region of Victoria.

Quality characteristics

Goroke has been classified as an ASW quality variety. Average flour yields and colour, water absorption, dough development time and dough breakdown are all similar to Meering. Dough of Goroke is on average more extensible and weaker than that of Meering.

Yield Data

Goroke has outyielded Meering 5 times,been equal to Meering 54 times,and been outyielded by Meering 7 times in trials conducted throughout Victoria.

Drysdale

Synonyms QH71-2
Pedigree Hartog*3/Quarrion
Bred & Selected by A. Condon, R. Richards, G. Farquhar, G. Rebetzke, P. Martin, H. Allen & Z.Tomes
Issued by CSIRO & NSW Agriculture in 2001

Quality Characteristics

Drysdale is the result of endeavours by CSIRO, in conjunction with NSW Agriculture, to produce a drought tolerant Hartog. Compared with most current varieties, it has large grain and this has contributed to high flour extraction rates. Its flour is creamy in colour with mediocre starch paste properties. Farinograph results show that Drysdale is comparable with Janz, whilst extensograph results show that it has very strong dough properties with acceptable extensibility.

This variety was discussed at the NSW State Wheat Technical Committee in June 2001, where AWB provided only an indicative Hard classification for southern NSW. Drysdale's high dough strength was noted as an attractive feature, but poor yellow alkaline noodle results made Prime Hard classification debateable. However it was also noted that Prime Hard dough strength levels in southern NSW need to be increased, and Drysdale may well provide this. A final classification will be provided after all available data is reviewed.

Variety	Test weight	1000 Kernel Weight	Wheat Protein	PSI	Extract-ionRate	Flour Ash	Colour Grade	Minolta		Viscograph	Farinograph				Extensograph (45min)		
								Flour		Peak	Water Abs.	DDT	Stab.	Break.	Extens.	Max. Height	Area
	(kg/hl)	(g)	(Nx5.7 11%mb)		(%)	(%14% mb)	(KJ)	L	b	(BU)	(%)	(min)	(min)	(BU)	(cm)	(BU)	(cm^2)
Banks	81.5	32.0	11.9	13	76.7	0.52	-2.4	92.79	9.3	310	64.7	3.5	6.1	85	20.4	190	60
Diamondbird	83.5	35.5	10.9	13	76.5	0.50	-1.7	91.62	9.4	560	67.3	4.2	5.8	75	17.7	280	73
Janz	82.0	32.2	11.5	13	76.5	0.48	-2.2	92.89	8.8	300	64.7	4.2	6.4	70	22.4	235	79
Mitre	80.5	30.5	12.0	12	74.9	0.49	-1.7	91.97	11.5	300	62.9	4.3	6.6	60	21.1	245	76
QH71-2	83.0	36.7	11.1	13	77.7	0.49	-1.8	92.53	9.7	310	64.6	4.8	6.9	70	19.5	300	86

Samples from NSW Ag South Main 11.5-13.0% Series 2001 NSW State Wheat Technical Committee, Quality results from Agrifood Technology

End Products	QH71-2	Banks	Diamondbird	Janz	Mitre	Lang
Pan Bread – Rapid*						
Average Volume (cc)	840	838	850	850	815	-
Total Score (100)	64	64	67	64	58	-
Pan Bread – Fermented*						
Average Volume (cc)	900	915	858	858	925	-
Total Score (100)	73	71	70	69	69	-
Pan Bread – Sponge & Dough**						
Average Volume (cc)	1856	1781	1800	1856	-	1819
Total Score (100)	60	54	57	61	-	56
Yellow Alkaline Noodles*						
Sensory Score %	64.3	67.1	64.2	64.5	62.8	-
Minolta L (1/2hr)	80.48	81.19	80.42	80.17	79.08	-
Minolta b (1/2hrs)	24.27	26.80	24.60	25.94	30.32	-
△ Minolta L (24hrs)	9.6	7.3	9.11	8.5	7.9	-

* South Main 11.5-13.0% Series
** South Main 13% Series
Source National Wheat Quality Evaluation Program 2001 Interim Report

Glover

Synonyms QT8733
Pedigree TC6/5*Hartog (TC6 = Sunstart//L1/Millewa)
Bred by P. Larkin & P. Banks
Issued by CSIRO & Department of Primary Industries Queensland in 2001

Quality Characteristics

Glover is a Hartog derivative with BYDV resistance. Its milling performance is acceptable given that it very similar to that of Hartog, the minimum standard for Prime Hard. Its Farinograph water absorption is on the low side when compared to control varieties, and although still low, baking absorptions are better than anticipated. In terms of flour yellowness, Minolta b* values are routinely higher than controls and are approaching the upper limit. In some bake tests, this resulted in poor crumb colour scores and consequently poor total bake scores.

Dough properties are strong but inextensible. This also contributes to varied and generally unsatisfactory baking performance. Even when using updated sponge and dough processing methods, Glover was below the controls. The yellow alkaline noodle results were disappointing with routinely poor total scores and poor colour stability

Glover has excessive flour yellowness, and also exhibits a range of other values that are minimal or sub-par for a Prime Hard classification. In particular poor sponge & dough baking and yellow alkaline noodle results, with no special counterbalancing features, rules it out for this class. Consequently Glover has been classified Hard in Queensland.

Variety	Test weight	1000 Kernel Weight	Wheat Protein	PSI	Extraction Rate	Flour Ash	Colour Grade	Minolta		Viscograph	Farinograph				Extensograph (45min)		
								Flour		Peak	Water Abs.	DDT	Stab	Break	Extens.	Max. Height	Area
	(kg/hl)	(g)	(Nx5.7 11%mb)		(%)	(%14% mb)	(KJ)	L	b	(BU)	(%)	(min)	(min)	(BU)	(cm)	(BU)	(cm^2)
Banks	81.0	31.7	13.7	14	77.6	0.48	-2.8	92.8	9.4	400	63.5	5.2	8.5	40	22.3	320	101
Hartog	81.0	34.3	13.2	11	76.9	0.43	-2.1	92	10.5	710	63.0	6.2	>15	20	21.3	460	137
Cunningham	82.0	32.3	14.5	16	76.7	0.47	-2.8	92.2	8.7	420	63.3	6.4	12	25	25.0	385	134
Sunco	82.5	31.2	14.6	17	77.3	0.42	-3.0	92.4	9.0	520	63.9	7.2	>15	20	>26	415	>157
QT8733	81.5	32.1	13.1	12	78.1	0.49	-1.8	92.2	11.8	780	62.0	6.5	12.5	45	20.5	545	149

Samples from 2001 DPI Queensland Main Series, Quality results from Agrifood Technology

End Products	QT8733	Banks	Hartog	Cunningham	Sunco
Pan Bread – Rapid					
Average Volume (cc)	895	940	935	860	938
Total Score (100)	76	76	79	69	77
Pan Bread – Fermented					
Average Volume (cc)	845	832	825	790	863
Total Score (100)	61	65	65	58	67
Pan Bread – Sponge & Dough					
Average Volume (cc)	1906	1925	1881	1925	1950
Total Score (100)	63	62	62	65	66
Yellow Alkaline Noodles					
Sensory Score %	60.1	64.8	67.6	63.3	71.1
Minolta L (1/2hr)	77.63	79.78	78.93	77.75	79.96
Minolta b (1/2hrs)	29.05	30.40	26.09	28.14	29.32
△ Minolta L (24hrs)	10.21	5.40	10.88	9.21	5.66

Source National Wheat Quality Evaluation Program Northern Region Interim Report 2001 – Main Series

H45 (Formerly Galaxy)

Pedigree	Ciano67/2*Olympic/3/WW80/3*ANZA//Kalyonsona/Bluebird
Synonym	H45, Galaxy H45
Selected by	P. Wilson, C.J.Tyson, R.P. Daniel and M.A. Materne
Issued by	SunPrime Research and Development (Formerly known as Hybrid Wheat Australia)

Quality Characteristics

H45 was initially assessed in the 1997 UQT and produced sufficiently variable results, particularly for milling yield, that it had to be reassessed in 1998. Concerns were also raised about H45's low protein achievement, and this is apparent from the accompanying data, showing H45 to be at least one percent lower in protein than the controls. Surprisingly however, its dough properties and processing characteristics were similar to the control varieties.

After some debate, H45 was finally classified as AH in New South Wales and Queensland. The breeder believes that H45 also has potential in other regions due to its maturity. But due to difficulties in obtaining appropriate samples and relevant controls, specifically in Western Australia, H45 is currently only classified APW in that State, South Australia and Victoria. The data presented below was provided by NSW Agriculture, Wagga Agricultural Research Institute, WARI, and represent 11 trials conducted in southern New South Wales in 1996 and 1997.

	TWT	KWt	Hard	WProt	FlrYld	Minolta L*	Minolta b *	W Abs	DDT	Ext	Rmax	LVol
	kg/hl	g		%	%			%	min.	cm	BU	cc
H45	82.4	32.7	48	11.8	74.4	94.0	6.1	62.8	4.9	24.3	332	548
Dollarbird	79.4	30.9	52	12.9	74.2	93.4	7.5	63.7	4.8	23.2	405	542
Janz	81.3	31.5	50	12.9	73.9	93.8	6.0	63.0	5.5	24.2	393	612
Banks	80.7	30.2	49	13.0	74.8	93.8	6.8	62.7	5.1	24.0	359	582
Comparisons	*11*	*11*	*11*	*11*	*11*	*9*	*9*	*6*	*6*	*5*	*5*	*3*

Yield Data

In 47 trials performed by NSW Agriculture in southern New South Wales in 1996 and 1997, H45 was between 104% and 105% of Janz. H45 has similar yields to Silverstar and Diamondbird in southern New South Wales.

HARTOG

Pedigree Vicam 71//Ciano 'S' – 7c/Kalysona/Bluebird

Synonyms 8 IBWSN285, QT 274, PAVON 'S'

Quality Characteristics

Hartog is of lower protein than all other varieties, with a flour yield intermediate between Timgalen and Banks. Compared to Cook, Hartog tends to be similar in water absorption, lower in extensibility and has greater dough strength. Hartog's baking quality is lower than all the other varieties with which it was compared.

HYBRID APOLLO

Pedigree	F1 Hybrid between Sunfield SIB and Kite/4/Sonora 64/Tezanos Pintos Precoz/Nainari 60/3/Penjamo 62/Gabo 55/HRW/Primepi
Synonyms	CH27, H27
Breeder	P Wilson, M A Materne
Selected by	P Wilson, R P Daniel, M A Materne, C J Tyson
Issued by	Hybrid Wheat Research. August 1995

PLANT CHARACTERISTICS

Developmental type	spring	Maturity stage 1 day (?) than Hybrid Meteor	
Vegetative stage	intermediate	Crop height is 3cm (?) than Hybrid Meteor	
Auricle type	hairy	Straw strength is strong	
Auricle colour	white	Flowering stage 1 day earlier than Hybrid Meteor	
Leaf length	long	Top auricle height	tall
Leaf width	wide	Flag leaf length	long
Leaf pubescence	light	Flag lead width	wide
HEAD CHARACTERS		**GRAIN CHARACTERS**	
Glume colour	white	Hardness	hard
Awns	tip-awned	Brush length	short
Head cross section	flattened	Grain colour	medium
Head side view	tapering	Grain texture	vitreous
Head density	medium		
Glume beak length	medium		

Quality Characteristics

Hybrid Apollo was released as a replacement for Hybrid Pulsar and Hybrid Meteor. Its milling quality, dough properties and baking performance are all similar to Hartog and as a result it was categorised by the NSW UQT Committee as "Prime Hard Export". It is also characterised by having a high Minolta b value which can effect crumb colour and depress bake scores. It has been classified by the AWB as Prime Hard in both Northern NSW and Queensland. Local flour milling representatives agreed unanimously that Hybrid Apollo was too strong for the domestic market.

	Test Wt (kg/hl)	P.S.I	Grain Protein %	Flour Yield %	Minolta colour L - b	Water Abs %	Dough Dev time (min)	Exten (cm)	Max Res (BU)	Loaf Vol -Br	Loaf Score -Br
H27	81.4	13	12.3	76.5	81.9	62.1	6.0	20.7	419	801	59.8
Hartog	82.9	12	12.1	76.1	82.5	61.7	5.2	21.0	434	808	61.3
Sunco	83.1	14	12.6	77.0	83.6	62.5	6.5	22.7	386	785	59.0
Sunclg	82.4	13	13.0	74.9	81.7	64.8	5.4	20.2	358	785	55.0

Yield Data

In over 60 comparisons, Hybrid Apollo outyielded Hybrid Meteor (4%) Hybrid Pulsar (3%) Cunningham (10%) Janz (8%) Sunco (12%) Sunmist(15%) and Sunvale(9%).

HYBRID GEMINI

Pedigree	F1 Hybrid between Sunfield SIB and Kite/4/Dirk R/3/Sonora 64/Tezanos Pintos Precoz/Nainari 60/5/Ciano/2*Olympic
Synonyms	CH31, H31
Breeder	P Wilson, M A Materne
Selected by	P Wilson, R P Daniel, M A Materne, C J Tyson
Issued by	Hybrid Wheat Research. August 1995

PLANT CHARACTERISTICS

Development type	spring	Maturity stage 1 day later than Hartog	
Vegetative stage	erect	Crop height is 10cm shorter than Hartog	
Auricle type	hairy	Straw strength is medium	
Auricle colour	white	Flowering stage 1 day later than Hartog	
Leaf length	medium	Top auricle height	short
Leaf width	medium	Flag leaf length	medium
Leaf pubescence	light	Flag lead width	medium
HEAD CHARACTERS		**GRAIN CHARACTERS**	
Glume colour	white	Hardness	hard
Awns	fully-awned	Brush length	short
Head cross section	flattened	Grain colour	medium
Head side view	tapering	Grain texture	vitreous
Head density	medium		
Glume beak length	medium		

Quality Characteristics

Hybrid Gemini was initially released as a possible replacement for Banks for use by the domestic flour milling industry. It has extensible dough properties and excellent baking quality. However, based on NSW UQT data, it was considered on the weak side for the export market, and thus was classified Australian Hard. Subsequent data obtained from Queensland Wheat Research Institute showed it to be substantially stronger when grown in that State, and at the time of reporting, its classification for both the export and domestic markets was under review.

	Test Wt (kg/hl)	P.S.I	Grain Protein %	Flour Yield %	Minolta colour L - b	Water Abs %	Dough Dev time (min)	Exten (cm)	Max Res (BU)	Loaf Vol -Br	Loaf Score - Br
H31	82.6	13	12.2	77.1	83.3	61.3	5.9	21.1	350	830	59.6
Banks	82.5	13	12.3	77.1	82.9	61.1	4.5	21.5	339	761	62.9
Sunco	83.1	14	12.6	77.0	83.6	62.5	6.5	22.7	386	785	59.0
Sunelg	82.4	13	13.0	74.9	81.7	64.8	5.4	20.2	358	785	55.0

Yield Data

In over 35 comparisons Hybrid Gemini outyielded Hartog (10%) Janz (8%) Sunco (13%) Sunland (10%) and Sunstate (9%). Given the yield potential of Hybrid Apollo and Hybrid Mercury and their Prime Hard classifications, it is unlikely to be widely sown.

HYBRID MERCURY

Pedigree	F1 Hybrid between Ciano/2*Olympic//WW15/QT7605 and Kite/4/Dirk R/3/Sonora 64//Tezanos Pintos Precos/Nainari 60/5/Ciano 2*Olympic
Synonyms	CH30, H30
Breeder	P Wilson, M A Materne
Selected by	P Wilson, R P Daniel, M A Materne, C J Tyson
Issued by	Hybrid Wheat Research. August 1995

PLANT CHARACTERISTICS

Development type	spring	Maturity stage 5 days earlier than Hartog	
Vegetative stage	erect	Crop height is 10cm shorter than Hartog	
Auricle type	hairy	Straw strength is medium	
Auricle colour	white	Flowering stage 5 days earlier than Hartog	
Leaf length	short	Top auricle height	medium
Leaf width	medium	Flag leaf length	short
Leaf pubescence	light	Flag lead width	medium

HEAD CHARACTERS		GRAIN CHARACTERS	
Glume colour	white	Hardness	hard
Awns	fully-awned	Brush length	short
Head cross section	flattened	Grain colour	medium
Head side view	tapering	Grain texture	vitreous
Head density	medium		
Glume beak length	medium		

Quality Characteristics

Hybrid Mercury is a quick maturing cultivar providing growers with a high yielding alternative to Hartog. It has good physical grain characteristics, and superior milling quality to Hartog, however, protein levels tend to be some what lower . It has strong dough properties and a protein levels in excess of 13% meets Prime Hard Export requirements. As with Hybrid Apollo, local flour milling industry representatives agreed that Hybrid Mercury was too strong for the domestic market.

	Test Wt (kg/hl)	P.S.I	Grain Protein %	Flour Yield %	Minolta colour L - b	Water Abs %	Dough Dev time (min)	Exten (cm)	Max Res (BU)	Loaf Vol -Br	Loaf Score -Br
H30	83.3	13	11.6	76.1	84.1	61.0	5.5	19.8	383	770	61.0
Hartog	82.9	12	12.1	76.1	82.5	61.7	5.2	21.0	434	808	61.3
Sunco	83.1	14	12.6	77.0	83.6	62.5	6.5	22.7	386	785	59.0
Sunelg	82.4	13	13.0	74.9	81.7	64.8	5.4	20.2	358	785	55.0

Yield Data

Hybrid Mercury is the highest yielding of the current hybrids. In over 35 comparisons it outyielded Hartog (15%) Janz (13%) Sunco (23%) Sunland (15%) and Sunstake (13%).

HYBRID METEOR

Pedigree F1 hybrid between Condor Sib*2/Pitic 62 and Kite/4/Mexico77/3/Mexico 8156//HRW Restorer/PRIMEPI

Synonym CH11

Quality Characteristics

Meteor is a hard-grained wheat with flour extraction, thousand kernel weight and extensibility between that of Banks and Kite. It has a grain protein achievement similar to Banks, whilst flour colour grade, loaf volume and loaf score are superior to Banks, Kite and Suneca. Both development time and extensograph resistance are similar to Suneca. Meteor is a hard-grained hybrid variety resistant to stem and stripe rust and urocystic agropyri. It is a very high yielding wheat issued by Cargill Seeds and is suitable for the Prime Hard class in silo groups 1, 2 and 3 of NSW. It is seen as an alternative to Hartog and Banks in Prime Hard areas and to Hybrid Comet and Kite in most non-Prime Hard area.

HYBRID PULSAR

Pedigree	F 1 hybrid between Sunfield sib. and R5084 Sunfield sib=WW31/4/W3566/TOPO/3/Waite Line/IRN 70.511//SUN15B R5084 = Kite sib/4/S0N64//TZPP/NAI60/3/MEX8156//HRW restorer/PRIMEP1
Synonym	CH26
Register	September, 1992 Cargill Seeds
Breeder	C J Tyson, R P Daniel, P Wilson, M A Materne
Resistances	Stem, stripe & leaf rust
Quality Type	Prime Hard
Growth Sites	Silo groups 1, 2 & 3 of NSW

VEGETATIVE STAGE

Auricle Type	Hairy
Auricle Colour	White
Leaf Length	Long
Leaf Width	Wide
Leaf Pubescence	Light

FLOWERING STAGE

Top Auricle Height	Tall
Flag Leaf Length	Long
Flag Leaf Width	Wide

Flowers 1 day earlier than Hybrid Meteor

MATURITY STAGE

Matures	One day earlier than Hybrid Meteor
Height	Five cm shorter than Hybrid Meteor
Straw Strength	Strong

HEAD CHARACTERS

Glume Colour	White
Awns	Tip awned
Head X Section	Flattened
Head Side View	Tapering
Density	Medium
Glume Beak	Medium

GRAIN CHARACTERS

Hardness	Hard
Brush Length	Short
Grain Colour	Medium
Grain Texture	Vitreous

HYBRID PULSAR is intended as a replacement for Hybrid Meteor. Hybrid Pulsar combines improved leaf rust resistance with slightly higher yield under good conditions. The seed of Hybrid Pulsar is easier to produce than Hybrid Meteor. This will help minimise the cost of hybrid planting seed to farmers and constitutes a significant advance in the development of F1 hybrid seed in Australia.

Physiological Characters

HYBRID PULSAR was classified as intolerant to boron.

Quality Characteristics

HYBRID PULSAR is a hard, spring wheat accepted into the Prime Hard classification of silo groups 1, 2 & 3 of NSW. It has a protein achievement, and strength similar to Sunco, milling quality and bakery mixing time between Hartog and Sunco and extensibility and baking quality similar to Hartog.

Yield Data

HYBRID PULSAR performs well at higher yielding sites but its performance tends to drop away under very stressed conditions. In the three years from 1989-91 Hybrid Pulsar gave similar yields to Hybrid Meteor. In comparison to non-hybrid varieties, Suneca and Sunco yielded 87% and 95% of Hybrid Pulsar over the same period which included two very dry seasons during the flowering and grain filling periods.

JANZ

Pedigree	3Ag3/4*Condor//Cook
Synonym	QT3685
Registered	12.6.1989 by Queensland Wheat Research Institute
Breeder	P.S.Brennan
Resistances	Stem, stripe and leaf rusts and flag smut
Quality type	Prime Hard
Growth sites	Queensland

VEGETATIVE STAGE

Auricle Type	Smooth
Auricle Colour	White
Leaf Length	Medium
Leaf Width	Medium
Leaf Pubescence	Medium

FLOWERING STAGE

Top Auricle Height	Medium
Flag Leaf Length	Short
Flag Leaf Width	Narrow

Flowers 3 days later than Hartog

MATURITY STAGE

Matures three days later than Hartog

Height	Thirteen centimetres shorter than Hartog
Straw Strength	Medium

HEAD CHARACTERS

Glume Colour	White
Awns	Fully Awned
Head Cross Section	Square
Head Side View	Tapering
Density	Medium
Glume Beak Length	Long

GRAIN CHARACTERS

Hardness	Hard
Brush Length	Short
Grain Colour	Light
Grain Texture	Vitreous

Janz is a hard-grained wheat of Prime Hard quality. It is proposed as an alternative to Hartog in Queensland.

Physiological Characters

Janz most likely has the Rht1 dwarfing gene as two of its parents have this gene.

Quality Characteristics

Janz has very good milling quality, similar to Banks. Protein achievement is similar to Banks but better than Hartog. Its dough strength is equal to Hartog and higher than Kite or Banks but it is more extensible than all three above check cultivars. Bread baking scores are similar to Hartog but inferior to Banks.

Yield Data

Janz had the same yield as Hartog over all of the Queensland wheat belt in the three-year period from 1986 to 1988. It out yielded Hartog in the Central highlands and gave a lower yield than Hartog in the South West, and had similar yields in other regions. However, Hartog has an overall yield advantage as it out yielded Janz more times than it was out yielded by Janz.

KALANNIE

Pedigree	Falcon-EMS / Sharbarti Sonora 64 (70Y71-315)/3/(71W15-7) Madden sib (M146) / (P10522B) Unknown (76W:591)//Aroona
Synonyms	WAWHT1426; 84Y:1426
Selected by	I R Barclay, G B Crosbie, R Loughman, G Brown, R E Wilson, W Lambe, W Anderson and staff
Issued by	Agriculture Western Australia, August 1996

Quality Characteristics

Kalannie is a very early maturing cultivar like Wilgoyne but with a significant yield advantage. It is hard grained with superior milling quality to all of the other hard grained cultivars released in Western Australia in 1996, and exceptionally white flour colour is an attractive feature. However, again water absorption is generally too low for a hard wheat, and initially an APW classification was awarded pending further end product evaluations at the AGT Werribee. These showed that Kalannie produced the best pan bread of all those tested, acceptable steamed bread, acceptable instant noodles, and yellow noodle sheets of average colour stability. On balance, an Australian Hard classification was warranted and Kalannie's classification was upgraded accordingly.

The following data from AgWA compares Kalannie with Wilgoyne, arguably the best quality hard wheat currently grown in Western Australia, from the 1991-1994 seasons.

	T WT Kg/hl	PSI	Wheat Prot %	Flour Yield %	Minolta col L	Min col b	Farin abs %	Ext cm	Rmax BU	Loaf vol cc	FSV ml/g
Kalannie	80.3	16	11.5	74.2	91.9	7.9	59.8	21.7	439	754	15.1
Wilgoyne	80.6	14	12.3	76.1	91.6	8.9	60.9	21.3	434	779	13.7

Yield Data

Kalannie gives its best yields in the short growing season environments and with later sowings where it clearly outyields Wilgoyne throughout Western Australia, and Amery in the lower and medium rainfall northern areas.

KARLGARIN

Pedigree Spear//(79W781)Bodallin/Eradu
Synonym WAWHT2050
Breeder Iain Barclay
Issued by Agriculture Western Australia in 1999

Quality Characteristics

Karlgarin is a hard, white wheat with average grain size that can, under certain seasonal conditions, have high screening levels. It has comparable milling yield to Spear, but is lower than varieties such as Cascades or Wilgoyne renowned for their superior milling performance. Karlgarin has white flour, with good water absorption and balanced dough properties, all of which are reflected in very good baking quality.

	TWT	KWt	Hard	WProt	Flour Yield	Flour Minolta L*	Flour Minolta b*	WA	Ext	Rmax	Wmeal FSV
	kg/hl	G	PSI	%	%			%	Cm	BU	ml/g
Karlgarin	82.2	35.8	14	11.1	74.5	91.9	9.5	63.4	21.4	340	17.2
Machete	78.9	36.7	15	11.7	73.9	91.7	9.6	64.0	22.0	358	16.4
Spear	81.9	37.0	15	11.7	74.7	91.5	11.3	63.4	20.5	276	16.4
Comparisons	*50*	*50*	*17*	*20*	*16*	*16*	*16*	*16*	*16*	*16*	*16*
Source Agriculture Western Australia Grain Products Laboratory 1994 to 1998 Trial Results											

Karlgarin has been tested at a range of protein levels in the NWQEP and it performed well in milling and dough evaluations. Across a broad range of end products including yellow alkaline noodle, steamed bread, pan bread and flat bread, Karlgarin was ranked acceptable to good.

Karlgarin is currently classified Australian Premium White in Western Australia.

Yield Data and Disease Comment

Karlgarin is a medium maturity, white chaffed, bearded wheat with strong straw. It has superior yield to Carnamah (the highest yielding Australian Hard variety in Western Australia) in the low to medium rainfall, south central areas. Carnamah is superior in the northern and high rainfall regions. Overall Karlgarin and Carnamah are similar in yield.

Karlgarin has useful resistance to Yellow Spot and Stripe Rust. Karlgarin is Aluminium tolerant, similar to Arrino and Westonia, and Boron tolerant, similar to Spear.

Kennedy

Synonyms	**QT6063**
Pedigree	**Veery #5/Hartog**
Bred & Selected by	**P.S. Brennan et al**
Issued by	**Department of Primary Industries Queensland in 1997**

Additional Quality Comments

Kennedy was first released in 1997, and classified Prime Hard in Queensland and northern NSW. It was recognised however, that Kennedy suffered from Late Maturing Alpha Amylase (LMAA), a defect initiated by cool temperatures during ripening that causes similar quality problems to those normally associated with sprouted grain, but in the absence of pre-harvest rainfall.

Given the industry's current inability to test all deliveries for LMAA, this serious quality fault has the potential to impact dramatically on both sellers and users of grain containing LMAA susceptible varieties. In future therefore, in order to qualify for classification in any of its milling grades, AWB Limited will require evidence that all new wheat varieties are LMAA-free. .

In Kennedy's case this stance is significant. Northern region Falling Number comparisons at the time of release showed Kennedy to exhibit high Falling Number results at all sites, whereas Seri, a notoriously LMAA-susceptible line, was low at many of the same sites. In southern NSW however, Kennedy exhibited low Falling Number results at some sites where there was no evidence of sprouting and control cultivars had high falling numbers. Consequently, the release of Kennedy was accompanied by the recommendation that it should not be grown outside northern NSW and Queensland – i.e. an attempt was made to restrict its cultivation to areas with a low probability of cool temperatures during ripening.

Unfortunately, this warning was disregarded and Kennedy has been recorded well outside the northern region, raising immediate concerns for marketers and end-users. Consequently, AWB has reviewed Kennedy's classification. It retains a Prime Hard in Queensland and northern NSW but is now Feed elsewhere. AWB will continue to monitor the susceptibility of Kennedy in those northern regions, and if deliveries show any evidence of LMAA, Kennedy will be downgraded.

KENNEDY (1997 report)

Pedigree Veery#5/Hartog
Synonym QT6063
Breeder P S Brennan
Selected by P.S. Brennan et al
Issued by Department of Primary Industries, Queensland, July 1997

Quality Characteristics

Kennedy is another Hartog derivative with strong dough properties and excellent extensibility. It has demonstrated very good baking quality and has the potential to make a significant contribution to Prime Hard wheat destined for breadmaking in Asia. Its downsides are milling quality marginally inferior of that of Hartog, and poor dough sheet colour development and stability, ruling it out for any future Ramen noodle segregation. Its strength and high mixing requirement make it unattractive for the domestic market.

The following are summarised quality data provided by QWRI for Kennedy in comparison with Banks, Kite and Hartog, for trials grown in Queensland in 1994/95/96.

	T WT Kg/hl	PSI	Grain Prot%	Flour Yield %	Minolta col L-b	Farin abs %	Ext cm	Rmax BU	Loaf vol cc	Bake score [50]
Kennedy	81.8	11	13.7	75.1	80.0	63.1	23.0	520	873	40
Kite	83.3	12	13.5	73.6	80.6	65.0	19.6	438	738	33
Banks	84.2	12	13.2	76.0	80.9	62.5	21.8	396	747	33
Hartog	84.5	10	12.6	75.9	80.0	62.6	22.3	52.4	755	34

Yield Data

Extensive yield comparisons indicate that Kennedy is higher yielding than Kite, Banks, Sunstate, Tasman and Hartog in Southern Queensland, and substantially superior to Banks, Hartog and Sunstate in New South Wales.

KENNEDY (2000 addition)

Quality Characteristics

Kennedy is a hard white-grained variety that demonstrated goods results for kernel weight and milling quality although it's milling yield is slightly behind some control varieties. Strong dough properties were combined with good extensibility. Farinograph water absorption was very good and excellent results were obtained for baking quality.

	TWT	KWt	Hard	WProt	Flour Yield	Flour Minolta L*	Flour Minolta b*	WA	Ext	Rmax	Noodle Sheet Colour (2-24hr)	
	kg/hl	G	PSI	%	%			%	Cm	BU	ΔL*	Δb*
Kennedy	81.8	32.4	11	13.7	75.1	90.4	10.3	63.1	23.0	520	7.1	0.2
Hartog	84.5	32.8	10	12.6	75.9	90.3	10.3	62.6	22.3	524	6.5	0.9
Banks	84.2	31.8	12	13.2	76.0	90.5	9.6	62.5	21.8	396	4.4	1.2
Kite	83.3	34.0	12	13.5	73.6	90.5	9.9	65.0	19.6	438	5.6	1.0

Adapted from Department of Primary Industries Queensland Summarised Queensland Trial Results from 1994-1996

In high-protein NWQEP tests, Kennedy had mediocre milling performance despite good test weights and large grain size. Water absorption and dough development, extensibility and strength in addition to RVA peak viscosity, were very good. In rapid, fermented and sponge and dough pan bread tests, Kennedy was better or equal to the best controls. Yellow alkaline noodle assessment demonstrated good texture but poor colour stability, although this latter attribute may be a result of the noodles made from straight run flour. Kennedy made excellent northern style steamed bread, which is consistent with the high strength requirements of this product. Kennedy has an Australian Prime Hard classification in Queensland and Northern New South Wales. In other growing regions, Kennedy will have a lower classification due to its potential to generate Late Maturing Alpha Amylase.

Yield and Disease Comment

In field trial comparisons to Hartog, Kennedy yielded slightly better in Northern New South Wales, had similar yields in Southern Queensland and lower yields in Central Queensland.

It has resistances to Stem, Leaf, Stripe Rust and Flag Smut. Kennedy has moderate resistance to Yellow Spot though less than that of Leichhardt. It is moderately tolerant to Root Lesion Nematodes and susceptible to Crown Rot and Common Root Rot.

KRICHAUFF

Synonyms	WA/11/7; WI95025; (WqKPWmH*Ag3Aroona)/11/7
Breeder	A J Rathjen, G A Palmer, C J Stone, M C Kroehn
Selected by	H Wallwork, D The, S P Jefferies, R D Wheeler, J Lewis, G B Cornish, D S Cooper, N K Howes
Issued by	University of Adelaide Waite Agricultural Research Institute, 1995

Quality Characteristics

Krichauff was initially rejected because of high flour Minolta 'b' values, which affected bread-crumb colour. However high xanthophyll and very low ppo levels produced alkaline noodle dough sheets of exceptional brightness, colour and stability. This encouraged the Waite Institute to propose its release specifically for yellow alkaline noodle purposes. Krichauff has been awarded an APW classification in South Australia but its influence on quality for other end-uses will be carefully monitored. In most other States it will be classified ASW.

The following comparisons provided by the Grain Quality Laboratories of SARDI, compare Krichauff with Janz and Machete, two of the leading AHard and APW varieties in South Australia.

	PSI	Flour Prot %	Flour Yield %	Minolta colour L	Min colour b	PPO	Farin abs %	Ext cm	Rmax BU	Bake Score
Krichauff	17	10.9	74	91.3	12.4	0.17	63.4	19.4	411	67
Janz	16	10.7	75	90.9	8.4	0.29	63.0	22.7	406	69
Machete	15	10.8	73	90.7	8.9	0.30	65.4	22.5	419	77

Krichauff has good early vigour, early maturity, good resistance to all rusts and moderate tolerance of boron toxic soils. It is susceptible to cereal eelworm and Pratylenchus neglectus. The grain yields of Krichauff are 5% or more above those for the other APW and Hard varieties and about the same as the ASW varieties, Trident and Excalibur.

KUKRI

Pedigree	76ECN36/76ECN34//RAC549
Synonyms	RAC820 & DT68570-117
Breeder	Dr. G. Hollamby
Issued by	Roseworthy Wheat Breeding Program in 1999

Quality Characteristics

Kukri is a hard, white-grained variety with very strong but balanced dough properties across a range of protein levels. This characteristic, coupled with its high dough extensibility, makes the variety suitable for yellow alkaline noodle production, aquaculture, frozen doughs and other end products requiring strong dough characteristics. The variety may also be suited to sponge and bread dough making processes although current pan bread bake methods (long fermentation) produce poor results largely due to its excessive strength. Kukri has a larger average grain size than Janz.

	Hard	Flour Prot	Flour Yield	Kent Jones	Flour Minolta L*	Flour Minolta B*	WA	Ext	Rmax	Bake Score	RVA Peak	Noodle Sheet Colour (2-24hr)	
	PSI	%	%				%	cm	BU		RVU	ΔL*	Δb*
Kukri	15	10.4	75.7	-2.2	91.9	10.0	61.9	21.5	505	75	135	3.8	0.6
Janz	17	9.6	75.6	-2.8	92.3	9.3	62.1	18.5	290	77	130	5.9	0.3
Sunco	18	10.4	75.6	-2.7	92.5	9.1	62.3	19.9	325	74	144	4.4	0.7
Molineux	16	10.6	75.4	-2.1	91.9	8.9	63.2	20.4	353	88	175	5.8	0.04

Source SARDI Grain Quality Laboratory Report on 1998/99 Prime Hard Trials

In high protein NWQEP tests Kukri had good flour yields but its water absorption was lower than controls, despite a relatively high starch damage value. The dough was strong and extensible with a relatively long development time. The dough strength properties are best described by the comment that "this sample had excessive mixing requirements....appears too strong for regular baking practices".

Kukri is considered suitable for Australian Prime Hard; however, segregations have yet to be finalised as feasibility studies are still underway. Until this evaluation work is complete, Kukri will be received as Australian Hard in South Australia.

Yield Data and Disease Comment

Kukri will demonstrate its greatest potential on the Upper and Western Eyre Peninsula and in the Murray Mallee regions of South Australia. In trials to date, Kukri has yielded slightly less than Janz and Frame, but has performed better than Barunga or Machete. Kukri's adaptation to areas outside South Australia is yet to be determined.

Kukri has a good level of resistance to Stem, Stripe and Leaf Rust. Kukri also has some resistance to Yellow Leaf Spot and Crown Rot, but is susceptible to, and intolerant of, Cereal Cyst Nematode. Kukri is very susceptible to Bunt.

LANG

Pedigree	QT3765/Sunco
Synonym	QT7029
Breeder	J.A. Sheppard & P.S. Brennan
Selected by	J.A. Sheppard et al
Issued by	Department of Primary Industries Queensland in 2000

Quality Characteristics

Lang is a hard, white-grained variety with high dough strength, a long mixing time (longer than Banks and Hartog and shorter than Sunco) and excellent baking qualities. The milling, physical dough, baking and noodle sheet colour properties of Lang are similar to those of Sunco. This would indicate that when commercial tonnage is available Lang will be a welcome addition to the northern wheat receivals being ideally suited to both Yellow Alkaline Noodles and domestic milling markets.

	TWT	KWt	Hard	Wht Prot	Flour Yield	Flour Minolta	Flour Minolta	WA	Ext	Rmax	Bake Score	Noodle Sheet Colour (2-24hr)	
	kg/hl	G	PSI	%	%	L*	B*	%	Cm	BU	Max50	ΔL*	Δb*
Lang	82.8	27.5	14	13.4	74.6	90.6	9.9	62.3	23.0	364	30	2.4	1.8
Banks	80.8	28.6	13	13.5	75.1	90.7	10.2	62.3	22.3	343	31	3.5	1.0
Hartog	82.7	31.2	11	12.7	74.8	90.5	10.4	62.1	21.4	432	31	6.9	2.1
Sunco	82.8	29.2	15	13.6	75.1	90.5	9.7	63.1	24.1	437	30	2.8	1.4
Source Department of Primary Industries Queensland Summarised Queensland Trial Results from 1997-1999													

When tested at high protein in the NWQEP, Lang had reasonable flour yield and water absorption results. These were combined with satisfactory dough properties. Bread made using the rapid dough method was favourable compared to controls, as was Lang's fermented dough results. Lang had the highest sponge and dough bread score. The yellow alkaline noodle sheet brightness was very good for a straight run flour and Lang had better colour stability than Sunco. Lang had the best steamed-bread score for the samples tested.

Lang has been classified Australian Prime Hard in Queensland and Northern New South Wales.

Yield Data and Disease Comment

Lang is best adapted to areas of Queensland and Northern New South Wales where in comparative yield trials, Lang out yielded both Sunco and Janz. Lodging resistance of Lang is better than that of Sunco or Sunvale and similar to Cunningham.

Lang is resistant to all 3 forms of rust and is moderately resistant to Crown and Common Root Rot. Lang is tolerant to Root Lesion Nematode *P. thornei*, and has shown partial resistance to black point in field situations.

LEICHHARDT

Pedigree	CNT2/4*Hartog
Synonym	QT5793
Breeder	R G Rees, R L Eisemann
Selected by	R G Rees, P S Brennan, D J Martin, D The, G J Platz, K C M Blaikie, P J Agius, J P Thompson, T G Clewett, G B Wildermith
Issued by	Dept of Primary Industries Queensland. July 1995

PLANT CHARACTERISTICS

Development type	spring	Maturity stage 1 day later than Hartog
Vegetative stage	erect	Crop height is 2 cm taller than Hartog
Auricle colour	white	Flowering stage 1 day later than Hartog
Leaf length	medium	Top auricle height
Leaf width	medium	Flag leaf length
Leaf pubescence	light	Flag leaf width

HEAD CHARACTERS

Glume colour	
Awns	
Head cross section	
Head side view	
Head density	medium
Glume beak length	medium

GRAIN CHARACTERS

Hardness	hard
Brush length	short
Grain colour	light
Grain texture	vitreous

Quality Characteristics

Leichhardt is a yellow-spot-resistant derivative of Hartog. It is hard-grained with strong dough properties and high flour paste viscosity. However, its milling quality and dough extensibility are somewhat inferior to those of Hartog, and thus its maximum classification in Queensland and Northern NSW is Australian Hard. Further testing will be undertaken to determine its suitability for yellow alkaline noodles.

	Test Wt (kg/hl)	P.S.I	Grain Protein %	Flour Yield %	Minolta colour L – b	Water Abs %	Dough Dev time (min)	Exten (cm)	Max Res (BU)	Loaf Vol (cm^3)
Leichhardt	83.0	7	12.4	73.8	79.58	61.3	3.8	18.4	592	682
Hartog	83.0	7	12.4	74.4	79.51	61.3	4.0	19.4	604	691
Banks	82.1	8	13.3	74.9	80.72	61.0	4.0	20.9	507	767
Kite	82.1	9	13.5	72.4	80.43	63.7	3.7	18.3	481	721

Yield Data

In trials conducted at 21 non yellow spot infected sites in 1993-94, Leichhardt outyielded Banks by 8%, was equivalent to Sunstate and slightly inferior to Hartog. In yellow spot infected soils however, substantial advantages can be demonstrated.

Lorikeet

Synonyms **M5631**
Pedigree **Lr21SrX/2*Shortim//3*Cook/3/3*M3087**
(M3087 is a sister line of Rosella)
Bred & Selected by **L. Penrose, R.H. Martin, D. The, K. Walsh, K. Clark, P. Martin & H. Allen**

Issued by **NSW Agriculture in 2001**

Quality Characteristics

This is a soft-grained variety with excellent starch pasting characteristics that make it suitable for white salted or udon noodle production. The table below compares Lorikeet with Rosella, a variety renowned for its udon noodle-making quality. Lorikeet has similar grain size and superior protein achievement. Milling performance and flour colour are also similar to that of Rosella. Starch pasting quality is better than Rosella, as is its water absorption and dough strength. Lorikeet is slightly less extensible than Rosella.

In udon noodle evaluations, raw and cooked noodle firmness was similar to Rosella, as was noodle brightness, colour and colour stability. As a consequence, Lorikeet has been classified ASWN in southern NSW.

Variety	Test weight	1000 Kernel Weight	Wheat Protein	PSI	Extraction Rate	Flour Ash	Colour Grade	Minolta		Viscograph	Farinograph				Extensograph (45min)		
								Flour		Peak	Water Abs.	DDT	Stab.	Break.	Extens.	Max. Height	Area
	(kg/hl)	(g)	(Nx5.7 11%mb)		(%)	(%14% mb)	(KJ)	L	b	(BU)	(%)	(min)	(min)	(BU)	(cm)	(BU)	(cm^2)
Rosella	82.8	38.3	10.2	23	60	0.40	-2.6	94.3	8.8	1100	53.0	2.0	2.7	130	21.0	205	64
M5631	80.7	35.6	11.3	21	60	0.39	-1.9	94.0	8.7	1125	54.4	2.6	3.3	105	21.8	250	79
Samples from NSW Ag 1997 UQT Southern Series 2 – "Soft White Salted Noodle", Results from Agrifood Technology																	

Udon Noodle Assessment	M5631	Rosella
Raw Noodle Sheet (t=0 hr) Minolta L	84.1	85.1
Raw Noodle Sheet (t=0 hr) Minolta a	-0.4	-0.7
Raw Noodle Sheet (t=0 hr) Minolta b	23.2	23.1
Raw Noodle Sheet (t=2 hr) Minolta L	81.7	82.8
Raw Noodle Sheet (t=2 hr) Minolta a	-0.2	-0.6
Raw Noodle Sheet (t=2 hr) Minolta b	25.4	25.6
Raw Noodle Sheet (t=24 hr) Minolta L	77.3	78.3
Raw Noodle Sheet (t=24 hr) Minolta a	0.0	-0.4
Raw Noodle Sheet (t=24 hr) Minolta b	23.2	23.7
Cooked Noodle Minolta L	81.7	82.3
Cooked Noodle Minolta a	-1.9	-2.5
Cooked Noodle Minolta b	22.3	23.6
Source Agrifood Technology 1997 UQT Southern Series 2		

MACHETE

Pedigree (SON64//TZPP/Y54) /2* Gabo//Madden

Synonym RAC460

Quality Characteristics

RAC460 is acceptable into the Hard Class of South Australia.

MAWSON

Pedigree	Veery #5/3*Ford [121496]
Synonym	QT7274
Breeder	P S Brennan, D The
Selected by	P S Brennan, D The, G Brown.
Issued by	Department of Primary Industries, Queensland, July 1996

Quality Characteristics

Mawson was released for hay purposes as a replacement for Ford, and no quality data was provided in support of the registration. As a result, the AWB gave Mawson a Feed classification. A subsequent pilot-scale milling on the BRI pilot mill organised by the Queensland flour millers showed Mawson to be poor milling, soft grained, giving flour low water absorption, strong inextensible dough properties and poor baking quality. Interestingly, admixtures of up to 30% Mawson in a bread grist did not affect baking quality but bakery water absorption was adversely affected.

Yield Data

No yield data were presented.

MEERING

Pedigree Condor Selection
Synonym RM 229

Quality Characteristics

In quality comparisons conducted for the same period, RM 229 has demonstrated quality attributes equivalent in all respects to Condor. RM 229 has marginally lower grain protein content than Condor and is equivalent to Millewa and Oxley in this regard but is superior to these two varieties in dough properties and breadmaking quality.

MIRA

Pedigree	CW-PC#162/Matong//XD85
Synonym	VG127*14R
Breeder	R. Eastwood
Issued by	Victorian Institute for Dryland Agriculture

Quality Characteristics

Mira is a hard, white-grained variety. It has large grain size although interestingly this does not transpose to give high test weights. Its milling performance is average with flour being yellowish. Mira has excellent water absorption but its dough strength is lower than what would be expected for a variety with its grain hardness and protein levels. Tests results based on the flour paste viscosity indicate it has good starch properties. These properties make Mira a good all-purpose milling wheat.

	TWT	KWt	Hard	WProt	Flour Yield	Paste Minolta L*	Paste Minolta b*	WA	Ext	Rmax	Flour Paste Visco
	Kg/hl	G	PSI	%	%			%	cm	BU	BU
Mira	77.2	36.5	19	10.7	76.5	74.6	11.0	64.0	18.4	202	692
Meering	79.6	33.8	23	10.8	77.6	74.4	9.1	62.7	18.5	222	371
Comparisons	*16*	*19*	*13*	*18*	*19*	*19*	*19*	*19*	*19*	*19*	*19*
Source Victorian Institute for Dryland Agriculture Wheat Quality Report 2000											

NWQEP assessment across a range of protein levels showed Mira to have acceptable milling and dough properties, although flour colour was on the yellow side. It was this latter attribute that caused Mira to be ranked below controls for pan breads and steamed bread. In the case of yellow alkaline noodles, those made from Mira were very yellow but lacked colour stability and had poor texture.

Mira has been classified as Australian Premium White in Victoria.

Yield Data and Disease Comment

Mira is a high-yielding variety, surpassing other Australian Premium White and Australian Hard varieties in the Mallee and Wimmera regions of Victoria with the exception of the variety Frame. In limited trials in Southern New South Wales Mira yielded well, although in South Australia and Western Australia it has not performed as well as other locally suited varieties.

In terms of disease resistance, Mira has a combination of resistance to Cereal Cyst Nematode and Leaf Rust, and moderate resistance to Stem and Stripe Rust.

MITRE

Pedigree	Janz/Beulah
Synonym	VK237
Breeder	Department of Natural Resources and Environment
Issued by	Victorian Institute for Dryland Agriculture in 2000

Quality Characteristics

Mitre is a hard, white-grained variety. Mitre has average grain size and when compared to other control varieties it milled better than Goldmark, similar to Silverstar but inferior to Meering. It has good water absorption, superior to Meering and moderate dough properties. These properties make Mitre a good all-purpose milling wheat.

	TWT	KWt	Hard	WProt	Flour Yield	Paste Minolta L*	Paste Minolta b*	WA	Ext	Rmax	Flour Paste Visco
	Kg/hl	G	PSI	%	%			%	cm	BU	BU
Mitre	79.0	35.7	18	11.4	76.7	75.0	10.9	65.0	19.6	276	380
Meering	80.6	34.4	19	11.9	77.9	75.0	9.3	64.3	20.6	247	454
Comparisons	*13*	*16*	*12*	*15*	*16*	*16*	*16*	*16*	*16*	*16*	*11*
Source Victorian Institute for Dryland Agriculture Wheat Quality Report 2000											

The NWQEP tested Mitre at differing protein levels. It had mediocre flour yield levels and mixed dough properties depending upon the protein level. Mitre had mixed pan bread results and was marked down for poor crumb colour. Yellow alkaline noodle sheets were very bright and maintained good colour stability. Steamed bread scores were average, due to colour score being too yellow. Depending on protein level, Mitre produce average to excellent flat bread.

Mitre is classified as Australian Hard in Victoria.

Yield Data and Disease Comment

Mitre is broadly adapted wheat with a combination of disease resistance. It has resistant to Leaf and Stem Rust, moderate resistant to Stripe Rust and resistant & moderately intolerant to Cereal Cyst Nematode.

It is has higher yields than other competitive Australian Standard White, Australian Premium White and Australian Hard varieties in all regions of Victoria with the exceptions of Kellalac and Rosella in Central Victoria where Mitre is equivalent in yield. Mitre has a 4-7% yield advantage over the variety Frame in the Mallee and Northern Wimmera regions of Victoria. Limited trial data indicates that Mitre has yielded well in Southern New South Wales and South Australia.

Mulgara

Synonyms **JM73**
Pedigree **Hartog/4*Sunco**
Bred & Selected by **J. Morgan et al**
Issued by **NSW Agriculture in 2000**

Quality Characteristics

Mulgara is the result of endeavours to produce a drought-tolerant Sunco. Whilst significant drought tolerance has been achieved, some of Sunco's highly desirable qualities, particularly in regard to dough strength and extensibility, and also yellow alkaline noodle brightness and colour stability, have been lost. However, other positive characteristics such as milling quality, flour water absorption, high starch pasting and rapid bake test performance, have been retained. On balance, a Hard classification was warranted in northern NSW and Queensland.

Variety	Test weight	1000 Kernel Weight	Wheat Protein	PSI	Extraction Rate	Flour Ash	Colour Grade	Minolta		Viscograph	Farinograph				Extensograph (45min)		
								Flour		Peak	Water Abs.	DDT	Stab.	Break.	Extens.	Max. Height	Area
	(kg/hl)	(g)	(Nx5.7 11%mb)		(%)	% 14%mb	(KJ)	L	B	(BU)	(%)	(min)	(min)	(BU)	(cm)	(BU)	(cm²)
Banks	79.2	31.6	12.4	16	75.4	0.50	-2.0	92.7	8.9	415	63.8	3.7	8.5	55	20.7	320	100
Hartog	81.2	36.8	11.8	14	76.6	0.44	-1.9	93.0	8.6	830	65.2	4.6	7.5	50	19.8	430	123
Sunco	81.8	35.6	12.0	14	77.0	0.45	-2.3	93.1	7.8	510	65.3	4.3	6.0	55	20.2	370	108
JM 73	81.5	35.6	11.8	15	77.4	0.46	-1.6	92.9	8.2	620	65.9	4.0	6.0	55	19.7	330	95

Samples from NSW Ag 1999 UQT Silo Group North – Main Series, Quality results from Agrifood Technology

End Products	JM73	Banks	Hartog	Sunco
Pan Bread – Rapid				
Average Volume (cc)	785	818	750	783
Total Score (100)	62	63	65	67
Pan Bread – Fermented				
Average Volume (cc)	695	848	810	770
Total Score (100)	50	61	62	56
Yellow Alkaline Noodles				
Sensory Score %	65.1	66.1	63.3	69.0
Minolta L (1/2hr)	78.00	78.41	79.70	80.06
Minolta b (1/2hrs)	26.63	26.70	23.70	27.01
△ Minolta L (24hrs)	11.89	8.45	11.55	6.27

Source National Wheat Quality Evaluation Program National Report 1999 – 12% Silo Group North Main

NYABING

Pedigree	Aroona-3Ag3 (WT329)/(IW753,WD194) Jabiro..3Ag14.4*Condor
Synonym	WAWHT1389
Breeder	R E Wilson
Issued by	Agriculture Western Australia, August 1997

Quality Characteristics

Nyabing is unusual in that it is a hard-grained cultivar with moderately high flour-swelling volume and moderately strong extensible dough properties, which has shown considerable potential for white salted noodle production. Unfortunately, it also has extremely low flour water absorption for a hard-grained wheat, and its yellow pigment level is sufficiently high to be of concern for some white-salted noodle applications. At the time of writing, end-product evaluations were incomplete and its potential as a blending wheat for noodle purposes was of particular interest. It appears unsuitable as a straight APW wheat because of the above-mentioned shortcomings.

The following data obtained from AgWA compares Nyabing with Gutha, a component of the ASWT blend, from the 1991/2/3 and 1995 seasons.

	T WT Kg/hl	PSI	Wheat Prot %	Flour Yield %	Minolta col L	Min col b	Farin abs %	Ext cm	Rmax BU	Loaf vol cc	FSV ml/g
Nyabing	82.5	18	11.4	74.8	91.9	11.0	57.9	22.2	347	773	16.9
Gutha	80.2	15	11.6	73.5	91.8	8.5	63.3	21.8	328	753	16.4

Yield Data

Nyabing gives yields very similar to Spear and therefore outyields Gutha, Halberd, Cadoux and Eradu, but is lower yielding than all of the new APW and AHard cultivars.

NYABING (Supplementary report ...1998)

Quality Characteristics

As reported last year, Nyabing is unusual in that it is a hard-grained, relatively free-milling cultivar with moderately strong extensible dough properties, and better than average starch properties, which give it significant noodle-making potential. Unfortunately it also suffers from low water absorption capacity and high flour yellow pigment levels, which both limit its potential as a multi-purpose , APW wheat.

Over the past twelve months numerous comparisons and end-product evaluations at a range of protein levels have been conducted, both at the AgWA Grain Products Laboratory, and the AGT at Werribee, to determine Nyabing's classification. After much deliberation it was concluded that Nyabing did not meet the overall quality requirements for an APW wheat, however its value as a blending wheat for various noodle types was recognised, and it has been included as an ASW T `wheat, a premium-generating segregation used for blending purposes.

The following data provided by Agriculture Western Australia compares Nyabing with Gutha from the 1991, '92, '93,'95 and '96 seasons. Flour quality data is all based on 60% extraction flours.

	T WT Kg/hl	PSI	Flour Prot %	Flour Yield %	Minol col L	Minol col b	Farin abs %	Ext cm	Rma x BU	Amylo peak vis AU
Nyabing	81.8	19	9.2	74.4	92.1	11.0	55.6	20.8	372	715
Gutha	79.4	15	9.5	73.2	92.0	8.4	60.2	20.8	356	460
No. trials	45	23	6	22	6	6	6	6	6	2

OUYEN

Pedigree	Takari/TM56//Cocamba
Synonym	EL254
Registered	August, 1993; Department of Agriculture, Victoria.
Breeder	L O'Brien, A O'Connor, R Young, P Martin, J Paoozzo and K McCormick
Resistances	Stripe rust [moderate], cereal cyst nematode, flag smut
Quality type	Hard
Growth sites	Silo groups A & B [the Mallee] Vic.

VEGETATIVE STAGE

Development type	spring
Habit	intermediate
Auricle type	hairy
Auricle colour	coloured [some anthocyanin]
Leaf length	medium
Leaf width	medium
Leaf pubescence	light

FLOWERING STAGE

Flowers 2 days later than Meering	
Top auricle height	
Flag leaf length	short to memium
Flag leaf width	medium

MATURITY STAGE

Crop height	equal to Meering
Straw strength	strong

HEAD CHARACTERS

Glume colour	white
Awns	fully awned
Head cross section	square
Head side view	tapering
Head density	dense
Glume beak length	long

GRAIN CHARACTERS

Hardness	hard
Brush length	medium
Grain colour	medium to dark
Grain texture	vitreous

Ouyen is being released as a cereal cyst nematode and stripe rust resistant wheat for the Mallee region of Victoria. It will be received into the Victorian Hard classification.

Physiological characteristics

Ouyen shows the same physiological yellowing at flowering as Cocamba.

Quality characteristics

Ouyen has average flour yields, lower than Meering. Flour colour, mixing properties, dough strength and extensibility are similar to Meering. Water absorption is higher than Meering.

Yield Data

Ouyen has outyielded Meering 3 times, been equal to Meering 55 times and been outyielded by Meering 5 times in trials conducted throughout Victoria.

Pardalote

Synonyms **M5395**
Pedigree **Osprey/M1998//M3101**
Bred & Selected by **L Penrose, R Martin, K Walsh, P Martin and H Allen**
Issued by **NSW Agriculture in 2000**

Quality Characteristics

Pardalote is a hard-grained, acid tolerant, multi-purpose winter wheat released for early sowing in south-eastern and southern NSW. Long-term quality data indicates overall processing quality somewhere between that of Whistler and Wylah, and thus a Premium White classification was awarded.

Variety	Test weight	1000 Kernel Weight	Wheat Protein	PSI	Extraction Rate	Flour Ash	Colour Grade	Minolta		Viscograph	Farinograph				Extensograph (45min)		
								Flour		Peak	Water Abs.	DDT	Stab.	Break.	Extens.	Max. Height	Area
	(kg/hl)	(g)	(Nx5.7 11%mb)		(%)	(%14% mb)	(KJ)	L	b	(BU)	(%)	(min)	(min)	(BU)	(cm)	(BU)	(cm^2)
Osprey	81.8	34.3	12.0	16	77.2	0.47	-2.1	93.2	8.3	613	62.1	4.3	7.9	70	21.9	243	79
Sunbri	83.8	34.4	11.6	15	78.0	0.47	-1.9	92.9	8.7	563	62.7	5.6	9.6	53	20.8	380	112
Whistler	80.8	37.5	11.3	14	77.6	0.49	-1.6	92.9	9.6	687	64.3	3.9	7.1	67	18.2	245	67
Wylah	81.5	36.8	11.8	15	77.1	0.43	-2.1	93.0	8.7	610	62.1	4.3	6.6	63	20.5	267	80
M5395	80.8	32.0	11.9	16	76.4	0.48	-1.8	93.0	8.6	650	63.1	3.8	7.3	70	19.6	247	73

Samples from NSW Ag 1997 UQT Southern Series 3 – Hard Lines, Quality results from Agrifood Technology

End Product	M5395	Osprey	Sunbri	Whistler	Wylah
Pan Bread – Fermented					
Loaf Volume (cm3)	705	740	700	710	750
Loaf Volume (score)	26	28	26	26	28
Appearance (score)	14	16	15	15	16
Texture (score)	26	26	25	25	26
Crumb Colour (score)	9	10	10	9	10
Loaf Score	75	80	76	75	80

Source Agrifood Technology 1997 UQT Southern Hard Series 3

PELSART

Pedigree	Potam 70/4* Cook
Synonym	QT4639
Register	May, 1993. Queensland Department of Primary Industries
Breeder	PS Brennan
Resistance	Stem, stripe and leaf rust, flag smut, root lesion nematode (tolerant)
Quality Type	Prime Hard
Growth Sites	Darling Downs of Queensland

VEGETATIVE STAGE

Auricle Type	Smooth
Auricle Colour	White
Leaf Length	Short
Leaf Width	Narrow
Leaf Pubescence	Medium

FLOWERING STAGE

Top Auricle Height	Medium
Flag Leaf Length	Short
Flag Leaf Width	Narrow

Flowers 1 day later than Janz

MATURITY STAGE

Matures	Same as Janz
Height	One cm taller than Sunco
Straw Strength	Weak

HEAD CHARACTERS

Glume Colour	White
Awns	Fully awned
Head Cross Section	Flattened
Head Side View	Tapering
Density	Medium
Glume Beak	Medium

GRAIN CHARACTERS

Hardness	Hard
Brush Length	Short
Grain Colour	Medium-dark
Grain Texture	Vitreous

Pelsart has a high level of tolerance to the root lesion nematode which is a major problem in the NE wheat growing region of Queensland. It also has partial resistance to crown rot and common root rot and is within the range of yield of current commercial varieties of its maturity class.

Physiological Characters

Pelsart possesses the Rht1 gene for reduced height.

Quality Characteristics

Pelsart is a hard, facultative wheat suitable for inclusion in the Prime Hard class in Queensland. It has excellent milling quality and produces strong doughs with good extensibility and good baking quality.

Yield Data

Pelsart yields in Queensland are towards the lower end of the yields of commercial varieties in its maturity class in the absence of root lesion nematode.

PERENJORI

Pedigree	Bodallin / Hyden
Synonyms	WAWHT1308; 83Y:1308
Selected by	I R Barclay, G B Crosbie, R Loughman, G Brown, R E Wilson, W Lambe, W Anderson and staff
Issued by	Agriculture Western Australia, August 1996

Quality Characteristics

Another hard-grained multi-purpose wheat giving good yield potential, particularly from mid-season and later sowings. Marginally inferior milling quality to Machete and Spear, but superior water absorption to Cunderdin were initially insufficient to warrant an AHard classification, resulting in APW. It was clear however that Perenjori was superior to Cunderdin and subsequent end product evaluations were undertaken at the AGT Werribee. These showed that Perenjori exhibited acceptable pan bread, very poor steamed bread with low specific volume and dull yellow colouration, acceptable instant noodles, and yellow alkaline noodle sheets with superior colour stability to all samples tested. On balance however, it was agreed that Perenjori did not warrant an upgrade to AH classification and was confirmed as an APW variety.

The following data was provided by AgWA of comparisons of Perenjori with Spear, from the 1992/3/4 seasons, and with Amery from the 1993/4 seasons, the leading APW and AH varieties in Western Australia respectively.

	T WT Kg/hl	PSI	Wheat Prot %	Flour Yield %	Minolta col L	Min col b	Farin abs %	Ext cm	Rmax BU	Loaf vol cc	FSV ml/g
Perenjori	80.5	14	11.6	73.3	91.4	10.5	61.3	21.4	427	761	15.4
Spear	81.3	14	11.5	73.9	91.4	10.7	62.7	19.6	325	752	15.3

	T WT Kg/hl	PSI	Wheat Prot %	Flour Yield %	Minolta col L	Min col b	Farin abs %	Ext cm	Rmax BU	Loaf vol cc	FSV ml/g
Perenjori	80.7	14	11.7	73.0	91.5	10.6	61.7	21.1	428	757	15.3
Amery	79.7	15	10.8	73.2	91.7	8.8	62.1	19.8	408	726	13.9

Yield Data

Over all trials in Western Australia, Perenjori outyields all presently grown Australian Hard and APW cultivars, and is the highest yielding of all the new Western Australian cultivars in the low rainfall area.

PETRIE

Synonyms	QT7634
Pedigree	Vasco/Batavia
Breeder	P.M Banks & P.S. Brennan
Selected by	P.M. Banks et al
Issued by	Department of Primary Industries Queensland in 2000

Quality Characteristics

Petrie is hard-grained, white wheat with medium-to-high dough strength, a long mixing time and very good baking qualities. The milling, physical dough and baking properties of Petrie are, in most cases, similar to those of Batavia. Petrie's flour is very bright, an attribute that helps make yellow alkaline noodles with excellent colour stability. This would indicate that Petrie would be readily acceptable for the production of yellow alkaline noodles.

	TWT	KWt	Hard	Wht Prot	Flour Yield	Flour Minolta L*	Flour Minolta B*	WA	Ext	Rmax	Bake Score	Noodle Sheet Colour (2-24hr)	
	kg/hl	G	PSI	%	%			%	cm	BU	Max50	ΔL*	Δb*
Petrie	81.0	26.6	13	12.6	73.1	90.6	10.2	60.4	21.7	468	30.0	2.7	2.2
Hartog	82.7	32.5	12	12.0	73.2	90.5	10.7	61.0	21.2	440	29.7	6.7	1.0
Sunco	82.7	29.0	14	12.7	74.1	90.7	9.5	61.9	22.4	451	31.0	3.7	0.4
Batavia	80.3	28.5	12	12.9	73.7	90.4	11.9	62.1	21.5	374	30.3	3.2	0.6
Cunningham	83.0	29.7	13	12.3	74.6	90.7	9.9	62.1	20.3	396	28.7	5.4	1.3
Sunvale	83.5	27.3	13	12.8	74.3	90.5	9.9	60.9	22.4	463	29.3	5.9	2.5

Source Department of Primary Industries Queensland Summarised Queensland Trial Results from 1997-1999

NWQEP has assessed Petrie at high protein where it milled satisfactorily but had a lower than expected water absorption level. Petrie's strong dough properties resulted in good pan bread made from rapid and sponge and dough methods, whilst the fermented method was not as favourable. Yellow alkaline noodles made from Petrie had good texture and appearance with excellent colour stability. Instant noodles and steamed bread made from Petrie were also satisfactory.

Petrie is classified Australian Prime Hard classification in Queensland and Northern New South Wales.

Yield Data and Disease Comment

Petrie is best adapted to areas of Queensland and Northern New South Wales, where the variety Batavia has been successfully grown.

Petrie is resistant to all three forms of rust, moderately resistant to common Root Rot and susceptible to Crown Rot. Petrie is moderately intolerant to Root Lesion Nematode *P. thornei*.

Petrie has shown some resistance to black point in field situations however is very susceptible to Yellow Leaf Spot.

ROSELLA

Parentage Farro Lunga/ Heron//2* Condor/3/Quarrion Sib
Synonym M 3265

Quality Characteristics

In quality comparisons with Egret and Olympic, Rosella has better test weight, extensograph length and bake score. Rosella is equal to Olympic and softer than Egret in grain hardness, and equal to Olympic and superior to Egret in flour extraction, extensograph resistance and flour protein content.

Rosella is a good quality, flag-smut resistant, soft-grained winter wheat acceptable as ASW in silo groups 4, 5 and 6 in NSW. Rosella was issued by the Department of Agriculture, NSW.

ROWAN

Pedigree	Jaral 66/Gamut/4* Hartog
Synonym	QT4636
Register	May, 1993 Queensland Department of Primary Industries
Breeder	P S Brennan
Resistance	Stem, stripe and leaf rust, yellow spot, flag smut, pratylenchus thornei (MT)
Quality Type	Australian Hard
Growth Sites	All Queensland

VEGETATIVE STAGE

Auricle Type	Smooth
Auricle Colour	White
Leaf Length	Medium
Leaf Width	Medium
Leaf Pubescence	Medium

FLOWERING STAGE

Top Auricle Height	Medium
Flag Leaf Length	Medium
Flag Leaf Width	Medium

Flowers 2 days later than Hartog

MATURITY STAGE

Matures	One day later than Hartog
Height	Same as Hartog
Straw Strength	Strong

HEAD CHARACTERS

Glume Colour	White
Awns	Tip awned
Head Cross Section	Square
Head Side View	Oblong
Density	Medium
Glume Beak	Short

GRAIN CHARACTERS

Hardness	Hard
Brush Length	Short
Grain Colour	Light
Grain Texture	Vitreous

Rowan was developed by genetically removing the awns from Hartog. This was undertaken because there is a requirement for an awnless variety for stockfeed and to have a variety that can be used as green feed if the grain yield potential of the crop is reduced due to frost or drought. Rowan has the added advantage of a higher degree of yellow spot resistance than Hartog and the same useful level of root lesion nematode tolerance as Hartog.

Physiological Characters

Rowan does not segregate greatly for height when crossed to a variety with Rht2. It is therefore highly likely that Rowan has the height reducing gene Rht2.

Quality Characteristics

Rowan is a hard, spring wheat recommended for receival into Australian Hard in Queensland. It has fair milling quality and produces strong doughs of mediocre extensibility and has shown low water absorption in some samples. Baking quality was similar to the controls. Quality comparison data is given in Table 4.

Yield Data

Rowan appears to have a slight advantage over the highest yielding, quick maturing cultivars, Hartog and Cunningham, when averaged over southern and central Queensland.

Rudd

Synonyms	**E30-82**
Pedigree	**B41/Rendezvous**
Bred & Selected by	**J. Davidson and S. Kleven**
Issued by	**CSIRO in 2001**

Characteristics

Rudd is a red-grained feed wheat aimed at the intensive livestock industry, but with the dual benefit of being suitable for both grazing plus grain, or as a grain only crop.

Rudd is a high yielding winter wheat variety in NSW and is 10% higher yielding than Dennis or Brennan. It is resistant to stem, strip and leaf rust and also septoria tritici blotch and yellow spot. It has been released as a replacement for Brennan and Dennis and it is anticipated it could also replace Declic due to improved disease profile. It performs well in most areas but due to its earliness, should not be grown in areas where there is a high risk of late frosts.

SILVERSTAR

Pedigree	Pavon 'S'/TM56
Synonym	VF664
Breeder	L O'Brien, A O'Connor
Selected by	P Martin, A O'Connor, J Panozzo, Neil Vallance, R Trethowan
Issued by	Agriculture Victoria, August 1996

Quality Characteristics

Silverstar was released as an early maturing, rust- and CCN-resistant wheat for drier Mallee-like environments, with potential for Australian Hard classification. Its milling quality is somewhat inferior to that of Meering, but dough strength and extensibility are more than adequate, giving excellent baking quality. The AWB and Flour Millers in both Victoria and Southern New South Wales have all agreed to an Australian Hard classification for Silv[illegible].

The following comparisons were provided by Agriculture Victoria from averages over three locations from the 1995 season.

	T WT Kg/hl	PSI	Flour Prot %	Flour Yield %	Minolta col L	Min col b	Farin abs %	Ext cm	Rmax BU	Loaf vol cc
Silverstar	84.4	13.4	11.0	77.0	74.6	8.4	64.8	21.4	277	1523
Meering	83.2	16.1	11.8	79.2	74.9	9.0	66.6	22.2	207	1542
Ouyen	83.7	10.3	10.3	75.0	74.6	8.3	68.0	19.5	260	1500

Yield Data

Silverstar is higher yielding than Meering and Ouyen in Silo Groups A and C in Victoria, and equivalent to Meering in Silo Group B over five years of advanced testing. Silverstar has performed significantly better than its competitors in dry years.

SNIPE

Pedigree	M2293 / Quarrion, [M2293= WW15 / M1238-2/Kite/3WW15]
Synonym	M5429
Breeder	R Martin
Selected by	L Penrose, K Walsh, R Martin, K Clarke and H Allen
Issued by	NSW Agriculture, 1997

Quality Characteristics

Snipe is a prime soft biscuit variety specifically selected and released for the domestic biscuit market. Detailed evaluations undertaken by Arnott's, Weston Milling and the WWAI confirmed it has better flour yield potential and dough extensibility than Triller, but the approval and release process was held up by seasonal conditions resulting in unacceptibility high protein samples.

The following data provided by NSW Agriculture, and drawn from the Registration details, compares Snipe with Triller, but again, at a protein level higher than is desirable for this grade.

	T WT Kg/hl	PSI	Grn Prot %	Flour Yield %	Farin abs %	DDT min	Ext cm	Rmax BU	RVA pk	Bisc. bake score +MBS	Bisc. bake score -MBS
Snipe	79.0	29	10.8	73.7	60.5	2.0	18.7	97	98	38	35
Triller	80.4	28	10.6	74.6	60.7	2.1	19.3	88	98	36	36

Yield Data

Yields of Snipe under irrigation have been equal to those of Rosella. Over all sites Snipe has been superior to Rosella, however the difference is not significant. Snipe will compete with Triller, the combination of winter habit and prime soft quality make it a useful addition to the varieties available for this grade under irrigation.

Pedigree	Veranopolis/3 *RAC 177(Sr13orSr26)/2/3 *Spear/3/Dagger
Synonym	RAC680, DT56448
Registered	July, 1993; University of Adelaide
Breeder	G.J. Hollamby and A. Bayraktar [Roseworthy campus]
Resistances	Stem rust [seedling], flag smut [moderate], bunt [moderate]
Quality type	ASW, possibly Australian hard above 11.5% protein
Growth sites	SA

VEGETATIVE STAGE

Development type	spring
Habit	intermediate to erect
Auricle colour	white
Leaf length	short to medium
Leaf width	narrow to medium
Leaf pubescence	medium to abundant

FLOWERING STAGE

Flowers one day earlier than Spear

Top auricle height	medium to tall
Flag leaf length	medium to long
Flag leaf width	medium to wide

MATURITY STAGE

Crop height	equal to Spear
Straw strength	medium to strong

HEAD CHARACTERS

Glume colour	white
Awns	fully awned
Head cross section	square
Head side view	oblong to tapering
Head density	medium
Glume beak length	medium to long

GRAIN CHARACTERS

Hardness	hard
Brush length	short to medium
Grain colour	medium
Grain texture	intermediate to vitreous

Stiletto is a backcross derivative of Dagger and possesses all the desirable attributes of Dagger plus Sr13. However, Sr13 in isolation leads to yield loss in heavy epidemics. Stiletto has a moderately long coleoptile and is about one day earlier than Spear, Dagger or Halberd. It will be a suitable replacement for these varieties. Stiletto is of excellent hard ASW quality and represents an improvement over current ASW varieties in SA. With more data from samples at high protein level, it may prove acceptable into Australian hard.

Physiological characteristics

Stiletto is a semi-dwarf variety with a mild vernalisation and no photoperiod requirement. It is tolerant of high soil boron levels [pot and filter paper tests] which aids its adaption to Mallee country. Its moderately long coleoptile means no special care is needed for crop establishment.

Quality characteristics

Stiletto is superior in every respect to Halberd and Spear. It overcomes the flour colour problem of Excalibur and although dough strength is lower, it is probably better balanced.

Yield data

Stiletto is adapted to the whole range of enviroments and yield levels experienced in SA. Over 4 years of widespread yield trials, it significantly outyielded Spear [higher 20 times, equal 96 times, less 6 times], Machete [higher 51 times, equal 64 times, less 7 times] and Excalibur [higher 17 times, equal 73 times, less 22 times].

STRETTON

Pedigree	Tom Pouce Barbu Rouge. IRN62-101:Z501 (AUS 18446)/Bodallin
Synonym	8OY:1117, 8OY15-9-75
Registered	August, 1993; Dept of Agriculture, WA
Breeder	I.R. Barclay
Resistance	Stripe rust, leaf rust [moderate]
Quality type	ASW
Growth sites	WA

VEGETATIVE STAGE		**FLOWERING STAGE**	
Development type	spring	Equal to Aroona	
Habit	erect	Top auricle height	short
Auricle type	hairy	Flag leaf length	long
Auricle colour	white	Flag leaf width	wide
Leaf length	medium-long		
Leaf width	wide		
Leaf pubescence	abundant		

MATURITY STAGE

Crop height	3 cm shorter than Aroona
Straw strength	strong

HEAD CHARACTERS		**GRAIN CHARACTERS**	
Glume colour	white	Hardness	hard
Awns	fully awned	Brush length	long
Head cross section	flattened	Grain colour	light
Head side view	tapering	Grain texture	vitreous
Head density	medium-dense	Glume beak length	long

Stretton is a high yielding hard ASW wheat. Stretton has yielded particularly well in the medium rainfall areas. The WA wheat crop is currently dominated by stripe rust susceptible varieties; a stripe-rust-resistant variety will be very valuable as an insurance against the future introduction of this disease into WA.

Physiological chancteristics

Stretton is insensitive to applied gibberellin. Stretton is seedling susceptible to leaf and stripe rust but has adult-plant resistance to both.

Quality characteristics

Stretton is a hard-grained ASW wheat. Compared with Gutha, Stretton has slightly lower hectolitre weight, grain weight, similar grain hardness and Farinograph water absorption, and superior milling quality. It has stronger dough qualities than Gutha but is less extensible [although slightly more extensible than Spear]. In limited baking tests, Stretton has produced loaves of similar volume and overall quality to Gutha, and similar volume but slightly better overall quality to Spear. Screenings are higher than Gutha and Spear, and this may necessitate grading of some harvested grain to meet receival standands.

Yield Data

Stretton is generally high yielding and is equal to or better than the highest yielding ASW varieties, Kulin and Spear.

STRZELECKI

Pedigree Vicam/4 *Batavia
Synonym QT7709

Yellow spot resistance was transferred from Vicam to a Batavia background by backcrossing and selection for yellow spot resistance. Evaluation was undertaken using a large number of trials grown on private farms. The assistance of cooperating growers is gratefully acknowledged.

Agronomic features

Strzelecki has strong straw and medium length coleoptiles, similar to Batavia. The maturity of Strzelecki is very similar to Batavia; suitable for early sowing.

Physiological features

An additional improvement of Strzelecki compared to Batavia is that it is not vulnerable to melanism (false black chaff). Observations to date indicate that the level of black-pointed grain in Strzelecki is similar to Batavia if grain size is comparable.

Disease resistance

Effective resistance to yellow spot was demonstrated in the 1998 epidemic. Strzelecki is resistant to stem rust, leaf rust, stripe rust, flag smut and common root rot. Strzelecki appears to be less vulnerable than Batavia to root lesion nematodes and crown rot.

Quality characteristics

Australian Prime Hard classification for the export market as well as a preferred variety by the domestic milling industry for high volume plant bakery applications.

Yield data

In the yellow spot epidemic year, 1998, the average yield of Strzelecki over 20 trials in Queensland was 165% that of Batavia. In the non-epidemic years 1997 and 1999, the average yield of Strzelecki over 30 trials in Queensland was 107% that of Batavia.

Strzelecki

Synonyms **QT7709**
Pedigree **Vicam/4*Batavia**
Bred by **P. M. Banks & R.G. Rees**
Issued by **Department of Primary Industries Queensland in 2000**

Quality Characteristics

Strzelecki is a yellow spot resistant Batavia, and its release was heavily influenced by the need for a variety tolerant to this damaging disease. Its quality characteristics are similar to those of Batavia, but with superior milling performance, higher flour water absorption, and similar high starch paste viscosity. Its only downside is weaker than desirable dough characteristics, however acceptable milling and end product performance were sufficient to warrant a Prime Hard Classification in Queensland and northern NSW.

Unfortunately, southern region trial results showed a further and substantial reduction in dough strength, which was supported by questionable end-product performance. As a result, pending the presentation of data to the contrary, Strzelecki has been awarded an interim classification of Premium White in southern NSW, and other areas.

Variety	Test weight	1000 Kernel Weight	Wheat Protein	PSI	Extraction Rate	Flour Ash	Colour Grade	Minolta		Viscograph	Farinograph				Extensograph (45min)		
								Flour		Peak	Water Abs.	DDT	Stab.	Break.	Extens.	Max. Height	Area
	(kg/hl)	(g)	(Nx5.7 11%mb)		(%)	(% 14% mb)	(KJ)	L	b	(BU)	(%)	(min)	(min)	(BU)	(cm)	(BU)	(cm^2)
Hartog	78.5	29.1	13.6	16	77.2	0.51	-1.0	92.3	9.4	720	61.4	5.8	15	25	22.7	380	122
Sunco	79.0	26.0	14.4	16	76.6	0.51	-1.1	92.1	9.2	410	62.5	6.2	12.5	35	25.4	355	129
Cunningham	80.5	28.8	12.9	17	76.9	0.47	-1.6	92.8	9.0	410	62.2	4.5	8	55	21.4	310	94
Batavia	74.5	25.0	14.6	15	74.3	0.57	-0.4	91.9	10.6	1000	62.8	5.5	13	40	23.9	335	114
Sunvale	80.5	25.8	14.0	16	76.7	0.46	-1.4	92.4	9.1	480	61.4	5.8	11.5	45	20.9	335	97
QT7709	78.0	34.0	13.5	14	76.2	0.51	-1.0	92.8	9.9	900	65.5	5.5	7.5	55	21.9	250	81

Samples from 1999 DPI Queensland Slow Series, Quality results from Agrifood Technology

End Product	QT7709	Batavia	Suneca	Sunbri
Pan Bread – Rapid				
Average Volume (cc)	883	913	845	858
Total Score (100)	72	70	67	71
Pan Bread – Fermented				
Average Volume (cc)	800	750	868	820
Total Score (100)	60	55	67	64
Pan Bread – Sponge & Dough				
Average Volume (cc)	1919	1963	1988	1906
Total Score (100)	62	64	66	61
Yellow Alkaline Noodles				
Sensory Score %	58.0	62.5	61.2	64.6
Minolta L (1/2hr)	77.29	78.13	77.85	77.77
Minolta b (1/2hrs)	30.70	29.97	26.49	26.33
△ Minolta L (24hrs)	5.90	5.44	12.04	10.62

Source National Wheat Quality Evaluation Program National Report 2000 - NSW

SUNBRI

Pedigree	Cook 2*/VPM1//3* Cook
Synonym	SUN140C
Registered	August, 1990; University of Sydney
Breeders	G Brown, F W Ellison and D J Mares
Resistances	Stem, stripe, and leaf rust, flag smut
Quality type	Prime Hard
Growth sites	NSW silo groups 1,23,4 and 5

VEGETATIVE STAGE

Auricle Type	Smooth
Auricle Colour	White
Leaf Length	Long
Leaf Width	Medium
Leaf Pubescence	Light

FLOWERING STAGE

Top Auricle Height	Medium
Flag Leaf Length	Long
Flag Leaf Width	Medium

Flowers 5 days later than Osprey

MATURITY STAGE

Matures	Two days earlier than Osprey
Height	Equal to Osprey (~ 95cm)
Straw Strength	Medium

HEAD CHARACTERS

Glume Colour	White
Awns	Fully Awned
Head Cross Section	Flattened
Head Side View	Tapering
Density	Medium
Glume Beak	Long

GRAIN CHARACTERS

Hardness	Hard
Brush Length	Long
Grain Colour	Medium
Grain Texture	Intermediate

Sunbri is a long-season, prime-hard-quality wheat suitable for sowing from early April to mid-late May in silo groups 1, 2 and 3.

Physiological Characters

Sunbri has a weather-damage tolerance equal to Cook and has a vernalization requirement.

Quality Characteristics

Sunbri is a hard-grained wheat with similar milling quality to Sunco. Its dough strength and extensibility are comparable with Sunco and extensibility is superior to Hartog over the range of protein contents observed in comparisons during 1985-89.

Yield Data

It is difficult to achieve meaningful yield comparisons for long-season wheats because of the lack of approved varieties for comparisons. Early sown trials favour the long-season type and disadvantage mid-season types and vice versa. In general, its yield is similar to that of the mid-season varieties Kite and Sunelg. Sunbri has the advantage over Osprey, Kite and Sunelg in that it is eligible for receival as prime hard.

SUNBROOK

Pedigree	Hartog *2/Suneca
Synonym	SUN 224A
Selected by	F W Ellison, G N Brown, D J Mares, S Moore, L O'Brien
Issued by	University of Sydney Plant Breeding Institute August 1995

PLANT CHARACTERISTICS

Development type	facultative	Maturity stage 3 days earlier than Sunbri	
Vegetative stage	intermediate	Crop height is equal to Sunbri	
Auricle type	hairy	Straw strength is strong	
Auricle colour	white	Flowering stage 3-5 days later than Sunbri	
Leaf length	medium	Top auricle height	medium
Leaf width	medium	Flag leaf length	medium
Leaf pubescence	medium	Flag lead width	medium

HEAD CHARACTERS		**GRAIN CHARACTERS**	
Glume colour	white	Hardness	hard
Awns	fully awned	Brush length	medium
Head cross section	square	Grain colour	medium
Head side view	tapering	Grain texture	vitreous
Head density	medium		
Glume beak length	medium		

Quality Characteristics

Sunbrook is a hard-grained cultivar with good test weight and milling quality combined with strong balanced dough properties and good baking performance. Provided it meets the relevant physical receivale criteria, it will be classified as Australian Prime Hard in both NSW and Queensland.

	Test Wt (kg/hl)	P.S.I	Grain Protein %	Flour Yield %	Colour Grade KJ	Water Abs %	Dough Dev time (min)	Exten (cm)	Max Res (BU)	Loaf Vol (cm^3)
Suneca	84.0	15	13.9	77	-1.7	58	8.8	24.3	510	712
Sunbri	84.4	15	12.9	76	-2.2	60	8.3	22.8	520	722
Sunbrook	82.0	11	12.5	76	-1.6	59	8.0	23.4	548	768

Yield Data

Yield comparisons carried out at 36 sites between 1992-94 showed Sunbrook to be comparable in yield to Hybrid Meteor and Superior to Sunbri (7%) and Suneca (18%)

CHARA

Pedigree	BD225/CD87 (=Beulah sib//Pavon'S'/Condor)
Synonyms	VI341
Breeder	Agriculture Victoria
Issued by	Agriculture Victoria Services in 1999

Quality Characteristics

Chara is a hard, white-grained variety with greater dough strength and dough extensibility than the Victorian control variety Meering. Extensive testing indicates that Chara is a balanced variety across a range of protein levels with good milling, baking and end product properties. Chara has been shown to make yellow alkaline noodles with good colour stability. Flour water absorption is moderate and similar to Meering at equivalent proteins.

	TWT	KWt	Hard	WProt	Flour Yield	Paste Minolta L*	Paste Minolta b*	WA	Ext	Rmax	Flour Paste Visco
	kg/hl	G	PSI	%	%			%	cm	BU	BU
Chara	82.2	38.1	18.8	11.6	77.9	74.9	10.1	63.1	23.4	431	464
Meering	82.8	36.1	18.2	11.5	78.3	75.0	9.2	63.8	20.5	244	379
Comparisons	*19*	*22*	*17*	*21*	22	22	22	22	22	22	22
Source Victorian Institute for Dryland Agriculture Wheat Quality Report 2000											

When tested at high protein the NWQEP reported that Chara had exceptional flour yield with intermediate water absorption and dough development time was longer than controls. Dough extensibility and strength were significantly better than the controls. These characteristics resulted in relatively poor baking results but this attributed to the sample being under mixed, as standard Australian test bake methods are not suited to Chara's extra strength.

With its unique dough properties Chara already has an Australian Prime Hard classification in Southern New South Wales. In Victoria it is classified as Australian Hard. Further quality evaluation both domestically and by overseas customers will determine the long term potential of this high strength style wheat.

Yield Data and Disease Comment

In comparative field trials, Chara has shown excellent performance across Southern New South Wales and Northern Victoria where it has averaged 103-106% of Janz and 102-104% of Diamondbird over several years of testing.

Chara has good resistance to Stem, Leaf and Stripe Rust, and has moderate resistance to *Septoria tritici.* Initial indicators have shown Chara to have some tolerance to black point.

ROWAN

Pedigree	Jaral 66/Gamut/4* Hartog
Synonym	QT4636
Register	May, 1993 Queensland Department of Primary Industries
Breeder	P S Brennan
Resistance	Stem, stripe and leaf rust, yellow spot, flag smut, pratylenchus thornei (MT)
Quality Type	Australian Hard
Growth Sites	All Queensland

VEGETATIVE STAGE

Auricle Type	Smooth
Auricle Colour	White
Leaf Length	Medium
Leaf Width	Medium
Leaf Pubescence	Medium

FLOWERING STAGE

Top Auricle Height	Medium
Flag Leaf Length	Medium
Flag Leaf Width	Medium

Flowers 2 days later than Hartog

MATURITY STAGE

Matures	One day later than Hartog
Height	Same as Hartog
Straw Strength	Strong

HEAD CHARACTERS

Glume Colour	White
Awns	Tip awned
Head Cross Section	Square
Head Side View	Oblong
Density	Medium
Glume Beak	Short

GRAIN CHARACTERS

Hardness	Hard
Brush Length	Short
Grain Colour	Light
Grain Texture	Vitreous

Rowan was developed by genetically removing the awns from Hartog. This was undertaken because there is a requirement for an awnless variety for stockfeed and to have a variety that can be used as green feed if the grain yield potential of the crop is reduced due to frost or drought. Rowan has the added advantage of a higher degree of yellow spot resistance than Hartog and the same useful level of root lesion nematode tolerance as Hartog.

Physiological Characters

Rowan does not segregate greatly for height when crossed to a variety with Rht2. It is therefore highly likely that Rowan has the height reducing gene Rht2.

Quality Characteristics

Rowan is a hard, spring wheat recommended for receival into Australian Hard in Queensland. It has fair milling quality and produces strong doughs of mediocre extensibility and has shown low water absorption in some samples. Baking quality was similar to the controls. Quality comparison data is given in Table 4.

Yield Data

Rowan appears to have a slight advantage over the highest yielding, quick maturing cultivars, Hartog and Cunningham, when averaged over southern and central Queensland.

SUNCO

Pedigree SUN 9E-27*4/3Ag14//WW15/3/3*Cook

Synonym SUN 88E

Quality Characteristics

SUN 88E is hard-grained wheat of good milling quality. The dough has strong, well balanced properties and is very similar to Cook in this regard.

Sunco is resistant to stem, leaf and stripe rust and flag smut. It was issued by the University of Sydney as a highly disease resistant replacement for Cook in the Prime Hard grade of groups 1, 2 and 3 in NSW.

SUNLAND

Pedigree	Cook*3/4/Shortim*2/C77.2.CS2A-2MTrans1/3/3*Songlen/CombIII/Shortim*2
Synonym	SUN155C
Register	August 1992, University of Sydney Plant Breeding Institute, Narrabri
Breeder	F W Ellison, G Brown, D J Mares, S G Moore, L O'Brien
Resistance	Stem, stripe and leaf rust
Quality Type	Prime Hard /Australian Hard
Growth Sites	Silo groups 1, 2, 3 & 4 of NSW

VEGETATIVE STAGE

Auricle Type	Smooth
Auricle Colour	White
Leaf Length	Medium
Leaf Width	Medium
Leaf Pubescence	Light

FLOWERING STAGE

Top Auricle Height	Medium
Flag Leaf Length	Medium
Flag Leaf Width	Medium

Flowers 2 days earlier than Hartog

MATURITY STAGE

Matures	One to two days later than Hartog
Height	Five cm taller than Hartog
Straw Strength	Medium

HEAD CHARACTERS

Glume Colour	White
Awns	Fully awned
Head X Section	Flattened
Head Side View	Tapering
Density	Medium
Glume Beak	Long

GRAIN CHARACTERS

Hardness	Hard
Brush Length	Short
Grain Colour	Medium
Grain Texture	Intermediate

SUNLAND provides genetic diversity for resistance to stem rust (Combination III; Sr9e & Sr36) and leaf rust (Lr28) while approaching the Cook level of adult plant resistance to stripe rust. This has been achieved with yield performance similar to Hartog.

Physiological Characters

SUNLAND has no special tolerance to weather damage. It is expected to be similar to Cook for most physiological characteristics, being a derivative of Cook.

Quality Characteristics

SUNLAND is a hard, spring wheat accepted into Prime Hard in silo groups 1, 2 & 3 and Australian Hard in silo group 4 of NSW. It is a good milling quality wheat of similar strength and extensibility to Hartog.

Yield Data

SUNLAND has yielded similarly to Hartog in comparisons between 1988-91 in silo groups 1, 2 & 3.

SUNLIN

Selected by G Brown, F W Ellison, D J Mares, S G Moore, and L O'Brien. Pedigree Sunelg 2*//3*Suneca/VPM1

Synonym SUN234A

Issued by University of Sydney, Plant Breeding Institute, August 1996

Quality Characteristics

Sunlin was the first cultivar from the Kite/Sunelg family to achieve a Prime Hard classification, its milling quality being significantly superior to any of its predecessors.

The following comparisons with Sunco and Sunelg are taken from BRI Data provided to the October 1993 UQT Meeting.

	T WT Kg/hl	PSI	Grain Prot %	Flour Yield %	Minolta col L-b	Farin abs %	Ext Cm	Rmax BU	Loaf vol cc	Bake score [100]
Sunlin	82.0	14	13.1	77.0	83.5	61.7	23.7	425	775	76
Sunco	82.9	15	14.1	76.0	83.3	62.2	25.4	405	785	77
Sunelg	82.7	14	13.2	74.0	82.2	61.8	20.1	370	685	72

Yield Data

Sunlin exhibits a high level of resistance to current field strains of stem leaf and stripe rust, and depending on conditions, can outyield the likes of Sunelg, Suneca and Hartog.

SUNMIST

Pedigree	Selection from Miskle (Cook//SUN27B/DOUGGA)
Synonym	Miskle 61A
Register	August 1992, Unversity of Sydney Plant Breeding Institute, Narrabri
Breeder	F W Ellison, G Brown, D J Mares, S G Moore, L O'Brien
Resistance	Stem, stripe and leaf rust, flag smut
Quality Type	Prime Hard
Growth Sites	Silo groups 1, 2 & 3 of NSW

VEGETATIVE STAGE

Auricle Type	Smooth
Auricle Colour	White
Leaf Length	Long
Leaf Width	Medium
Leaf Pubescence	Light

FLOWERING STAGE

Top Auricle Height	Medium-tall
Flag Leaf Length	Medium-long
Flag Leaf Width	Medium
Flowers same as Miskle	

MATURITY STAGE

Matures	Same as Miskle
Height	Same as Miskle
Straw Strength	Strong

HEAD CHARACTERS

Glume Colour	White
Awns	Fully awned
Head X Section	Square
Head Side View	Oblong
Density	Medium
Glume Beak	Long

GRAIN CHARACTERS

Hardness	Hard
Brush Length	Medium
Grain Colour	Medium
Grain Texture	Vitreous

SUNMIST was selected from Miskle as a replacement for Miskle to ensure homogeneity for stem rust resistance (Sr13 and Sr30) and high molecular weight glutenin composition. Sunmist is a high yielding wheat suitable for sowing from early May to mid June in silo groups 1, 2 & 3 of NSW. It has a unique combination of genes conferring stem rust resistance and good adult plant stripe rust resistance.

Physiological Characters

SUNMIST is moderately susceptible to sprouting (similar to Cook) and is of Gai/Rht1 semi dwarf height.

Quality Characteristics

SUNMIST is a hard, spring wheat accepted into Prime Hard in silo groups 1, 2 & 3 of NSW. It is of similar milling quality and extensibility to Miskle but of stronger dough characteristics.

Yield Data

SUNMIST yields similarly to Miskle

SUNSOFT98

Pedigree	3*Rosella / Sr24:Lr24
Synonym	SUN230A
Breeder	University of Sydney – Plant Breeding Institute
Issued by	University of Sydney – Plant Breeding Institute

Quality Characteristics

Sunsoft98 was released specifically for the Northern wheatbelt, and in the hope that it could be useful for the ASWN segregation. It is not surprising with a pedigree including Rosella, that Sunsoft98's quality characteristics are almost indistinguishable from those of Rosella. With a wider adaptation, Sunsoft98 will also provide a soft grained variety for the domestic market in the Northern region.

In white salted noodles tests performed at BRI Australia in 1996, the total noodle scores for Sunsoft98 and Rosella were very similar. This was despite a wheat protein difference of 0.7%, although the flour proteins were much closer with only 0.3% difference.

	TWT	Hard	WProt	Flr Prt	Flr Ash	Minolta L*	Minolta b*	RVA Peak	Colour	Eating Quality	Total Score
	kg/hl	PSI	%	%	%			BU	Noodle Quality		
Sunsoft98	80	25	12.0	10.5	0.4	94.2	8.4	291	22.6	42.0	80.8
Rosella	79	27	11.3	10.2	0.5	94.1	8.8	282	23.0	41.3	80.4

Yield Data

Sunsoft98 has comparable yield to Rosella in northern New South Wales. In southern New South Wales, Sunsoft98's yield ranges from two to four percent below that of Rosella.

In addition, Sunsoft98 is highly resistant to stem, leaf and stripe rust with a proposed genotype of Sr24, Lr24, YrA. However, for other diseases such as flag smut, yellow leaf spot and crown rot, Sunsoft98 is susceptible.

SUNSTATE

Pedigree	HARTOG*4//COOK*5/VPM1
Synonym	SUN148L
Register	August 1992, University of Sydney Plant Breeding Institute, Narrabri
Breeder	F W Ellison, G Brown, D J Mares, S G Moore, L O'Brien
Resistance	Stem, stripe and leaf rust
Quality Type	Prime Hard
Growth Sites	Silo groups 1 & 2 of NSW

VEGETATIVE STAGE

Auricle Type	Smooth
Auricle Colour	White
Leaf Length	Medium
Leaf Width	Medium
Leaf Pubescence	Light

FLOWERING STAGE

Top Auricle Height	Medium-tall
Flag Leaf Length	Medium-long
Flag Leaf Width	Wide

Flowers 1-2 days earlier than Hartog

MATURITY STAGE

Matures	Two days earlier than Hartog
Height	Same as Hartog
Straw Strength	Strong

HEAD CHARACTERS

Glume Colour	White
Awns	Fully awned
Head X Section	Flattened
Head Side View	Tapering
Density	Medium
Glume Beak	Long

GRAIN CHARACTERS

Hardness	Hard
Brush Length	Short
Grain Colour	Medium
Grain Texture	Intermediate

SUNSTATE is a quick maturing spring wheat with high levels of resistance to stem, leaf and stripe rust.

Physiological Characters

SUNSTATE is susceptible to sprouting and, being a Hartog derivative, is expected to be similar to Hartog for most physiological characteristics.

Quality Characteristics

SUNSTATE is a hard, spring wheat accepted into Prime Hard in silo groups 1, 2 & 3 of NSW. However, it is currently only approved for growing in silo groups 1 & 2 due to poor yield performance in silo group 3 at a limited number of sites. It has slightly better milling quality, extensibility and baking than Hartog and similar dough strength to Sunco.

Yield Data

SUNSTATE yields similarly on average to Hartog in silo groups 1, 2 & 3 of NSW.

SUNVALE

Pedigree	Cook*2/VPM1/Cook*3
Synonym	SUN 146F
Registered	September, 1993; University of Sydney
Breeder	F.W. Ellison, G.N. Brown, D.J. Mares
Resistances	Stem rust, stripe rust, leaf rust [moderate], crown rot [moderate]
Quality type	Prime hard
Growth sites	NSW

VEGETATIVE STAGE		**FLOWERING STAGE**	
Development type	spring	Flowers 2 days earlier than Sunco	
Habit	intermediate	Top auricle height	medium
Auricle type	hairy	Flag leaf length	medium
Auricle colour	white	Flag leaf width	medium
Leaf length	medium		
Leaf width	medium		
Leaf pubescence	light		

MATURITY STAGE Same as Sunco

Crop height	same as Hartog
Straw strength	medium

HEAD CHARACTERS		**GRAIN CHARACTERS**	
Glume colour	white	Hardness	hard
Awns	fully awned	Brush length	medium
Head cross section	flattened	Grain colour	light
Head side view	tapering	Grain texture	vitreous
Head density	medium		
Glume beak length	short		

Sunvale is a prime-hard-quality spring-season wheat, resistant to field pathotypes of stem, leaf and stripe rust. This line combines the resistances utilised in Sunbri, with maturity appropriate to main-season cultivars. It is better yielding and of similar maturity to Sunco.

Physiological characteristics

Sunvale has no special tolerance to weather damage. It is similar to Cook which ranks between Suneca [moderately tolerant] and Hartog [very susceptible]. Sunvale, being a Cook derivative, is expected to be similar to Cook for most physiological characteristics.

Quality characteristics

Sunvale is approved for release and classified as acceptable for receival into the Prime Hard grade of silo groups 1-3 of NSW. Compared to Sunco in trials over nine sites, Sunvale has slightly higher test weight, flour yield, protein content, Farinograph water absorption, dough strength and extensibility. In limited baking tests, Sunvale produced loaves of higher volume and quality score than Sunco when using a rapid-dough procedure. In a fermented-dough procedure, Sunvale performed similarly to Sunco and slightly better than Hartog.

Yield Data

Sunvale is comparable in yield to Hartog, Sunstate and Sunco, and slightly inferior in yield to Janz in silo groups 1-3 of NSW.

SWIFT

Pedigree	Condor/3Ag14//Romany/4189
Synonym	WW879
Register	August 1993, NSW Agriculture
Breeder	J.A. Fisher
Resistances	Stem and stripe rust, Leaf rust (moderate), Septoria tritici blotch (moderate), flag smut, bunt (moderate)
Quality type	Australian hard
Growth sites	NSW silo groups 5 and 6

VEGETATIVE STAGE		**FLOWERING STAGE**	
Development type	Spring	Flowers with Janz	
Habit	Intermediate	Top auricle height	Short
Auricle type	Hairy	Flag leaf length	Short to med
Auricle colour	Red	Flag leaf width	Med to wide
Leaf length	Short to medium		
Leaf width	Medium to wide		
Leaf pubescence-	Light		
MATURITY STAGE-	Same as Janz		
Crop height	3cm shorter than Janz		
Straw strength	Strong		
HEAD CHARACTERS		**GRAIN CHARACTERS**	
Glume colour	White	Hardness	Hard
Awns	Fully awned	Brush length	Medium
Head cross section	Square	Grain colour	Medium
Head side view	Oblong	Grain texture	Vitreous
Head density	Medium		
Glume beak length	Long		

Swift is proposed as main season variety in NSW silo groups 5 and 6. It will provide growers with an alternative to Janz and Dollarbird. The quality of Swift is similar to Banks and should be more acceptable to the domestic baking industry than Janz and Dollarbird. Swift is suitable for sowing in southern NSW from early May to late June (optimum sowing mid-May). Establishment and early growth are similar to current commercial varieties. It has excellent straw strength and only lodges in extreme situations.

Physiological characteristics: Swift is a semi-dwarf spring wheat. It has moderate tolerance to aluminium (haematoxylin root tip stain test). It has also been moderately tolerant in trails on acid soils, although inferior to Dollarbird it is superior to other cultivars currently recommended in this area. Swift has a moderate susceptibility to weather damage. Swift was moderately intolerant of boron, similar to other Condor derivatives in the 22nd IWVT.

Quality characteristics: Swift is similar to Banks in most aspects of grain quality. Protein content is higher than check varieties. Flour extraction and ash flour colour parameters indicate milling quality similar to Banks and better than Vulcan. A higher protein sites (>13%) it appears stronger than Banks. At protein contents of 10–12% extensograph characteristics are well balanced. Extensibility does not shorten greatly at lower protein contents. Swift bakes well in fermented systems with and without bromate and in no-time systems. Starch quality is at least as good as Banks.

Yield Data: Swift had a slight yield advantage over current commercial varieties in 1992. In previous years it was inferior. It has an advantage over Janz in acid soils and an advantage over Dollarbird and Janz at sites where Septoria tritici blotch is present and where lodging is favoured.

TAILORBIRD

Pedigree	Dollarbird/M3348/Cook (M3348 = Kavkaz/Timgalen/3*Oxley)
Synonym	K3018
Breeder	New South Wales Agriculture, Wagga Agricultural Research Institute
Selected by	Akram Khan, Kerry Taylor, Ritchie Munro, Helen Allen, John Oliver
Issued by	New South Wales Agriculture , October 1996

Quality Characteristics

Tailorbird was released by New South Wales Agriculture as a replacement for Dollarbird in Southern New South Wales. It is a hard grained cultivar, with protein levels superior to all the normal controls. Milling quality is similar to that of Dollarbird and therefore inferior to Banks and Janz with flour ash levels tending on the high side. Overall dough properties are strong and stable, although mixing times are not excessive. Farinograph water absorption is uniformly higher than controls, and falling number / viscogram data shows good starch paste viscosity similar to that of Dollarbird. Its quality is therefore similar to that of Dollarbird, and as such it was awarded an APW classification.

The following comparison with Banks, Dollarbird and Janz was taken from the report of the New South Wales Flour Millers to the 1995 UQT Meeting.

	TWT Kg/hl	Starch Damage AACC	Grain Prot %	Flour Yield %	Minolta colour L-b	Farin abs %	Ext cm	Rmax BU	Loaf vol (IA)	Bake score
Tailorbird	79.2	7.3	12.4	73.8	81.9	63.2	19.8	400	1436	39.0
Banks	81.2	6.2	11.7	74.9	82.0	62.6	18.7	290	1476	40.3
Dollarbird	80.7	7.7	11.9	75.7	81.8	64.2	19.8	395	1446	40.7
Janz	81.7	5.6	11.3	74.5	83.0	60.7	20.9	363	1400	39.3

Yield Data

Tailorbird was released for main season sowing as a companion to Dollarbird, particularly well suited to acid soils. It is resistant to the three rusts and Septoria tritici blotch

TAMAROI

Pedigree	Altar84/4TAM1B-17/Kamilaroi/3Wells/56111/Guillemot
Synonym	912025
Breeder	RA Hare
Selected by	NSW Agriculture: RA Hare, BE Koth, DI Gulliford, EA McKenzie, P Roffe, B Whitten,and S Balfe. University of Adelaide: AJ Rathjen, BJ Brooks.
Issued by	NSW Agriculture/University of Adelaide, 1997

Background

The varietal development process for Durum is very different from that for *Triticum aestivum* cultivars in that there is currently one dedicated breeding program, based at the Tamworth Centre for Crop Improvement, Tamworth, NSW. Material from this program is then taken by other programs, primarily in SA and more recently in WA, and evaluated under local conditions. This report will cover comparisons undertaken in SA and NSW.

Quality Characteristics

Tamaroi combines strong dough rheological properties [greater than Yallaroi] and a bright clear yellow colour in the semolina and subsequent pasta [slightly less than Yallaroi]. The grain protein content of Tamaroi has been consistently greater than the check cultivar, Yallaroi, in South Australia. Tamaroi offers improved pasta processing properties in the form of greater firmness and lower water absorption, than Yallaroi.

The following tables compare mean values from South Australian trials in 1995 and NSW trials in 1996.

South Australia - 1995

Entry	T Wt Kg/Hl	Hard. pearlo Units	Grn. prot. %	Mill Yield		Semo. colour		Semo. prot. %	Farinogram		
				Tot. %	Sem %	b*	Brn OD405		Abs %	DT min	Bd10 BU
Wallaroi	82.5	218	12.1	79.1	68.0	30.0	0.099	11.5	59.9	3.8	13
Yallaroi	82.2	247	12.0	77.7	66.8	27.4	0.132	11.5	62.5	3.6	37
Tamaroi	82.2	251	12.6	79.6	69.1	26.2	0.119	12.1	69.1	4.9	26

New South Wales - 1996

Entry	T Wt Kg/Hl	Hard. pearlo Units	Grn. prot. %	Mill Yield		Semo. colour		Semo. prot. %	Farinogram		
				Tot. %	Sem %	b*	Brn OD405		Abs %	DT min	Bd10 BU
Kamilaroi	80.5	217	13.7	80.1	69.6	26.0	0.131	13.1	60.4	2.3	80
Yallaroi	78.7	211	14.0	78.4	67.5	25.3	0.171	13.2	61.1	3.2	67
Wallaroi	79.8	200	14.0	79.5	67.7	25.8	0.146	13.0	59.3	3.0	57
Tamaroi	78.4	204	14.1	79.5	68.9	23.3	0.186	13.4	59.4	3.4	70

Yield Data

Tamaroi has been tested in 46 trials conducted by NSW Agriculture and the Waite Institute SA in 1993-96. On average, in Waite Institute trials Tamaroi yielded 15% greater than Yallaroi but 14% less than Spear. On average., in northern NSW, Tamaroi yielded 2%, 5% and 6% greater than Yallaroi, Wollaroi and Kamillaroi respectively.

Tamaroi will offer the South Australian durum wheat industry a cultivar of superior agronomic performance, while maintaining the pasta quality and disease resistance characteristics of Yallaroi. It appears to offer no significant yield advantage over the existing durum varieties in Northern NSW.

TASMAN

Pedigree	Torres///Gaboto/Siete Cerros//Bluebird/Ciano
Synonym	QT4546
Registered	August, 1993; Dept. of Primary Industries, Qld
Breeder	P.S. Brennan
Resistances	Stem rust, stripe rust, leaf rust, root lesion nematode [tolerant], flag smut
Quality type	Prime Hard
Growth sites	Qld

VEGETATIVE STAGE		**FLOWERING STAGE**	
Development type	spring	Flowers 2 days earlier than Hartog	
Habit	erect	Top auricle height	short
Auricle type	smooth	Flag leaf length	medium
Auricle colour	white	Flag leaf width	medium
Leaf length	short		
Leaf width	medium		
Leaf pubescence	medium		

MATURITY STAGE 2 days earlier than Hartog

Crop height	8 cm shorter than Hartog
Straw strength	strong

HEAD CHARACTERS		**GRAIN CHARACTERS**	
Glume colour	red-brown	Hardness	hard
Awns	fully awned	Brush length	medium
Head cross section	flattened	Grain colour	light
Head side view	tapering	Grain texture	vitreous
Head density	medium		
Glume beak length	medium		

Tasman is being released as a high-yielding, strong-strawed alternative to the quick maturing variety Hartog. It has better quality than Hartog and its widespread cultivation would improve the quality of the north-east Australian wheat crop.

Quality characteristics

Tasman is a hard-grained wheat with excellent kernel weight and good milling quality. In physical dough properties, it combines a high level of strength with excellent extensibility. Baking quality is also of a high standard. Based on this, Tasman has been provisionally recommended for receival with a maximum classification of Prime Hard in Queensland.

Yield Data

Tasman was evaluated in 1990, 1991 and 1992 in all Queensland wheat-growing regions at a total of 68 trials. Tasman significantly outyielded Hartog in 6 trials with no significant differences between the two varieties at 54 trials. Tasman significantly outyielded the slightly longer maturing variety Janz in 19 trials. Their yield did not significantly differ in 48 trials.

TATIARA

Parentage (Mexico 120*Koda) *Raven) *Mengavi *Siete Cerros) W18/18
Synonyms (MKR*MM) / W18/18; WT107

Quality Characteristics

Tatiara is a soft-grained wheat with a lower flour yield, extensograph resistance and extensibility than Bindawarra. It is a harder wheat with a higher flour colour grade and water absorption but it has the advantage over Bindawarra of stripe rust resistance. Quality comparison data is given in Table 5.
Tatiara is a soft grained, stripe rust resistant wheat released by the Waite Agricultural Research Institute, Adelaide as a replacement for Bindawarra in zone 7 of SA.

QUALITY COMPARISON DATA FOR TATIARA

	MKR*MM/W18/18	Bindawarra
Specific Weight (kg/hl)	79.0	79.7
Hardness (PR)	4.0	3.3
Flour Yield (%)	74.7	75.8
Colour Grade	0.4	0.2
Protein (%)	9.4	9.7
Water Absorption (%)	55.6	53.3
Development Time (min)	2.1	2.0
Resistance (BU)	139	174
Extension (cm)	19.4	20.7
Cookie Width (cm)	46.1	46.8
Cookie Thickness (cm)	5.9	5.9
Bread (score)	38	38

TENNANT

Pedigree	A cross between Hornet and B56 (Hobbit x Pitic 62) x Mardler
Synonym	D51
Breeder	Dr. Jim Davidson
Issued by	CSIRO, AWB Limited and GRDC

Quality Characteristics

Tennant is a red-grained feed wheat. Its processing characteristics render it unsuitable as a milling wheat, therefore it is currently classed as an Australian Winter Wheat. Where separate segregation is not available, Tennant will be received as Australian Feed.

Yield Data

Tennant is best adapted to all long season regions of the high rainfall and irrigated zones. Tennant performs well wherever the varieties Declic, Gordon, Lawson, More and Paterson have been traditionally grown.

On average, Tennant has outyielded Gordon, Paterson and More in trials in high rainfall regions of Victoria and New South Wales.

Thornbill

Synonyms **M5635**
Pedigree **LR21, SR X/3*M30867 (M3087 is a sister line of Rosella)**
Bred & Selected by **L. Penrose, R.H. Martin, D. The, K. Walsh, K. Clark, P. Martin & H. Allen**

Issued by **NSW Agriculture in 2000**

Quality Characteristics

Thornbill was released as a special purpose Soft wheat for southern NSW. This classification was confirmed after testing showed Thornbill to have good test weights, but slightly inferior flour yield compared to control varieties, although the flour was of a better quality being brighter and whiter. The domestic mills described Thornbill's milling quality as "satisfactory, better than controls".

Thornbill has good starch pasting properties and similar water absorption levels compared to other Soft wheats. It's dough properties are typical for a Soft wheat, although on the upper side of domestic acceptability.

In domestic trials, Thornbill performed well compared to control Soft wheat varieties and the Arnott standard. It showed possibly better cut length and was a little softer, both attributes seen as advantages. Alternative end product testing was also performed on Thornbill where it made steamed breads with good volume and skin colour.

Variety	Test weight	1000 Kernel Weight	Wheat Protein	PSI	Extraction Rate	Flour Ash	Colour Grade	Minolta		RVA	Farinograph		Extensograph (45min)	
								Flour		Peak	Water Abs.	DDT	Extensibility	Max. Height
	(kg/hl)	(g)	(Nx5.7 11%mb)		(%)	(%14%mb)	(KJ)	L	b	(RVU)	(%)	(min)	(cm)	(BU)
Triller	81.7	41.9	9.6	21	78.1	0.52	-1.3	92.6	9.0	284	53.6	2.7	19.3	190
Bowie	78.9	41.4	9.3	26	79.8	0.54	-0.4	92.4	10.6	284	54.7	1.9	22.5	110
Tatiara	78.5	41.9	9.0	31	79.9	0.63	-0.2	92.4	10.6	277	54.1	1.4	19.0	95
Snipe	81.8	40.1	8.9	27	79.2	0.53	-0.9	92.4	8.0	237	53.9	1.5	17.8	90
M5635	81.7	34.5	9.1	24	78.1	0.55	-1.7	92.8	8.5	304	53.1	1.4	18.4	170
Source UQT 1999/00 BRI Australia Soft Wheat Report														

End Products	M5635	Triller	Bowie	Tatiara	Snipe	Arnott Standard
Steamed Bread (Guandong Style)*						
Total Score	66.1	62.0	61.1	59.9	53.2	-
Biscuit*						
Average Spread (cm)	7.5	7.5	7.5	7.5	7.6	-
Thickness (cm)	5.4	5.4	5.7	5.4	5.2	-
Spread Ratio	8.3	8.3	7.9	8.3	8.8	-
Biscuit**						
Flour Protein (%)	8.4	8.5	8.5	8.1	8.35	8.4
Water Absorption (%)	54.8	56.5	56.4	56.6	55.9	56.6
Work Time (kJ/sec)	4.13	4.04	3.81	3.78	3.89	3.50
Final Consistency (W)	42.2	33.8	35.5	30.4	32.1	38.2
PL:BDW	1.12	1.14	1.12	1.10	1.15	1.09
Hardness – Saw Time (sec)	60.0	64.0	61.5	62.0	61.0	66.2
Biscuit Circularity	1.01	1.02	1.01	1.01	1.01	1.01
* BRI Australia ** Arnott's Limited						

TRIDENT

Pedigree	VPM1/5*Cook//4*Spear
Synonyms	RAC698, DT56707
Registered	August, 1993; University of Adelaide
Breeder	G.J. Hollamby and A Bayraktar [Roseworthy campus]
Resistances	Stem rust, stripe rust, leaf rust [moderate], flag smut
Quality type	ASW
Growth site	SA

VEGETATIVE STAGE		**FLOWERING STAGE**	
Development type	spring	Flowers three days earlier than Spear	
Habit	intermediate	Top auricle height	tall
Auricle type	hairy	Flag leaf width	narrow to medium
Auricle colour	white		
Leaf length	short to medium		
Leaf width	narrow to medium		
Leaf pubescence	light to medium		

MATURITY STAGE	
Crop height	equal to Spear
Straw strength	medium to strong

HEAD CHARACTERS		**GRAIN CHARACTERS**	
Glume colour	white	Hardness	hard
Awns	fully awned	Brush length	short to medium
Head cross section	square	Grain colour	medium
Head side view	oblong	Grain texture	intermediate to vitreous
Head density	medium		
Glume beak length	long		

Trident is a backcross derivative of Spear and carries all the desirable attributes of Spear, plus the promise of higher yields protected from stem, stripe and leaf rusts. It is earlier to heading and maturity than Spear and Dagger and this will help in achieving yield in drier situations. It is susceptible to *Septoria tritici* blotch and should be planted with caution where this disease is expected. It has the potential to replace most current ASW varieties.

Physiological characteristics

Trident is a semi-dwarf variety with a mild vernalisation and no photoperiod requirement. It is tolerant of high soil boron levels (pot and filter paper tests) which aids its adaption to Mallee country. It has good coleoptile length.

Quality characteristics

Trident is a hard ASW quality type slightly inferior to Spear in milling yield and extensibility, much improved over Halberd for extensibility. Milling quality will not be affected by foliar diseases or dry finishes as much as Spear.

Yield Data

Trident is adapted to the wide range of environments and yield levels experienced in SA. Over 4 years of widespread yield trials, it significantly outyielded Spear [better 50 times, equal 47 times, poorer twice], Machete [better 66 times, equal 32 times, poorer once], and Excalibur [better 28 times, equal 52 times, poorer three times].

TINCURRIN

Pedgree Gluclub/3/Chile 1B//Insignia/Falcon
Synonym 70W10-19

Quality Characteristics

Tincurrin has similar milling quality to Egret but in most other respects it is very similar in quality to the renowned biscuit variety Gluclub. It has a lower Farinograph water absorption and weaker but more extensible dough properties than Egret. Tincurrin tends to be less extensible than Gluclub which can be explained by its significantly lower protein content, however it performed comparably in standard cookie tests.

It has been released specifically as a soft biscuit wheat and will be confined to traditional low protein, soft wheat areas. Its breadmaking quality is understandably very poor and thus its presence in any quantity in the ASW would be detrimental. It has yielded well in interstate Variety Trials under a wide range of environmental conditions and thus it is likely to be a major target for impending variety control legislation.

TRILLER

Pedigree	Warbler//Cl601-68/Quarrion (C1601-68 is a fixed line selected by Dr C Qualset from the cross Cleo/Inia)
Synonym	WW1477
Register	NSW Agriculture, October 1994
Bred/Selected	B. Ballantyne, Z. Tomes, H. Allen, J. Oliver, J. Fischer
Resistances	Stem rust, Stripe rust, Leaf rust, *Septoria nodorum* blotch (M)
Quality type	Special purpose soft biscuit wheat
Growth sites	NSW

VEGETATIVE STAGE

Development type	Winter
Habit	Prostrate
Auricle	Hairy
Auricle colour	White
Leaf length	Medium
Leaf width	Medium
Leaf pubescence	Light

FLOWERING STAGE

Flowers- 1 – 2 days earlier than Rosella

Top auricle height	Medium
Flag leaf length	Med-long
Flag leaf width	Medium

MATURITY STAGE 1 day earlier than Rosella

Crop height	4cm taller than Rosella
Straw strength	Strong

HEAD CHARACTERS

Glume colour	White
Awns	Fully awned
Head cross section	Square
Head side view	Oblong
Head density	Medium
Glume beak length	Long

GRAIN CHARACTERS

Hardness	Soft
Brush length	Medium
Grain colour	Light
Grain texture	Opaque

Triller is being released as a special purpose soft biscuit quality cultivar for the irrigation and higher rainfall areas of silogroups 4, 5 and 6 in NSW. It is suitable for early sowing from late March to early June. No current biscuit wheat cultivar is suitable for this sowing time. Triller will complement the current biscuit wheat varieties Tatiara, Vectis, Wyuna and Grebe which are all spring types and suitable for sowing from May to July.

Physiological characteristics: Triller is a winter wheat with similar development and maturity to Rosella. It is a medium height semidwarf wheat and has adequate straw strength for growing under irrigation or other high yielding situations. As an early sown winter wheat Triller can also be grazed, aiding flexibility in farm management.

Quality characteristics: Comparisons between Triller and current biscuit varieties depend on sowing dates. The current biscuit wheats are likely to be frosted if sown before May but TRILLER tends to be too high in protein in trials sown after mid-June. In early sown trials protein content was similar to Wyuna, Tatiara and Grebe, milling yield was lower but ash and flour colour were better. Extensibility was similar to Tatiara and Wyuna. Dough strength (Rmax) was similar to Grebe, lower than Wyuna and higher than Tatiara. Biscuit test bake scores were superior to Wyuna and Tatiara.

Yield data: Triller significantly outyielded Rosella in 28 of 47 trials in silogroups 4,5 and 6. Yield advantage was from 3 (ns)-11% (significant at $P \leq 0.01$).

VECTIS

Pedigree	Mexico 120/Koda//Raven/3/Mexico22A/Mengavi/4/ Gamenya/Jaral//Warriqum
Synonym	ED069; (MKR*MM)*(GJ*Wq)/1/103
Registered	August, 1993; Dept of Agriculture, Vic., and Waite Agricultural Research Institute.
Breeder	A.J.Rathjen, J. Lewis
Resistances	Stripe rust [moderate], flag smut
Quality type	Soft, biscuit quality
Growth sites	Wimmera [Vic/SA]

VEGETATIVE STAGE

Development type	spring
Habit	erect
Auricle type	smooth
Auricle colour	coloured
[variable expression of anthocyanin]	
Leaf length	medium
Leaf width	medium
Leaf pubescence	light

FLOWERING STAGE

Flowers 1 day earlier than Wyuna

Top auricle height	short
Flag leaf length	medium
Flag leaf width	medium

MATURITY STAGE

Crop height	30 cm taller than Wyuna
Straw strength	strong

HEAD CHARACTERS

Glume colour	white
Awns	fullyawned
Head cross section	square
Head side view	tapering
Head density	lax
Glume beak length	long

GRAIN CHARACTERS

Hardness	soft
Brush length	long
Grain colour	light
Grain texture	opaque

Vectis is being registered jointly between the Department of Agriculture Victoria and the Waite Agricultural Institute. The superior soft biscuit quality of Vectis compared to Wyuna means that it is likely to replace Wyuna in the Wimmera [Silo group C].

Quality characteristics

Vectis is a soft, biscuit-quality wheat. Compared with Wyuna, it has a weaker dough, longer extensibility and lower milling extraction. The weaker dough and longer extensibility mean Vectis is of superior quality for biscuit manufacture than Wyuna.

Yield Data

Vectis was not significantly higher or lower yielding than Wyuna in any of the yield trials conducted between 1989 and 1992.

WELLSTEAD

Pedigree	Egret*4/Kavkaz
Synonym	78Z:895; 78Z228-5*2
Registered	August, 1993; Dept of Agriculture, WA
Beeder	A.A. Rosielle, B.R. Whan, R.E. Wilson
Resistances	Stripe rust, leaf rust [moderate], root lesion nematode [tolerant], *Septoria tritici* blotch [moderate], *Septoria nodorum* blotch [moderate], yellow spot [moderate].
Quality type	ASW [soft]
Growth site	WA

VEGETATIVE STAGE

Development type	spring
Habit	intermediate to erect
Auricle type	smooth
Auricle colour	white
Leaf length	medium
Leaf width	medium
Leaf pubescence	light

FLOWERING STAGE

Flowers	1 day earlier than Spear
Top auricle height	medium
Flag leaf length	medium
Flag leaf width	medium

MATURITY STAGE 1 day earlier than Spear

Crop height	1 cm shorter than Spear
Straw strength	strong

HEAD CHARACTERS

Glume colour	white
Awns	fullyawned
Head cross section	flattened-square
Head side view	oblong-tapering
Head density	medium-lax
Glume beak length	long

GRAIN CHARACTERS

Hardness	soft
Brush length	short
Grain colour	light
Grain texture	opaque

Wellstead is a soft-grained ASW wheat suited to the high rainfall southern area of WA. Both Septoria diseases are prevalent and of long term significance in the southern areas of WA. Wellstead provides the best combination of resistance to both Septorias currently available. It has shown outstanding yields when used under the "package" management approach, under which some fungicide can be used to supplement varietal resistance.

Physiological characteristics

Wellstead is a semi-dwarf variety likely to have the Rht1 gene, which is present in the recurrent parent, Egret. It is moderately intolerant of toxic levels of boron. Wellstead has been assessed as having Sr8a, Sr9b, and Lr3, but these are not effective to the current pathotypes in WA. Wellstead is likdy to have Yr6. Becasue the original strains of stripe rust predominate in states other than WA, it seems more likely that it will be one of these that is introduced into WA. The Yr6 gene may provide initial resistance in WA. Reactions to the Septorias and yellow spot were classed as moderately resistant and moderately susceptible.

Quality characteristics

Wellstead is a soft-grained wheat. Milling quality is generally similar to Kulin. Wellstead has higher hectolitre weight and falling number, ane lower levels of yellow pigment [reflectance at 436nm]. Wellstead has slightly smaller grains than the large-grained Kulin. Compared with other recognised soft-grained ASW varieties, Eradu and Gamenya, Wellstead is intermediate in hectolitre weight, milling quality and dough strength, and it has superior extensibility. Low starch swelling capacity makes it unsuitable for Japanese noodles. In its role as a component of an ASW grist, Wellstead offers better balanced dough properties than the hard-grained ASW varieties Spear and Aroona that it would compete with, but it has lower milling quality. In limited baking tests, Wellstead has produced better quality loaves than Eradu, Gamenya, Spear or Aroona.

Yield Data

Wellstead significantly outyields Spear and Aroona in the high-rainfall south western area of WA [H5 west) and is equal in the H5 central. In years of high leaf disease, it out yields these varieties in other areas of the state.

WHISTLER

Pedigree Osprey/Hartog//Osprey*2/Kite sib.
Synonym M5660
Breeder Dr. Peter Martin
Issued by NSW Agriculture, WARI

Quality Characteristics

Whistler is a hard-grained wheat with acceptable flour extraction and water absorption. However, its dough quality is marginal, being both weaker and less extensible than Osprey. This has been demonstrated in data from a wide range of trials. The data presented below, which is not entirely typical, was calculated from individual Silo Group South (Hard Series) results published in the 1997 NSW Agriculture WARI Quality Evaluation Report.

The marginal quality of Whistler has resulted in only been classified as an ASW wheat.

	TWT	KWt	Hard	WProt	FlrYld	Minolta L-b	WA	DDT	Ext	Rmax	LVol
	kg/hl	g		%	%		%	min.	cm	BU	cc
Whistler	80.0	36.0	54	12.8	75.9	60.5	66.7	4.5	23.0	245	644
Osprey	80.7	32.8	54	13.5	75.1	57.5	65.8	6.1	25.3	272	627
Comparisons	*6*	*6*	*6*	*6*	*6*	*4*	*6*	*6*	*6*	*6*	*5*

Yield Data

In the south of New South Wales, as a winter wheat, Whistler outyields Rosella by six percent and Currawong by seven to eight percent. Whistler is resistant to stem , leaf and stripe rust.

Initially proposed for southern NSW, Whistler has since been evaluated for the Northern region where its inadequate dough properties were confirmed. Consequently, Whistler has been awarded a maximum classification of ASW Australia-wide.

Pedigree [illegible]
Synonym WAWHT2109
Breeder R E Wilson
Issued by Agriculture Western Australia, August 1997

Quality Characteristics

Westonia is a hard grained cultivar with acceptable milling quality, inferior only to that of Wilgoyne and Cascades. Its dough strength is similar to that of Brookton, being intermediate between Kalannie and Cunderdin, and its baking quality occupies a similar position. Extensive end product evaluations conducted at the AGT Werribee confirmed these bake tests and showed that Westonia has little potential for steamed bread manufacture, thus ruling out AHard and confirming that an APW classification is appropriate.

The following data provided by AgWA compares Westonia with Spear, currently the most popular variety in Western Australia, from the 1993-1995 seasons.

	T WT Kg/hl	PSI	Wheat Prot %	Flour Yield %	Minolta col L	Min col b	Farin abs %	Ext cm	Rmax BU	Loaf vol cc	FSV ml/g
Westonia	80.6	15	11.6	74.5	91.1	10.6	61.3	22.8	350	723	15.5
Spear	82.4	16	12.1	74.3	91.3	10.7	64.0	20.0	304	739	14.7

Yield Data

Westonia has outstanding yield, being similar or slightly better than Tammin in the medium and low rainfall areas.

WILGOYNE

Parentage Ciano/Gallo
Synonyms IW/610, ANTIZANA

Quality Characteristics

Wilgoyne is a hard wheat with a higher test weight, grain size, protein level, milling quality and dough strength than Gutha. Loaf volume and other loaf characteristics are equal. At protein levels above 13% Wilgoyne has rated well in comparison to prime hard samples from Queensland and NSW.

Wilgoyne is an early-maturing, hard-grained wheat which has been released by the Western Australian Department of Agriculture. It is resistant to stem and stripe rust and flag smut but is very susceptible to aluminium toxicity associated with acid soils. It is released as a replacement for Gutha in the Australian Hard class in Western Australia.

WOLLAROI

Pedigree	TAM1B-17/Kamilaroi sib//Rokel selection/Kamilaroi sib
Synonym	880096
Registered	October, 1993; NSW Agriculture
Breeder	R.A. Hare
Resistances	Stem rust, stripe rust, leaf rust, yellow pigment [moderate], *Septoria tritici* blotch [moderate], stinking bunt, flag smut, black poiint
Quality type	Durum [pasta]

VEGETATIVE STAGE

Development type	spring
Habit	intermediate
Auricle type	smooth
Auricle colour	white
Leaf length	long
Leaf width	medium
Leaf pubescence	light

FLOWERING STAGE

Flowers 4 days earlier than Kamilaroi

Top auricle height	medium
Flag leaf length	medium
Flag leaf width	medium

MATURITY STAGE

Crop height 3 cm taller than Kamilaroi

Straw strength	medium-strong

HEAD CHARACTERS

Glume colour	white
Awns	fully awned
Head cross section	square
Head side view	oblong
Head density	medium
Glume beak length	long

GRAIN CHARACTERS

Hardness	very hard
Brush length	short
Grain colour	amber
Grain texture	vitreous

Wollaroi is a quick maturing semi-dwarf durum cultivar. It offers the Australian durum wheat industry a cultivar of superior quality while maintaining the agronomic and disease resistance characteristics of the current cultivars. Commercial semolina millers and pasta makers have evaluated 5 tonne [1992] and 45 tonne [1993] samples and have commented favourably on its processing performance.

Physiological characteristics

Wollaroi has less pre-harvest sprouting than Kamilaroi and Yallaroi. However, Wollaroi is moderately superior to the most resistant bread-wheat cultivars, Sunelg and Sunco.

Quality characteristics

Wollaroi has consistently produced grain with at least 0.5% more protein than the check cultivars, Kamilaroi and Yallaroi, without loss of yield. Farinograph dough strength was equivalent to Yallaroi, and combined with increased protein resulted in reduced solids loss during cooking. Wollaroi combines strong dough rheological properties with a strong clear bright yellow colour in the semolina and subsequent pasta. The improved colour was not entirely retained through cooking althohgh cooked pasta was of better colour than the Yallaroi product. Wollaroi did not differ significantly from the check cultivars in any other aspect of cooking quality.

Yield Data

Wollaroi has grain yield performance similar to Kamilaroi, Yallaroi, Hartog, Sunco and Sunelg, in comparisons between 1990-92 in silo groups 1 and 2 of NSW.

WORRAKATA

Synonyms WA/11/9; WI334; [WqKPWmH*Ag3Ar]/11/9
Breeder A J Rathjen, G A Palmer, C J Stone, M C Kroehn
Issued by Waite Agricultural Research Institute, University of Adelaide,1997

Quality Characteristics

Worrakata is a sister-line to Krichauff, and exhibits the same high flour Minolta 'b' values which affects bread crumb colour. Blending experiments undertaken by the SA Flour Millers Council showed that it could be tolerated in bread flour grists up to a maximum of 30%, beyond which colour deterioration was visually discernible. However like Krichauff, its alkaline noodle dough sheet colour development and stability is exceptional and thus initially Worrakata was awarded an APW classification throughout South Australia, with a view to segregating it, together with Krichauff, specifically for Yellow Alkaline noodle purposes. Unfortunately its influence on quality for most other end-uses is negative, and given its high yield potential it will be classified ASW in all other States, and in South Australia, in all situations where a segregation is not operating.

The following table compares Worrakata with Machete, and the results are the means of 1994 and 1995 trials, analysed by the Grain Quality Laboratories of SARDI.

	TWT Kg/hl	PSI	Flour Prot %	Flour Yield %	Flour colour KJ	Minolta col L-b	Farin abs %	Devel time min	Rmax BU	Ext cm
Worrakata	81.7	13.8	10.2	72.1	-2.0	77.3	62.6	4.8	330	19.0
Machete	80.8	15.2	11.0	70.7	-2.1	82.0	64.4	5.1	361	19.4

Yield Data

At the time of its release, Worrakata was described as having grain yields of around 5% above Krichauff, Trident and Excalibur, and about 10% above Spear. It's adaptation to South Australian soils was partly attributed to its early maturity and moderate boron tolerance. Subsequent field performance has been exceptional, to the extent that if allowed to go unchecked, it would undoubtedly have a deleterious effect on the processing quality of the APW from South Australia. As a result, plans are afoot to limit Worrakata's classification to ASW at all sites other than where APW[Y] is being segregated, commencing from the 1998/99 season.

WYLAH

Pedigree M3458/Osprey (M3458=WW15/M1238-2//Kite/3/WW15/4/Cook)
Synonym M5487
Selected by L. Penrose, R.H. Martin, K. Walsh, P. Martin & H.Allen
Issued by NSW Agriculture in 1999

Quality Characteristics

Wylah is a hard, white-grained wheat. It has good flour milling properties with a flour extraction rate below Osprey and Sunbri but has superior flour ash levels. Water absorption is good and Wylah has acceptable dough properties. These characteristics mean that Wylah produces pan bread with good loaf volume and crumb colour. Yellow alkaline noodles made from Wylah had good colour stability and texture. Wylah made acceptable steamed bread.

	TWT	KWt	Hard	Wht Prot	Flour Yield	Flour Ash	Flour Minolta L-b*	WA	Ext	Rmax	LVol	Noodle Sheet Colour (0-24hr)	
	kg/hl	G	PSI	%	%	%		%	cm	BU	Max50	ΔL*	Δb*
Wylah	**80.8**	**36.6**	**53.0**	**11.7**	**74.9**	**0.42**	**82.7**	**65.5**	**23.7**	**318**	**656**	7.4	6.0
Sunbri	81.3	36.0	53.5	11.4	75.9	0.4	83.3	65.1	25.0	460	631	-	-
Osprey	81.5	35.1	51.3	11.9	75.6	0.45	83.3	63.7	25.6	300	661	**6.5**	**5.1**
Source NSW Agriculture Silo Group South UQT October 1997 Quality Results													

Wylah has been classified as Australian Hard in New South Wales (n.b. this process was finalised before the commencement of the NWQEP).

Yield Data and Disease Comment

Wylah has shown good yield performance in field trials yielding 2% higher than Rosella in South East New South Wales and similar in South West New South Wales. In Northern New South Wales Wylah has out yielded Rosella and Sunbri.

Wylah has mixed disease features with resistances to Stem Rust and Flag Smut. It is moderately resistant to Stripe rust. Wylah is moderately resistant to moderately susceptible to *Septoria tritici* and moderately susceptible to Leaf Rust and Yellow Spot.

WYUNA

Parentage DX3-134/Olympic DX3-134 = Sonora 64 *Knott^{2}* 11-8156-100Y-Rojo

Synonym SD34

Quality Characteristics

SD 34 is a special purpose soft-grained biscuit variety. It possesses a unique combination of inherent low protein content, low farinograph absorption and weak, yet extensible, dough properties. This makes it ideally suited for soft biscuit use. Average quality data for SD 34 versus Olympic for comparisons conducted in Victoria, and SD 34 versus Egret for comparisons conducted as part of the Interstate Wheat Variety Trials are presented in Table 14.

Yield Data

Wyuna is a soft-grained biscuit wheat variety issued by the Victorian Crop Research Institute of Victoria. It is a high-yielding wheat which has yielded higher than the variety Olympic in all Victorian Silo groups.

YALLAROI

Pedigree Guillemot Selection No. 3/Kamilaroi Sib.
Synonym 820946

Quality Characteristics

Yallaroi is a durum wheat with a lower grain protein than Kamilaroi. However, it has stronger pasta dough strength at similar protein levels and has a similar bright, clear yellow semolina/pasta colour to Kamilaroi.

Yallaroi is resistant to stem, stripe and leaf rust and is proposed as a pasta wheat for cultivation in the high fertility areas of NSW silo groups 1 and 2 and southern Queensland.

YANAC

Pedigree	Jabiru/M5392-1/M5392/3/cook
Synonym	VF302, CD208
Breeder	B Whan, R Christie, J Davies
Selected by	P Marin, J Panozzo, A O'Connor, K McCormick, R Trethowan
Issued by	Agriculture Victoria, October 1995

PLANT CHARACTERISTICS

Development type	spring	Maturity stage 3-6 days later than Meering	
Vegetative stage	intermediate	Crop height is equal to Meering	
Auricle type	hairy, variable	Straw strength is medium	
Auricle colour	white	Flowering stage 3 days later than Meering	
Leaf length	medium	Top auricle height	
Leaf width	medium	Flag leaf length	medium
Leaf pubescence	light	Flag lead width	medium

HEAD CHARACTERS		GRAIN CHARACTERS	
Glume colour	white	Hardness	hard
Awns	fully-awned	Brush length	medium
Head cross section	square	Grain colour	medium
Head side view	tapering	Grain texture	vitreous
Head density	medium		
Glume beak length	medium		

Quality Characteristics

Yanac was released as an Australian Premium White (APW) Wheat in Victoria and neighbouring states. End product testing both at home and overseas indicated some potential for white salted and other noodle types and these opportunities will be further evaluated.

Average quality parameters, across all silo groups in Victoria, of Yanac, Meering and Rosella.

	Test Wt (kg/hl)	P.S.I	Grain Protein %	Flour Yield %	Minolta colour L	b	Water Abs %	Dough Dev time (min)	Exten (cm)	Max Res (BU)	Amylo Peak Vis (AU)	Loaf Vol (cm^3)
Yanac	77.8	19.6	10.6	77.6	74.5	8.4	59.4	3.8	19.6	270	830	1550
Meering	78.4	20.8	10.6	77.3	74.9	9.4	59.9	3.5	19.1	256	355	1600
Rosella	77.3	29	10.5	77.6	74	11.6	53.8	3.2	19.9	252	760	1520

Yield Data

Yanac was equivalent to, or better than Rosella, for grain yield in Silo Groups A. B and C and Meering in Silo Groups A and B over two years of advanced testing in Victoria.

YITPI

Pedigree C8MMC8HMM*Frame
Synonym WI96080 & 59/1
Breeder Dr. T. Rathjen
Issued by Waite Institute South Australia in 1999

Quality Characteristics

A white-grained wheat, Yitpi has greater test weight and grain plumpness than control varieties Frame or Machete. It has high flour extraction levels and when milled it produces white, bright flour. It has overall flour and dough quality characteristics that are very similar to Janz, and its balanced dough properties make it suitable for a range of end products such as pan or flat bread and yellow alkaline noodle production.

	Hard	Flour Prot	Flour Yield	Kent Jones	Flour Minolta L*	Flour Minolta B*	WA	Ext	Rmax	Bake Score	RVA Peak	Noodle Sheet Colour (2-24hr)	
	PSI	%	%				%	cm	BU		RVU	ΔL*	Δb*
Yitpi	15	11.0	74.6	-2.5	92.6	9.7	63.7	20.6	341	79	147	5.13	0.66
Frame	12	11.1	74.5	-2.8	92.3	11.3	66.1	19.0	283	80	142	5.15	0.62
Janz	17	11.1	74.3	-2.9	92.7	9.3	63.5	20.6	325	77	119	5.49	0.84
Krichauff	17	11.4	74.0	-2.1	92.2	13.0	64.7	20.7	356	81	172	4.18	0.02
Silverstar	15	10.2	74.4	-3.0	92.4	9.1	62.8	21.2	333	85	160	5.73	0.92
Westonia	14	10.1	74.1	-2.0	92.2	11.1	62.9	21.0	309	82	174	5.73	0.92

Source SARDI Grain Quality Laboratory Report on 1998/99 Stage 4 Wheat Trials

The NWQEP has tested Yitpi at low and high protein levels and as a consequence the flour and dough results for these tests were quite varied. In bread evaluation, Yitpi flour had long mixing times that produced the best breads made using rapid and fermented methods. Yipti produced bright noodles with good colour stability. Steamed bread results were just acceptable with mixed flat bread results.

Yitpi is accepted into Australian Hard in South Australia.

Yield Data and Disease Comment

Yitpi has shown a clear yield advantage over most current commercial Australian Premium White and Australian Hard varieties through most soil types and rainfall regions in South Australia. Recent trials in Victoria have indicated similar yield advantages in the Mallee, Wimmera and North Central regions. Yitpi is expected to show similar adaptation throughout South-Western New South Wales.

Yitpi is resistant and moderately tolerant to Cereal Eelworm and is less susceptible to *Pratylenchus neglectus* Root Lesion Nematode than Frame. Yitpi is very susceptible to Yellow Leaf Spot and moderately susceptible to Crown Rot, and therefore should not be sown as a second crop in wheat on wheat rotations. Yitpi has resistance to Stem, Stripe and Leaf Rusts.