Proc. Tenth Annual Conf. Grassld. Soc. NSW, 1995, pp. 66-72.

GETTING IT ALL TOGETHER:

INTEGRATED LIVESTOCK AND CROPPING ENTERPRISES

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"Windy Station", Pine Ridge, NSW, 2343

SUMMARY: "Windy Station" comprises 13,697 ha located west of Quirindi on the Liverpool Plains. The enterprises are integrated livestock and cropping including: grow-out of beef cattle for finishing on pasture, forage crops or feedlot, Merino wethers for wool, and grain cropping. The management emphases are : (1) identification and targeting of specific markets; and (2) implementation of a whole farm plan to maximise profit in a sustainable way. The farm plan is based on classification of the property into land management groups, rotational ley farming for improved agronomic parctice, and feed-budgeting to match animal requirements with the feed supply. Forward planning and detailed systems needed for the integration of these activities is vital.

Windy Station is situated 38 kms. west of Quirindi on the Liverpool Plains with an annual average rainfall of 660 mm. The property, now 13,697 ha, originally formed part of Warrah Station which was first settled by the Australian Agricultural Company in 1832.

A change in direction for "Windy" was considered necessary almost four years ago when a review of our goals was undertaken. Questions such as: What are we doing? Why are we here? Where are we going? How are we selling our commodities? clearly needed to be answered. What additional involvement could Windy have in a company which produces 100,000 cattle each year? What opportunities were there? What could be gained? Were there synergies to be had from planned integration? I took over as Manager of Windy in autumn of 1992 after our R & D Manager and others in our company had determined the strategies by which we could achieve our objectives (Figure 1). As a result of this review, Windy is now well advanced in the implementation of a farm plan to achieve our corporate objectives of "maximising profit in a sustainable way".

Development of the farm plan

Land Management Groups (LMG)

"Everybody" knew Windy Station was a magnificent, well balanced property. But what did we really know? What were the natural attributes of the property? It needed to be quantified. CaLM were commissioned to undertake a property plan, from which the land capabilities were determined

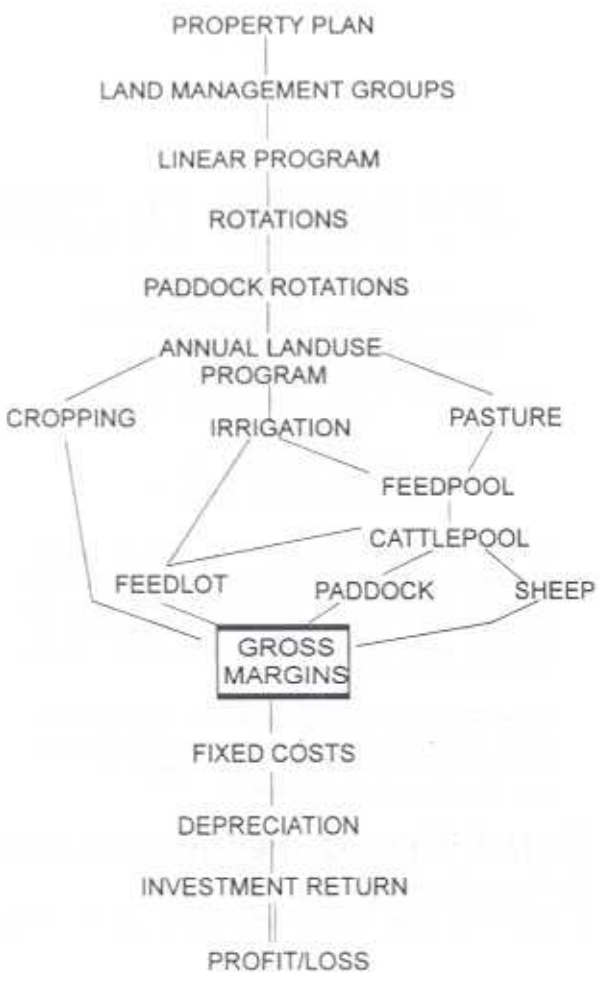


Figure 1. Profit determination flow chart

and it is from this that specific LMG's were defined. These now comprise eight separate areas:

- S1A - Black alluvial soils on timberless flood plain in north west section of Windy; associated inundation from Windy Creek and some rill erosion problems.
- S1B - Black alluvial soils on timberless plain or flood plain in eastern section of Windy; dissected by Yarramanbah and Pump Station Creeks. Associated inundation and rill erosion and minor salinity problems.
- S2 - Black alluvial and black earths on timberless foot slopes of Windy Ridge located in southern and middle sections of Windy - not flooded but subject to moderate sheet and rill erosion with occasional gullying problems overcome by construction of grassed waterways.
- S3 - Black alluvial soils in drainage or flood plain east of Box Island. Subject to poor drainage and inundation from Yarramanbah Creek.
- S4 - Black earths derived from basalt on hill slopes (2-10%) of Windy Ridge to the west of the property. Some rocky outcrops, moderate gully erosion problems on lower slopes requiring contour banks and graded waterways.
- S5 - Euchrozemic soils derived from basalt on steeper timbered slopes and crown of Windy Ridge. Stony areas suited to aerial seeding and fertiliser application.
- S6 - Red brown earths on hill slopes (2 - 5%) in the northern area of Windy with isolated timber. Moderate sheet erosion problems when cleared requiring contour banks.
- S7 - Shallow solodic soils (sandy, red and yellow) on timbered (including cypress pine) steeper slopes in north area known as Pine Ridge.
- S8 - Waste or unused areas including laneways.

LMG's are segregated physically but are fully integrated for property management (Table 1).

Landcare Issues

Consideration of the "whole" property has also allowed land care issues to be addressed. Windy is an active, long term participant in the Pine Ridge Landcare Group. Full co-operation with neighbouring land holders is set to ensure better management of our catchment area by good communication and practical solutions. A grid of piezometers is installed across the property to allow standing water levels and electrical conductivity readings to be taken.

The property was previously managed with separate areas of improved and natural pastures and a large strip farming system comprising 305 strips,

Table 1. "Windy" land management groups program

Land use	Code	S1A	S1A1	S1B	S2	S3	S4	S5	S6	S7	S8	TOTAL
Wheat	W	94	0	230	481	219	0	0	0	0	0	1024
Wheat/Lucerne Establishing	WLE	295	0	352	0	0	0	0	0	0	0	647
Barley	B	0	0	205	489	0	0	0	0	0	0	694
Lab Lab/Barley	LL B	0	0	221	0	0	0	0	0	0	0	221
Grain Sorghum	GS	0	0	460	244	0	119	0	0	0	0	823
Grain Sorghum/Faba Beans	GS FB	0	0	0	272	0	0	0	0	0	0	272
Fallow	F	0	0	229	466	0	85	0	0	0	0	780
Irr. Maize/Irr. Oats	IM IO	0	45	0	0	0	0	0	0	0	0	45
Irr. Forage Sorghum/Irr. Oats	IFS IO	0	90	0	0	0	0	0	0	0	0	90
Irr. F. Sorghum/Irr. C. Lucerne	IFS CL	0	45	0	0	0	0	0	0	0	0	45
Cutting Lucerne	CL	0	45	0	0	0	0	0	0	0	0	45
Irrigated Oats	IO	0	45	0	0	0	0	0	0	0	0	45
Grazing Oats	GO	260	135	0	0	0	364	0	0	0	0	759
Grazing Barley	GB	151	0	0	0	0	0	0	0	0	0	151
Forage Sorghum	FS	0	50	0	0	0	326	0	0	0	0	376
Lab Lab	LL	0	0	235	0	0	0	0	0	0	0	235
Lucerne Establishing	LE	150	37	451	0	124	124	0	0	0	0	762
Lucerne Good	L1	453	0	1157	0	154	154	0	0	0	0	1764
Lucerne Average	L2	0	0	0	0	326	326	0	0	0	0	326
Lucerne Poor	L3	0	0	0	0	320	320	0	0	0	0	320
Pasture Establishing	PE	0	0	0	0	0	0	0	330	0	0	405
Improved Pasture	IP	0	0	0	0	0	0	0	0	0	0	626
Improved Pasture Average	IP2	0	0	0	0	0	0	0	218	0	0	218
Natural Pasture	NP*	0	0	0	0	61	61	1093	469	178	557	2752
Timbered and Buildings	X	0	0	0	0	0	0	0	0	0	235	235
Total		1403	529	3540	1952	1879	1879	1093	1017	178	792	13697

90 m wide, some up to 8 km in length which covered 6,781 ha. The strip farming practices required high levels of agronomic management and did not allow the use of a full moisture profile "out of season" nor did it eliminate the effects of sheet and rill erosion. It could not incorporate a pasture/legume phase in the farming rotation which is now acknowledged as a necessity on the Liverpool Plains. The benefits expected from incorporation of a pasture phase are better utilisation of soil moisture and a consequential reduction of potential saline areas, a stabilising and improvement of the soil structure and the ability to improve soil nutrients (*e.g.* residual nitrogen) for subsequent crops. On the flood plains the reduction of soil erosion is also a major essential benefit.

Whole Farm Assessment

Cropping yields under the strip farming system could be very high but also very low, and in addition, maximising output from cropping alone meant exposure to volatile commodity markets. Conversely, maximising output from solely livestock enterprises usually meant missing the returns possible from the high quality, arable soils.

A linear programming assessment was carried out to determine the combination of enterprises which maximised the use of all resources in a long term sustainable profit maximising way. This analysis only considered those alternatives and rotations which were self sustainable on each LMG. The computer then selected the combination of these enterprises that maximised the returns on all resources on Windy. This demonstrated that we could maximise profits by maintaining a careful balance between cropping and livestock.

Ingredients of the farm plan

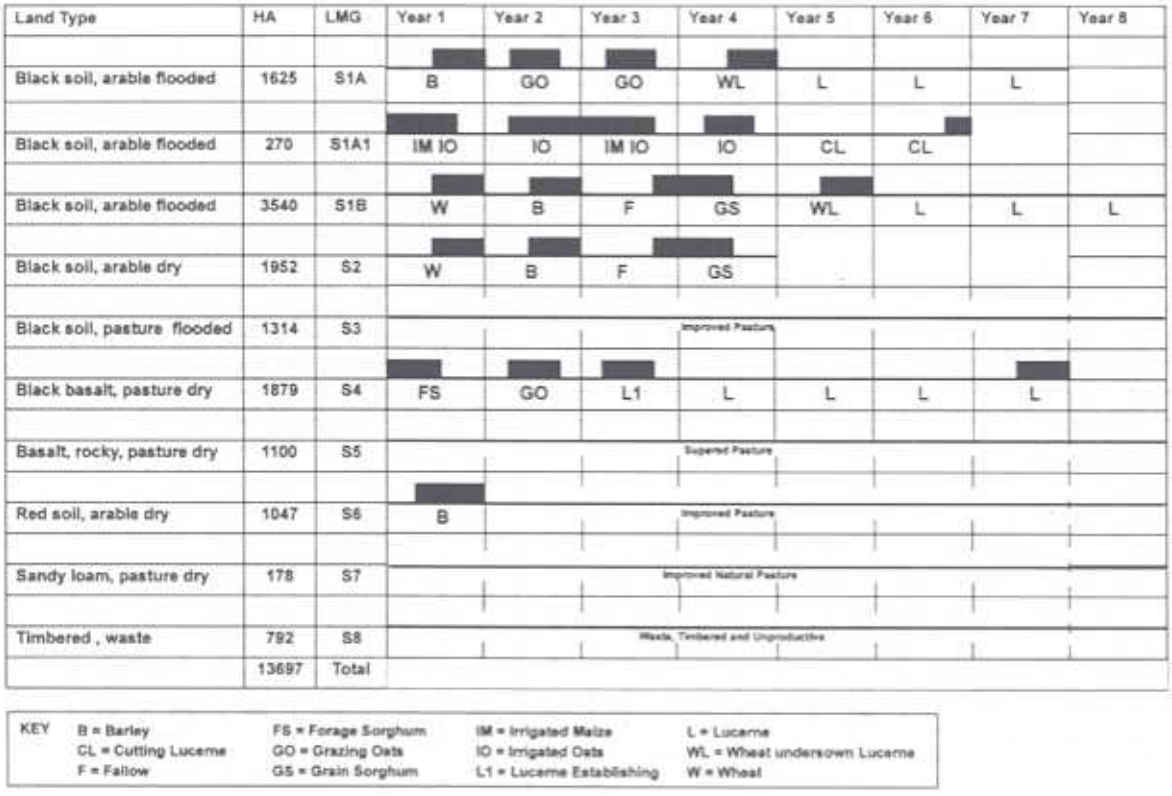
Ingredients of the farm plan for "Windy Station" are shown in Figure 2.

"Windy" Rotations

The rotations now implemented are designed to achieve the balance between cropping and livestock. A greater area of pasture has been sown on fertile soils to take advantage of the high water table, giving improving soil structure and an increased amount of residual nitrogen available for subsequent cereal crops. Having determined the many different cropping and livestock enterprises which we could now run rotations were designed to ensure the maximum output of the "whole" in a sustainable way. Sound rotational farming is improving our agronomic practices, soil fertility and reducing weeds and our dependence on herbicides. The significant advantage also obtained is less exposure to extremes of climate and volatile commodity markets.

These rotations may be considered conservative (*i.e.* traditional). This is intended, as it is vital to

Figure 2. "Windy Station" land management groups rotations.



maintain the correct ratio of pasture to crops year in, year out. Otherwise, the stocking capacity or "feedpool", which will be defined later, will be jeopardised and the main objective compromised.

Property Infrastructure

Internal roads, sub-division fences and soil conservation work all needed to be addressed to implement this new farm plan. Three additional waterways grassed with kikuyu and rhodes grass and a residual drain were constructed and large areas of strip farming sub divided with permanent electric fences. Regular maintenance of two permanent creeks has been necessary which has also contributed to better management of the total catchment area.

Fertiliser Requirements

Soil analyses are done regularly. Nitrogen levels are presently low and phosphorus is also marginal particularly in some areas previously intensively cropped. Zinc is inherently deficient on our black soils and low sulphur levels exist. Compound fertilisers with sulphur are regularly used. Sulphate of ammonia and urea are also used for cereal and forage crops and zinc is applied prior to summer crops and twice in the eight year rotations.

Pasture Establishment and Management

Pasture species have been chosen which can maximise production for growing animals. They must be drought tolerant, have an ability to maximise moisture and tolerate surface flooding. For example, improved pastures in LMG S6 consist of lucerne, sirosa phalaris and Clare and Seaton Park sub-clovers. In the flood prone areas along the corridors of the main Yarramanbah Creek, in LMG S3, tall fescue and strawberry clover have been added, lucerne reduced and sub-clover omitted. In the most intensive rotation, LMG S1B, pure lucerne only is established to maximise dry matter production. The stocking rates and grazing periods, particularly on the straight lucerne, are controlled by the lucerne not by a set rotational grazing regime. Different species require different grazing management, and their management must be complementary to the soil types and rotation of that LMG.

We presently have over 2,000 ha of dry land lucerne stands. The cultivars presently grown include Aurora, 5929, L69, 581 and L52. Lucerne stands are required to last a minimum of four years and a predominance of winter active varieties appears to maximise production for our feedpool. Lucerne is normally sown at 5 kg/ha. using an air seeder fitted with a small seeds box. Trifluralin at 1.4 l/ha. is applied immediately prior to the seeding operation when a compound fertiliser is also applied. Lucerne seed is dropped behind a levelling bar and finger harrows and before a large weighted weldmesh sheet. A rubber tyred roller follows as closely as possible without picking up moisture. Sowing depth is considered correct, particularly for lucerne, when 10 percent of seed is still visible on the surface prior to rolling. Wheat undersown with lucerne is also established in the same way. No newly sown pastures are grazed until they have flowered.

Beef Production

Beef production is aimed at the regular supply of a consistent quality carcase suitable for export to the Japanese market. Normally we are targeting to produce a carcase weight of between 300 kg and 400 kg (HSCW). Our target fat range, measured at the P8 site is 9 mm to 22 mm with a maximum fat colour score of 1. We aim to achieve a muscle score of C or better for each carcase and a minimum marble score of 2. All animals should be killed with a dentition of between 2 and 6 teeth. This is achieved by growing out and finishing cattle on pasture and forage crops or finishing cattle in our feedlot. Integrating our objectives within our company means we are able to purchase large lines of suitable cattle from other company stations to grow out and fatten on pasture or grow out and background for finishing in our own feedlot. Having identified the market we aim to produce a consistent quality product that regularly satisfies customer demand. This requires the right cattle to be produced on the correct nutrition. In order to achieve maximum DLG (daily liveweight gain), pasture species are needed which can produce high dry matter (DM) yield with high digestibility to maximise the intake of energy and protein requirements of the growing animal. All cereals and coarse grains required for the feedlot operations are produced on Windy. Market forces prevail however with this integration, and no one enterprise subsidises another, but the assured supply and the quality standards that can be attained offer many economic advantages.

Wool Production

Between 5,000 and 7,000 spring-shorn Merino wethers are run to fully utilise the grazing areas of LMG's S5, S6, S7, which have a predominance of natural pastures.

Planning and monitoring

The forward planning needed for these operations is vital, as is the necessity for all information for management purposes to be accurate. Detailed systems are in place to collect this information and

Table 2. "Windy Station" feed pool for 1995.

Land use	Rot	Area (ha)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Wheat	S1A S1B S2 S3 S4	94 230 481 219 70												
Wheat/Lucerne Establishing	S1A S1B	295 352												
Barley	S1B S2	205 489												
Lab Lab /Barley	S1B	221		0.0	0.0	0.0								
Grain Sorghum	S1B S2 S4	460 516 119					0.7 0.5	0.7 0.5	0.3 0.2					
Harvest	S1B	0												
Fallow	S1B S1A1 S1A S2 S3 S4	464 0 0 449 0 82	0.5	0.5										
Irr. Maize/Irr. Oats	S1A1	45					1.5	3.5	4.0	3.5	2.0			
Irr. Forage Sorghum /Irr Oats	S1A1	90	4	4	3		2	3	3.5	3	2	1		
Irr. Forage Sorghum /Irr. C. Lucerne	S1A1	45	0	1	5	5								
Cutting Lucerne	S1A1	45												
Irrigated Oats	S1A1	45					2.5	3.5	4.0	3.5	2.5	1.0		
Grazing Oats	S1A S1A1 S4	260 135 364					1.0 1.0 1.0	2.5 2.5 2.5	2.5 2.5 2.5	2.5 2.5 2.5	1.0 1.0 1.0	0.5 0.5 0.5		
Grazing Barley	S1A	151	0.5				1.5	2.0	2.0	2.0	1.5	1.0		
Forage Sorghum	S1A1 S4	50 326	0.0 0.0	0.0 2.5	1.5 2.0	2.0 2.5	1.5 1.5							
Lab Lab	S6	205	0.0	1.0	2.0	1.5	1.0							
Lucerne Establishing	S1A S1A1 S1B S4	150 37 224 124											0.5 0.5 0.5 0.5	0.7 0.7 0.7 0.7
Lucerne Good	S1A S1B S4	313 1157 154	2.0 2.0 1.5	2.0 2.0 1.5	2.0 2.0 1.5	1.5 1.5 1.5	1.5 1.5 1.0	1.0 1.0 1.0	0.5 0.5 0.5	0.8 0.8 0.8	1.5 1.5 1.5	2.5 2.5 1.5	2.0 2.0 2.0	2.0 2.0 2.0
Lucerne Average	S4 S3	326 0	1.0	1.0	1.0	1.0	0.7	0.5	0.5	0.5	0.8	1.0	1.5	1.0
Lucerne Poor	S4	510	1.0	2.0	1.5	1.0	0.8	0.5	0.2	0.8	1.0	1.2	1.8	1.8
Lucerne Poor/ Ryegrass	S1A	0												
Pasture Establishing	S3	75												
Improved Pasture	S3	626	1.0	1.5	1.6	1.2	1.0	0.8	0.8	0.8	1.4	1.8	1.4	1.0
Improved Pasture 2	S6	218	0.5	1.0	1.0	0.8	0.6	0.4	0.4	0.4	1.0	1.2	1.0	0.6
Supered Pasture	S5	790	0.0	0.0	0.4	0.5	0.4	0.3	0.3	0.3	0.5	0.7	0.5	0.4
Supered Pasture (*Super)	S5	352	0.3	0.3	0.4	0.4	0.3	0.2	0.2	0.2	0.4	0.6	0.5	0.3
Unimproved Pasture	S3	267	0.3	0.3	1.0	0.8	0.6	0.4	0.2	0.2	0.4	0.6	0.4	0.3
Unimproved Pasture (*Super)	S3	52	0.3	0.3	0.4	0.4	0.3	0.2	0.2	0.2	0.4	0.5	0.5	0.4
Natural Pasture	S3 S4 S6 S8	75 146 499 682	0.3 0.5 0.3 0.3	0.3 0.5 0.2 0.2	0.4 0.4 0.3 0.3	0.3 0.3 0.3 0.3	0.3 0.4 0.2 0.2	0.2 0.4 0.1 0.1	0.2 0.4 0.1 0.1	0.2 0.4 0.1 0.1	0.3 0.4 0.3 0.3	0.4 0.6 0.4 0.4	0.3 0.5 0.3 0.3	0.3 0.5 0.2 0.2
Natural Pasture (*Super)	S7	178	0.3	0.2	0.3	0.3	0.2	0.1	0.1	0.1	0.3	0.4	0.3	0.2
Timbered and Buildings	S8	235				0.1	0.1	0.1	0.1	0.1	0.1	0.1		
Total - Farm Capacity		13697	6114	7900	8354	6913	7222	6453	5305	5847	6845	8533	7224	6551

Table 3. "Windy Station" cattle pool, 1995.

	Open		Month												Total
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	
Balance	Total	3423	3409	3409	5034	5132	6752	6172	5186	5582	5444	5620	5560	5549	5236
	Steers	3039	3039	3039	4664	4782	6382	5802	5186	5582	5444	5620	5560	5549	5051
	Heifers	384	370	370	370	370	370	370	0	0	0	0	0	0	185
Sales	Total		14	0	720	403	617	585	1626	1334	138	809	59	11	6316
	Steers	kg	0	0	720	403	617	585	1256	1334	138	809	59	11	5932
	Pdck	500	0	0	0	0	0	0	0	0	0	0	0	0	0
	Pdck	580	0	0	0	0	90	120	260	138	138	809	59	11	1624
	Fdlt	420	0	0	491	20	102	0	0	0	0	0	0	0	613
	Fdlt	400	0	0	230	383	425	465	996	1197	0	0	0	0	3695
	Heifers	kg	14	0	0	0	0	0	370	0	0	0	0	0	384
	Pdck	400	14	0	0	0	0	0	370	0	0	0	0	0	384
	Pdck	380	0	0	0	0	0	0	0	0	0	0	0	0	0
	Fdlt	300	0	0	0	0	0	0	0	0	0	0	0	0	0
	Fdlt	280	0	0	0	0	0	0	0	0	0	0	0	0	0
Deaths	Total		0	0	24	5	23	0	6	18	0	10	0	0	85
	Steers		0	0	24	5	23	0	6	18	0	10	0	0	85
	Heifers		0	0	0	0	0	0	0	0	0	0	0	0	0
Intake	Total		0	0	2369	506	2260	6	626	1767	0	994	0	0	8528
	Steers	kg	0	0	2369	506	2260	6	626	1767	0	994	0	0	8528
	Group	400											0		0
	Group	380			240										240
	Group	360			240		536								776
	Group	340			470		540					199			1209
	Group	320			470	501	270		814			596			2451
	Group	300			470		536			753		199			2058
	Group	280			470		272			1000					1742
	Group	260													0
	Feedlot	440	0	0	9	5	6	6	12	14	0	0	0	0	52
	Heifers	kg	0	0	0	0	0	0	0	0	0	0	0	0	0
	Group	280													0
	Group	260													0
	Group	240													0
	Group	220													0
	Group	200													0
	Feedlot	320	0	0	0	0	0	0	0	0	0	0	0	0	0
Feed Demand	Cattle	(DSE)	3202	3403	4720	4970	6377	6082	5147	5277	5356	5243	5438	5700	60916
	Sheep	(1)	618	617	616	665	664	663	662	661	660	784	783	782	8175
	Total (2)	(DSE)	3820	4020	5336	5635	7041	6745	5809	5938	6016	6027	6221	6482	69091
Feed Supply															
Feed Supply	Budgeted		6114	7900	8354	6913	7222	6453	5305	5847	6845	8533	7224	6551	83260
Surplus/Deficit	Actual		4133	5795	7391	7167	8778	8778							
			2294	3880	3018	1278	180	-291	-503	-91	828	2506	1003	69	14169

* 1. DSE = Dry Steer Equivalent is defined as a 400kg steer gaining 0.75 kg/day
2. There could actually be more cattle and sheep than the DSE figure

collate it to allow comparisons of performance against budgets to be monitored in all necessary areas on a regular basis.

Planning of livestock carrying capacity is done by building a "feedpool" which shows the stocking capacity of each crop or pasture in each LMG for each month of the year (Table 2). The value of the unit used is a Dry Steer Equivalent (DSE), a 400 kg steer gaining 0.75 kg/day. Having established the total DSE per month that can be fed then a cattle pool can be developed on a monthly basis (Table 3) to maximise the feed supply.

The cropping/pasture rotations have major reviews annually for budgetary purposes and are further reviewed when seasonal and economic conditions demand. These allow a review of the feedpool and the feed demand. It is from the cattle pool that accurate predictions of cattle requirements from intercompany stations and cattle turnoff can be made.

People management

One other prerequisite of "Getting It All Together" is the "People Management". Without doubt of all the facets of property management, people management is the most challenging. "Getting It All Together" requires the co-ordinated effort of all levels of human skills, be it the weighing of cattle, the sowing of lucerne, the collation of data, the maintenance of stock waters, the drafting of fat cattle or the harvesting of cereal crops.

It is my responsibility to achieve this co-ordination and ensure that all operations are carried out in a timely manner to the highest quality standards. Long term planning is essential with regular reviews and monitoring of all operations. A competent team is essential with a good understanding of our objectives maintained by strong communication. All the Windy team including myself as "team leader" meet every morning prior to work when instructions for the day are given and relevant issues raised or advised or briefly discussed. This standard of competence, commitment and communication cannot be overstated and is the key to our success.

Conclusion

To maximise the benefits of integrated livestock and cropping enterprises a whole farm plan needs to be designed and followed. Specific markets need to be identified and achieved. Monitoring of overall performance against a budget is essential to ensure

Table 4. "Windy Station" paddock book summary.

Date	Paddock	Days Pdk	Ha	DSE/ha	Group Identification	Age	Actual Weight Date	Actual Weight Range	Projected Weight	Previous Count	Actual Count	Un Acc
24.2.95	South Old Windy	41	174	1.7	Magenta	2-3	22.2.95	285-380	372	325	325	0
3.3.95	North Gangat	34	95	2.4	Chocolate	2-3	2.3.95	321-370	381	235	235	0
3.3.95	North Old Windy	34	154	1.3	Chocolate	2-3	2.3.95	321-370	381	230	230	0
13.3.95	N.W. Pine Ridge	24	70	1.3	Bulls	0-1	3.1.95	269-405	386	95	95	0
24.3.95	Block 3.3	13	225	2.4	Choc Malt	2-3	8.3.95	446-470	482	450	450	0
30.3.95	Block 3.8	7	238	1.2	Magenta	2-3	22.2.95	285-380	372	300	300	0
31.3.95	Block 3.11	6	237	1.3	Magenta	2-3	22.2.95	285-380	372	338	338	0
4.4.95	Middle Ram	2	82	4.1	Honey	2-3	8.3.95	471-550	512	251	260	-9
4.4.95	Block 4 Creek	2	118	1.5	Honey	2-3	8.3.95	471-550	512	142	142	0

that output of each enterprise is enhanced by its dependence on the other enterprises, and that the system is truly sustainable. Effects of extremes of climate and exposure to variable returns from export markets can be lessened and profitability maintained. It is not a new or unique system, but is the basis of good agriculture, which, I believe, is to be encouraged in us all.