ESTABLISHING FEED FOR DAIRY COWS ON THE COAST

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INTRODUCTION

The University of Sydney has 13 farms within 65 km of the main University campus which support the teaching and research activities of the Faculties of Veterinary Science and Agriculture. They total over 1400 ha and are located in three major complexes at Camden, Bringelly and Badgery's Creek.

Some areas of land and buildings on these farms are allocated to the Department of Animal Husbandry, Veterinary Clinical Studies, Agronomy and Horticultural Science, Veterinary Physiology and to various Research Foundations within the University, viz: Dairy, Poultry and Deer.

Final year students in Veterinary Science and Animal Husbandry have all their lectures and practical classes on this campus. Approximately 30 post-graduate students are involved in research projects with the permanent academic staff at Camden.

The land not specifically allocated for academic purposes is farmed in a commercial-like manner so that its maintenance as a teaching and research resource is cost-free to the University.

THE FARMS

There are four "commercial" dairy farms viz: Corstorphine, Mayfarm, Wolverton and McGarvie Smith which have a total milk quota of 30,651 litres per week. The basically Holstein-Friesian herds are currently being upgraded through the herd book appendices and total approximately 850 head. (350 milking, 100 dry, 400 replacements).

The herd average milk production per cow for 1984-86 is shown in table 1.

TABLE 1. Herd Recording Summary

Farm	Year	Milk (l)	Butterfat (Kg)	Butterfat (%)
Corstorphine	1984	4527	182	3.9
	1985	5126	203	3.9
	1986	5580	220	3.9
Mayfarm	1984	5467	218	3.9
	1985	5964	235	3.9
	1986	6455	252	3.8
Wolverton	1984	4503	185	4.0
	1985	5574	225	4.0
	1986	5493	222	4.0
McGarvie Smith	1984	4593	200	4.3
	1985	5320	220	4.0
	1986	5462	223	4.0

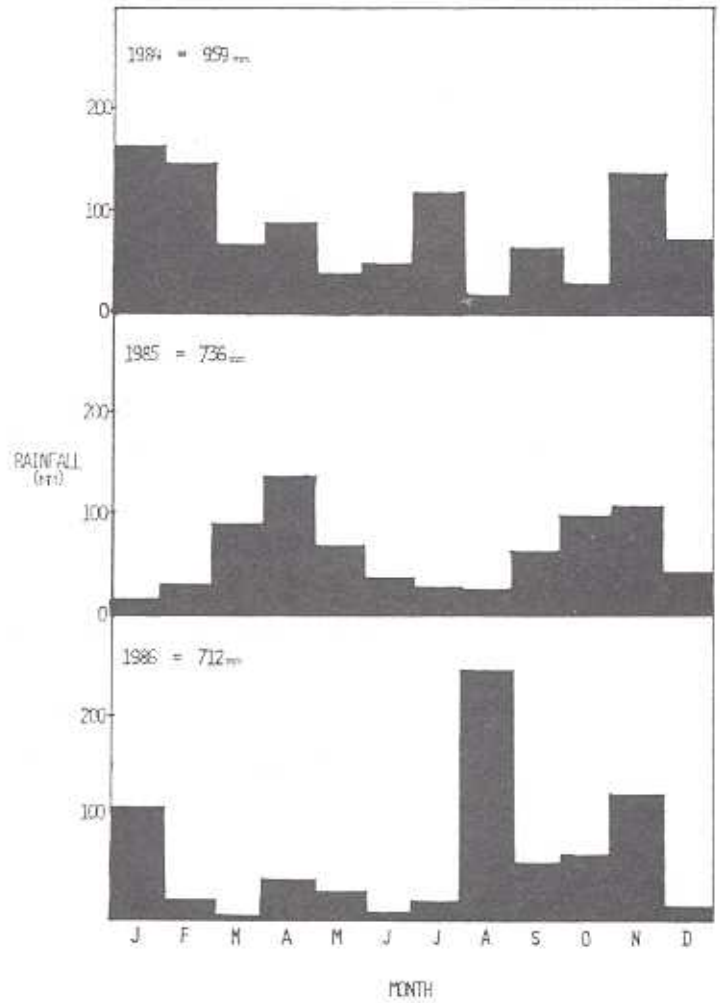
The total area of each of the 4 dairy farms is listed with the area under irrigation in parentheses: Corstorphine = 168.0 ha (76.4 ha), Mayfarm = 105.5 ha (37.2 ha), Wolverton = 272.0 ha (54.7 ha), McGarvie Smith = 162.0 ha (55.5 ha).

ENVIRONMENTAL FACTORS

The soils on the properties range in type from river alluvium to undulating to steep clay country derived from Wiannamatta shales.

All the dairy farms are situated in a rain-shadow area with a wide variation of rainfall from year to year and a capricious distribution of rain throughout the year (figure 1).

FIGURE 1. Distribution of rainfall in the Camden district (1984-1986)



To overcome this problem a system known as water harvesting (Geddes 1960, Crofts 1963) was developed from a pilot programme in 1952.

Water harvesting involves the economic storage of water in times of high run-off and the effective use of such water for irrigation. Apart from gravity collection of normal run-off during periods of high rainfall, flood pumps are used to fill dams from creeks that only flow during such periods.
The concept of water storage was not new but the focus on the economics of farm storage of water and its utilisation was the important factor which, I believe, has allowed economic dairying to survive in this area for the last 30 years.

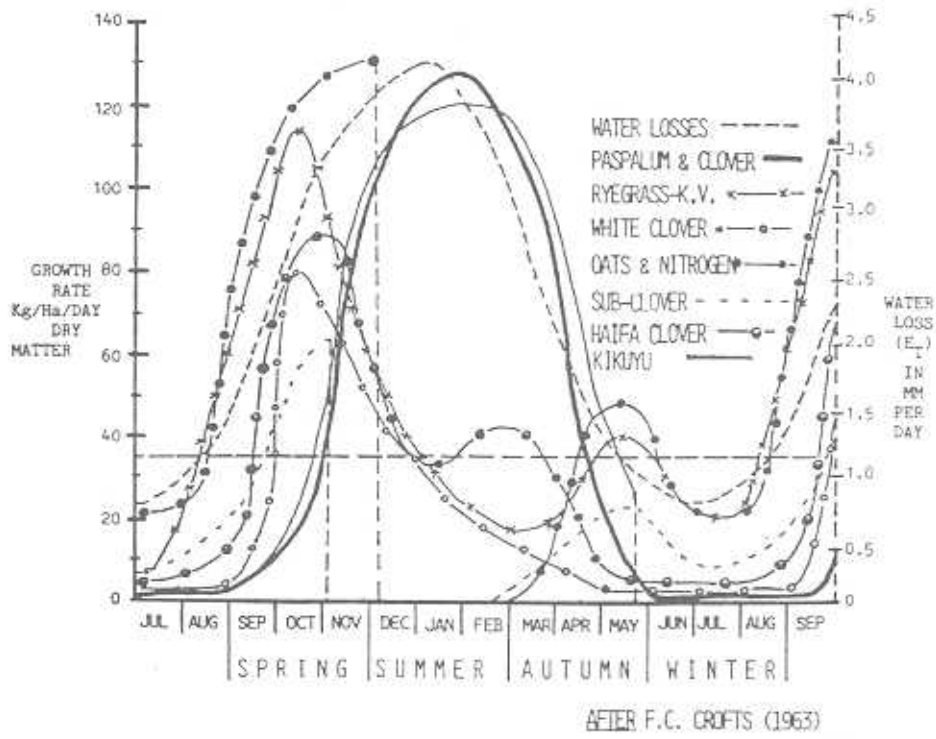
PHILOSOPHY OF FEEDING

To obtain maximum profit on a dairy farm in NSW under the present economic conditions the aim is not to maximise milk production but to produce one's quota and the required surplus milk as cheaply as possible.

To this end, the philosophy of the university farms is to produce pasture or forage crops as the major source of feed for the herds and to"top-up" with concentrates as required. The concentrates fed are a commercial 14% protein pelleted feed which is mixed on one farm with low cost grain when available.

The best usage of irrigation for fodder production can be seen from figure 2 which shows forage growth rates and water loss. The species which grows the fastest on any one day is the species that gives the most yield of dry matter per litre of water used (Crofts 1963). For example, in mid January the water loss is 4.0 mm per day and at this time paspalum and clover is growing at the rate of 126 kg dry matter per hectare while ryegrass is growing at only 30 kg dry matter per hectare. Thus at this time over four times the amount of feed is obtained by using 4 mm of irrigation water on paspalum and clover rather than on ryegrass/clover.

FIGURE 2. Field growth rates of forage species under sprinkler irrigation and their relationship to evapotranspiration estimates and mean screen temperatures at McGarvie Smith Farm, Badgery's Creek, NSW.



When the growth curves are near to or above the water use curve then the species is using water efficiently. When these growth curves drop well below the water use curve, water is being inefficiently used and it is time to apply the water to species that can use it more efficiently (Crofts 1963).

Paddocks are either divided by a single permanent electric wire into one hectare strips or strip grazed with portable electric fences.

Meadow hay is made on the farms (Number of bales: 1984 = 8221; 1985 = 5812; 1986 = 15979) but is not fed routinely. It is used in excessively dry

periods during pasture shortage or wet weather when pugging of pastures can be a problem.

SPECIES

The summer species favoured for irrigation are kikuyu and paspalum (a volunteer species) both with Haifa white clover. For other seasons the perennial pasture of choice is Kangaroo Valley ryegrass and Haifa white clover. However the growth rate of this pasture in autumn and winter will not provide the bulk of feed necessary to feed the dairy herds. To this end grazing oats (Sual or Cooba), Tetila or Concord ryegrass are sown to supplement the permanent pasture and fill the feed gap. Nitrogenous fertiliser is essential to obtain maximum growth and benefit of the irrigation water used (Crofts, 1959).

PASTURE ESTABLISHMENT AND USAGE

No ploughing for forage or pasture establishment has been carried out on the university farms for well over 15 years. All irrigated pastures/crops are direct drilled into existing pastures using sod-seeders (Duncan Triple Disc Multiseeder^{R} or Connor Shea Coulter Coil Tine Drill).

Sodseeding of oats or ryegrass commences late February and continues through April to provide a continuity of production. A "knockback" spray, eg. Sprayseed^{R}, is required for sowings in late February and March (depending on seasonal conditions) to prevent competition of summer species. Seed is drilled with 19:5:0 fertiliser (Greentop^{R}) at 200 kg/ha, topdressed with 200 kg/ha NH_4NO_3 (Nitram^{R}) and irrigated immediately if necessary.

The cash outlay for various combinations of species can be calculated from table 2 which indicates the 1987 costs to the University of seed, fertiliser and sprays at their usage rate per hectare. eg. Cash outlay of sowing of oats, Kangaroo Valley ryegrass and Haifa white clover on a new or weed-infested area with Roundup^{R} would be $275.76 per hectare.

TABLE 2. Actual costs of pasture components to the University farms in 1987

Product Seed	Cost ($) Per Kg	Rate/ha Kg	Cost/ha $
Cooba oats	0.325	160	52.00
Haifa white clover	5.30	2	10.60
Kangaroo Valley ryegrass	2.60	6	15.60
Tetila ryegrass	1.10	25	27.50
Concord^{R} ryegrass	2.55	25	63.75
Fertilisers	Per Tonne	Kg	$
Bulk superphosphate (0:9:0)	176.60	200	35.32
Nitram^{R} (34:0:0)	299.00	200	59.80
Greentop (19:5:0)	330.40	200	66.08
Sprays	Per Litre	Litre	$
Sprayseed^{R}	7.60	1	7.60
Roundup^{R}	18.18	2	36.36

The oats or ryegrass are ready to graze at a height of 30-35 cm in 6 to 8 weeks after sowing. Two grazings and a hay crop or 3 grazings are anticipated from an early sowing in a good season. After each grazing 200 kg/ha Nitram^{R} is applied and irrigated if necessary.

FINANCIAL ASPECTS

The returns from milk produced over the period 1984-1986 together with the cash outlay for fodder produced is shown in table 3. The figure for pasture costs includes seed, fertiliser, electricity and diesel fuel but no labour cost.

TABLE 3. Milk production, milk income and cash outlay for feed on the University farms 1984-1986

	MILK		
Year	Production (l)	Income ($)	Income (c/l)
1984	2291041	566749	24.7
1985	2377495	571753	24.0
1986	2231091	582262	26.1

	FEED		
Year	Concentrate Cost ($)	Pasture Cost ($)	Total Cost (c/l)
1984	81974	76936	6.94
1985	99376	88670	7.91
1986	110590	94291	9.18

The total labour costs of those on the farm involved in milk/feed production were: 1984 = $216,968 or 9.47 c/l, 1985 = $227,344 or 9.56 c/l, 1986 = $246,769 or 11.06 c/l.

An assessment of the partition of labour is as follows: milking = 40%, pasture work = 33%, other jobs = 15% and supervisory = 12%. Accordingly the approximate costs for labour of 3.12 c/l for 1984, 3.15 c/l for 1985 and 3.64 c/l for 1986 can be added to feed costs.

It has been recognised for some time that to be economic the feed costs on a dairy farm should be less than 50% of the gross income (Geddes 1960). If the feed plus labour costs for 1984 = 10.06 c/l, 1985 = 11.06 c/l and 1986 = 12.82 c/l are looked at as a percentage of c/l milk income (table 3) it can be seen that 1984 = 40.7%, 1985 = 46.1% and 1986 = 49.1%. It is obvious that even in 1986 feed costs were much less than 50% of the gross income of the farms which includes sale of calves and surplus stock.

If the base figure for actual nett income for the University farms for 1984 is taken as 100% then nett income for 1985 was 91.18% and 1986 was 64.5%.

This can be understood from the rainfall conditions as seen in figure 1 with increased costs in 1985 and 1986 for irrigation and concentrate feeding. N.B. The 1986 income includes payment of fringe benefits tax and the milk export levy for 6 months.

Pasture costs in c/l were seen to increase over 1984 by 9.9% in 1985 and 27.4% in 1986 while concentrate costs increased by 21.2% and 34.9% during the

same period (table 3). While these figures seem to indicate that pasture is cheaper than concentrates these figures reflect an increase in concentrate usage: 1984 = 471 tonnes; 1985 = 611 tonnes (+29.7%) and 1986 = 636 tonnes (+35.0%) with minimal price increase. Indeed the concentrate cost as a percentage of total feed costs (table 3) remained relatively stable: i.e. 1984 = 51.6%, 1985 = 52.8% and 1986 = 54.0%).

CONCLUSIONS

Figures for growth in the Farm Cost Index from the Bureau of Agricultural Economics indicate that increases over the period 1980/81 to 1985/86 were: fertiliser 49%; chemicals 32%; fuel 51%; electricity 66% and labour 50% (Dairymen's Digest 1987).

All these factors are costs to pasture production and although I believe it is still economic to produce the bulk of feed for dairy cows from grazed pasture and forage crops, these factors must be watched in line with concentrate cost increases.

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