IMPROVING FEED MANAGEMENT

for profits

Assisting farmers to identify areas of feed management which will help improve profits

DAIRY CHECK

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TERMS USED IN THIS BOOKLET

After grazing residue [post-grazing residue]. The amount (kgDM/ha) or height of stubble (cm) remaining after stock have finished grazing. It is an indication of grazing intensity.

Batch calving. As for seasonal calving but at 2 or 3 times of the year.

Concentrates. Usually grain or proprietary pellets.

Daily feed allocation. Amount of feed allocated each day and its components.

Dry matter. All feeds are usually expressed on a DM basis, ie all moisture was removed. This allows valid comparisons between feeds unconfounded by % moisture.

Flat rate feeding. Cows are fed at the same rate of concentrate or supplement irrespective of pasture available but the amount may vary in relation to stage of lactation of cows.

Grazing duration [occupation time] (days). Period over which stock are permitted to graze the same pasture.

Grazing rotation [grazing interval] (days). Period between the commencement of one grazing and the next.

Irrigation application rate (mm). Amount of water applied at each irrigation event.

Irrigation frequency [irrigation interval] (days). Time between one irrigation event and the next.

Pasture utilisation (kgDM/ha) Amount of pasture used either by grazing stock or conserved as silage or hay.

Seasonal calving. When cows calve over a restricted period (4-12 weeks) in a particular season in an attempt to match feed requirements with pasture growth.

Stocking rate (stock units/ha). The number of animals on a given area, usually inferred to be per annum.

Strategic feeding. Supplement/concentrate are fed in relation to pasture availability and stage of lactation.

Supplements. Includes concentrates, conserved fodder (silage or hay) and by-products.

Temperate pastures (C3 pastures). Includes ryegrass, prairie grass, fescue, white clover and other clovers, oats and lucerne.

Tropical pastures (C4 pastures). Includes kikuyu, setaria, paspalum, rhodes grass.

Foreword

Change is occurring at a rapid rate in the NSW dairy industry due to the cost-price squeeze associated with reduced milk prices and increasing costs of production.

Many farmers, wishing to stay in the industry are at the crossroads, having to make major decisions on ways to improve farm productivity and profitability.

It is difficult to speculate on future milk prices but the cost of production and living expenses suggest that we will need to continually challenge existing herd sizes and profit margins per hectare and per farm.

Lower milk prices suggest that gradual change will not be the complete answer and productivity gains will have to be made at even faster rates and greater amounts than in the past.

It has been estimated that we will have a shrinking industry when it comes to the number of farms, however, in terms of the production per farm and the adoption of new technology, dairying in NSW will continue to be a growth industry.

A common factor will be the need to increase the effectiveness of existing operations to reduce costs then consider ways to graze and milk larger herds to improve total farm income. This will involve close examination of the key drivers of profit ie herd, shed, feed, labour and farm management.

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WHAT IS DAIRYCHECK?

DairyCHECK is about farmers selecting the most appropriate technology and farm management to improve the overall profitability of their farm.

The project comprises of three stages:

Stage 1 – Farm Management Audit - using a "Checklist" to determine management opportunities for your farm by:

- Calculating the impact of deregulation on farm income
- Knowing the strengths and opportunities of your farm
- Identifying financial and physical key performance indicators
- Examining ways to improve profits

Stage 2 – Farm Business Management - using various tools and packages to determine the best ways to optimise the use of resources by:

- Understanding the financial and physical performance of your farm
- Identifying your goals and needs
- Considering ways to be profitable
- Analysing farm profits and performance

Stage 3 – Profitable Production System - using the most up-to-date knowledge and skills to develop and introduce new technology and different production systems by:

- Examining different production scenarios
- Identifying and analysing cost effective technology
- Planning the implementation of different systems
- Analysing future options and alternatives to improve profits.

FEED MANAGEMENT BOOKLET

This booklet looks at feed management to improve farm profitability.

STEP ONE Key pasture management areas to improve profits

- How important is increased pasture production
- The importance of converting grass to milk
- What are the opportunities to improve pasture management
- What do you need to change?

STEP TWO Key feed management areas to improve profits.

- Balancing pasture imbalances
- Improving response to supplements
- Whole lactation management
- What do you need to change?

STEP THREE Key factors to profitable pasture systems

- Cost effective systems
- Farm profitability and productivity
- Partial budgets for different scenarios
- What do you need to change?

This DairyCHECK Feed Management Booklet provides some key management areas and key performance indicators to help you achieve higher levels of profit from pasture based systems.

The booklet will hopefully be an introduction to other feed management packages, and decision support systems available through your participation in DairyCHECK.

This self-help booklet on Feed Management to improve profits was compiled by:

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INTRODUCTION

Profitable pasture-based systems require better pasture production, forage utilisation and feed management.

Suitable production systems and larger herds are seen as an opportunity to reduce the costs of production and increase productivity and profits.

The key feed management areas that will make a "real difference" to the viability and competitiveness of your farm include:

- Improved pasture availability and utilisation through: -
  - Better use of resources to produce pasture
  - Improved pasture and grazing management
- Increased milk production per farm and per hectare through: -
  - Improved feed allocation
  - Strategic feeding of supplements
- Profit focussed dairying: -
  - Management goals based on the best economic information available
  - Adoption of appropriate cost effective technology

Feed is the major variable cost of production and the efficiency of feed management has a major influence on profits.

This booklet examines ways to improve profits through high pasture production and strategic use of supplements to cost effectively convert pastures into profitable milk production.

FEED MANAGEMENT CHECKLIST

The following checklist allows you to examine your performance compared to Key Performance Indicators (KPI) achievable on commercial farms.

Checklist	KPI	My farm	Action		Things to consider
	Range		OK (✓)	Check(?)	
Stocking rate (cows/ha) Irrigated Non-irrigated	 2.5–5.0 1.0–1.5				• Agistment of drys & replacements • Level of pasture protection • Farm layout • Grazing management • Pasture monitoring • Feed allocation
Milk from pasture (litres/ha) Irrigated Non-irrigated	 10000–13500 4000–8000				• Grazing management • Fodder conservation • Fertiliser program • Soil fertility &pH • Irrigation scheduling • Pasture management • Pasture production • Stocking rate • Pasture utilisation
Conserved feed (tDM/cow/year) Irrigated Non-irrigated	 0.3–0.5 1.0–1.5				• Type of conserved feed • Pasture production • Grazing management • Feed planning • Nutritional deficiencies
Concentrates fed (t/cow/year) Irrigated Non-irrigated	 0.7–1.2 1.0–1.5				• Types of concentrate • Animal requirements • Pasture availability • Balanced rations
Total feed costs (cents/litre)	<10				• All the above facts

***Note 1**: An irrigated farm is where full use of irrigation is made on at least 1/3 of the farm. Non irrigated may use irrigation on small areas or intermittently. Consideration should be given to number of calvers, rather than milkers, and total area, not milking areas to obtain a better picture of potential to improve performance.*

SECTION 1

Pasture Production and Utilisation

BACKGROUND

Many dairy farms utilise less that 4t dry matter (DM)/ha on the farm as a whole with ryegrass pastures growing over 8 t DM/ha and kikuyu pastures producing 10t DM/ha. However, well managed irrigated temperate pastures can produce 15t DM/ha, and kikuyu pastures can produce at least 16t DM/ha of quality pasture depending on moisture and fertiliser management.

High pastures costs are not necessarily due to input costs (irrigation, fertiliser) but low levels of pasture utilisation.

CHALLENGES

The major issue to address on most farms is to improve pasture production and utilisation.

PASTURE GROWN

A combination of management components influences the amount of pasture grown. There is little point in improving one area of management eg irrigation, if other areas such as grazing management are limiting utilisation.

Soil moisture

- Irrigation.

The application rate and timing of irrigation should be related to root depth with ryegrass roots limited to using moisture in the top 15-20mm of soil. This means an interval of 4 to 7 days in late spring to 14 days in mid-winter. Differences in DM yield between average and well managed irrigation can be more than double.

Drainage

This involves 3 issues:

- Feed out area (feed pad) to keep stock off wet areas of pasture
- Conserved fodder to feed out when stock need to be deferred from grazing
- Drainage to get stock back onto pastures as soon as possible

Research has shown that moderate waterlogging of ryegrass pastures will reduce yields by 20% but even moderate pugging of such pastures by stock will reduce yields to 30-35%.

Soil fertility

Use soils tests to look at trends in soil nutrients over time to examine the effectiveness of your fertiliser program. The fertiliser program should be based on an estimate of nutrients removed off the paddock. This will be primarily determined by stocking rate, supplements brought in and grazing management practices.

Pasture species

The mix of annual and perennial ryegrass, prairie grass, kikuyu, brassicas, maize and other pastures and crops depends on water availability and feed requirements. Variation between the best varieties within species are small, with most gains to be made by improved management.

Grazing management – or pasture utilisation

Every pasture species has a management system which optimises its growth and utilisation. Pasture and grazing management influences the level of supplementation required, the intake by milking cows and the overall productivity and profitability of your farm (ie milk/ha and margin/ha).

PASTURE UTILISATION

Good indicators of pasture utilisation are stocking rate, milk from pasture, supplements fed and the cost of pastures.

Stocking rate (calvers/milking area)

With an average stocking rate of 1 cow/ha for the milking area and 4500-5000 litres milk/ha, there is tremendous potential to improve the milk produced from pastures.

The effect of increases in pasture grown and utilised on farm production is shown in Table 1.

***Table 1**: Improving milk production/ha and reducing pasture costs*

Feed grown (kg/DM/ha)	Feed used (%)	Feed consumed (kg DM/ha)	Stocking rate (cows/ha)	Pasture costs		Extra milk (litres/ha)	Extra milk ($/ha)
				($/ha)	(c/kgDM)		
7000	50	3500	1	600	17.1	–	–
7000	70	4900	1.4	600	12.2	2800	700
10000	70	7000	2	700	10.0	7000	1750
12000	70	8400	2.4	800	9.5	9800	2450

***Note**:*

1. *Pasture costs have risen slightly to allow for increased pasture production.*
2. *At high levels of utilisation (70% plus) supplements can be used to further increase milk production.*
3. *The assumption is a milk price of 25c/L milk*
4. *1 cow/ha equivalence = 3500 kgDM/ha pasture for a 550 kg Friesian cow producing 5500 L milk/lactation and fed 1 t concentrate/lactation.*

Milk from pasture (litres/ha)

High levels of pasture growth and consumption are essential if feed costs are to be reduced. Every additional kg of pasture converted to milk reduces the unit cost of production (cents/litre)

Converting improved levels of pasture production to milk reduces costs, despite higher inputs/ha. That is, cost are spread over more litres of milk (Table 1). Higher pasture production will mean the need for higher inputs of fertilisers.

Pasture costs

The costs of producing a kg of pasture is between 6–12 cents/kg DM. The actual cost of harvested pasture is 8–30 cents/kg DM. If pasture systems are to be profitable, pasture must be used efficiently.

The major determinant of pasture costs is not the level of inputs but the amount consumed and converted to milk by high producing cows (Table 1).

"Making a difference"

The **key management** areas that have the potential to substantially increase farm productivity and profitability are changes in the **feed management** and **feed availability.**

Change feed requirements

- Seasonal or batch calving
- Realistic milk production/cow
- Increased stocking rate

Change feed availability

- Growing more pasture
- Better grazing management
- Daily allocation of feed.

Seasonal, or batch calving

Calving seasonally or at least in 2 or 3 batches each year can substantially improve feed use and labour efficiency.

Batch calving ensures feed requirements more closely parallel availability of pasture growth. For example, in the most of coastal NSW there are 2 peaks in pasture growth-in August to October (ryegrass) and January to March (kikuyu, paspalum). Calving in April/May and October/November allows a better match of pasture availability and stock requirement than calving all-year-round. The proportion in each batch will depend on proportion of area of irrigated ryegrass. Other benefits of batch calving include:

- having 1 or 2 groups at the same stage of lactation allows more effective feed management,
- less labour and more efficient management of labour over the shortened periods of calving, calf rearing and mating.

There is scope to increase stocking rate by 20-25% simply by capturing the efficiencies of batch calving.

Realistic production/cow

With adequate levels of temperate pastures, Friesian cows can produce 5000-5500 L milk/cow/lactation without supplements and 6000-6500 L milk/cow/lactation is achievable if cows are supplemented with 1 t grain/cow/year. Comparable figures for kikuyu are 3500-4000 L milk/cow/lactation and 4700-5200 L milk/cow/lactation when supplemented with 1 t grain/cow.

High genetic merit cows (Australian Breeding Value of more than 30 kg fat plus protein) need to be fed to produce at least 6500 L milk/cow/lactation otherwise they will draw too greatly on body reserves to satisfy feed deficits and consequently reproductive performance will be lowered.

Increase stocking rates

The benefits from management to increase milk production/cow are small compared to increased milk production/ha.

Stocking rate is the most potent tool to increase pasture utilisation. However, stocking rate cannot be increased in isolation. A logical approach may be:

Determine herd feed requirements

⇩

Improve pasture management

⇩

Conserve any extra fodder grown

⇩

Review pasture available and set herd production targets

⇩

Increase stocking rate according to predicted feed surplus

⇩

Strategically feed supplements

⇩

Monitor farm performance

Consideration must also be given to the need to increase infrastructure associated with increase in herd size as a consequence of increased stocking rate eg Dairy throughput, milk vat size, laneways, effluent disposal system etc.

Grow more pasture

With good management over 15 t DM/ha of pasture can be grown on commercial farms. On the average dairy farm less than 4 t DM/ha is utilised, indicating the potential for improvement.

Maximising pasture growth and utilisation depends on identifying the management components which limit production (eg soil fertility, drainage, irrigation, grazing). Often a number of components need to be addressed, to improve production, eg if fertiliser input is inadequate you are simply wasting water irrigating pastures.

Better grazing management

The principles of good pasture management are well known for temperate and kikuyu pastures. These principles should also be used in planning the layout of your farm. (See **DAIRY**LINK – Managing Pastures.)

For temperate pastures there are 3 components of grazing management over which you have substantial control:

1 Grazing interval. Adhering to a grazing interval between 2-3 leaves/tiller regrowth, and before 2500 kgDM/ha is reached, will substantially increase growth and utilisation of pasture, pasture quality and persistence.

2 Duration of grazing. This should be less than 2 days if possible otherwise regrowth will be suppressed.

3 After grazing residues. These should be between 5-7 cm. Grazing residues of 10 cm stubble height reduce pasture availability by ½ t DM/ha/grazing.

Daily feed allocation

Dairy cows are markedly over and under fed from one day to the next under normal grazing management systems due to inaccurate assessment of daily pasture available. In a recent study, where the aim was to allocate a block of pasture uniformly by eye, the amount of pasture available varied from 6 to 20 kgDM/cow/day when 11 kg/cow/day was actually required. At 6 kgDM/cow the cows would be severely underfed whilst at 20 kgDM/cow, the responses to concentrates would be very low and pasture would be wasted.

Accurate measurement of pasture on offer and supplementing accordingly would remove this daily variation in feed intake. It would also provide consistant feed quality of the ration.

PLANNING CHANGE
(FORM 1A)

Pasture production availability

(Performance Checks)

Key Management Area (KMA)	Your farm	Action		Things to consider
		OK (✓)	Check (?)	
PASTURE PRODUCTION **Irrigation:** kg DM/ML water (Irrig & rain) [1.0 t DM/ML] Water application rate • ryegrass/clover [<25mm] • kikuyu/tropicals/lucerne [50mm] Water interval • ryegrass/clover Spring/autumn [<6 days] Winter [<14 days] • kikuyu Summer [<14 days] • lucerne [14-18 days] Labour (Hours/10 ha/week when irrigating) [2½ h]				Soil moisture test Pasture/crop type Irrigation system Pasture utilised
Fertiliser: P applied/1000 L milk/ha [>3 kg] K applied/1000 L milk/ha [>13 kg] N applied/1000 L milk/ha [40 kg] (on all grass)				Annual soil tests Pasture utilised Pasture persistence
pH (CaCl2)* Ryegrass/clover [>5.0] Kikuyu [>4.3] Lucerne [>5.6]				Response to fertilisers
Drainage: clay flood plains - % drained				Run-off drains Feed out pad Laser levelling

** Does depend on exchangeable aluminium levels in soil*

[ ] = recommendation

PLANNING CHANGE (FORM 1A)

Pasture production availability

(Performance Checks)

Key Management Area (KMA)	Your farm	Action		Things to Consider
		OK (✓)	Check (?)	
PASTURE UTILISATION [>10t DM/ha from lucerne, kikuyu/ryegrass or ryegrass/clover] [>75% of that achieved experimentally]				All other KMA's
Grazing: Interval • Ryegrass [from 2-3 leaves/tiller and < 2500 kgDM/ha] • Kikuyu [<4½ leaves/tiller] • Lucerne [10% bloom, bud initiation] – all species Intensity [5-7cm] – all species Duration [< 2 days]				Persistence (>3 years for perennials) Pasture utilised Milk fat test Metabolic diseases No of paddocks Stocking rate Pasture management Pasture utilised Back fence Poor regrowth
Silage (or hay): Store [0.9 t DM/cow/year]				Use 1/2 as roll over reserve Use to manage pasture
Concentrate: Flat rate feeding Strategic [range 1-6 kg concentrate kg/cow/day] feeding				response to concentrate kgDM consumed/ha from pasture
Calving pattern All-year-round Batch calve Seasonal [50% calved in 20 days]				Dates and duration % calved in 20 days

PLANNING CHANGE
(FORM 1B)

Pasture production and Utilisation

Using your knowledge and key performance indicators please consider the following questions:

- What are your strengths in pasture management?

- What are your pasture management opportunities?

- What do you need to change?

- What do you need to change first?

- How will you make the changes?

- What will you achieve by changing?

PLANNING CHANGE
(FORM 1C)

Pasture production and availability

a) Examples of ways to improve pasture production and consumption on your farm.

Key management areas	
Pasture production eg	**Pasture utilisation eg**
1 Phosphorus & Potassium fertiliser use	1 Silage or hay making
2 N Fertiliser use	3 Grazing management grazing interval grazing duration grazing intensity
3 Irrigation frequency application	3 Farm layout - paddock number
4 pH of Soil	4 Laneway
5 Drainage	5 Water points for stock
6 Pasture Species	6 Stocking rate
7 Weed Control	7 Daily feed allocation
8 Suitable Stocking Rates	8 Ability to feed supplements strategically

b) Now you consider ways to improve the conversion of pasture to milk using the following steps:-

1. Identify what things you will need to change?
2. What steps are necessary to make the change?
3. How will you know what has changed?

KMA	**1 (What)**	**2 (Steps)**	**3 (Change)**
Pasture production			
1			
2			
Pasture utilisation			
1			
2			

PLANNING CHANGE
(FORM 1D)

Key Pasture Management Tools and Packages

Package	Purpose
Feed allocation (Manual and DSS) The feed allocation package is on an Excel spreadsheet format, (requires Version 5 or above) and will need a computer with 16MB RAM and at least Windows 95.	The package uses an estimate of pasture available (visually or by pasture meter) to allocate pasture and then fill any feed deficit with supplements, with changes in feed quality and cost of the ration being automatically calculated. There are default values for quality and costs of all pastures and feeds used but there is provision to enter your own values. The weekly estimates of pasture growth and pasture cover on the farm are graphed over a 12 month period and these values can also be obtained for individual paddocks. There is also a small spreadsheet program which allows pasture costs to be calculated.
Feed Planning (Manual and DSS)	(see later)
DairyLink (Manuals and Tutorials)	(see later)
Water wise	This is a water management project to improve irrigation efficiency and improve milk production per megalitre of water. *Keys areas discussed include:* Irrigation scheduling, soil texturing, the evaluation of existing irrigation requirements for forages.

SECTION2

Supplementing Pastures for Profit

BACKGROUND

Feed costs are the largest single variable cost of producing milk and growing replacements. Feed costs range from 9–20c/litre and supplements are often the major component of high feed costs (ie up to 70% of feed costs).

Producing the majority of milk from pastures and strategically feeding low cost supplements will improve profitability and productivity on most farms.

CHALLENGES

On pasture based farms the goal is to improve farm productivity and profitability by converting high quality pastures to milk. There is also a need to strategically feed supplements to optimise the genetic potential of good quality cows.

For intensive use of pastures and making the best use of supplements it is necessary to identify:-

- The nutritional limitations of pastures and how to correct imbalances
- Ways to cost effectively feed supplements
- Major factors that affect whole lactation management and milk production

BALANCING PASTURE

Feed supplements are necessary to meet pasture quantity and quality shortfalls.

Good quality pastures allow a cow to consume 3% of her body weight. For a 600 kg cow this is an intake of 18kg of dry matter/day which provides enough energy to support 20–23 kg of milk/day. An additional 6–8 litres/cow/day is produced from body weight loss in early lactation.

Moderate supplementation (eg 1 tonne grain/cow/lactation) should increase cow production (6–7000 litres/cow) and permit higher stocking rates (2–3 cows/ha) to allow higher milk production/ha (12–15000 L/ha).

Pasture Quality

Cows require high intakes of high quality forages to avoid an over reliance on supplements.

Pastures may limit cow production because of the following reasons:

- High moisture levels which reduces dry matter intake.
- High levels of digestible crude protein which can reduce milk production (by 1.5 litres of milk/day) and reproduction.

- Low levels of digestible fibre which reduces milk fat composition.
- Low levels of some minerals (eg Ca, P, Mg, Na).
- The low energy content of some pastures (eg tropicals).
- Insufficient pasture available or time to graze pasture.

Table 1: *The nutrient content of pastures commonly fed to cows in NSW.*

MJ/kg DM		g per kg DM									
	ME	DM	CP	NDF	Ca	P	Mg	Na	K	S	Fat
Kikuyu											
• early	9.0	180	200	580	3.5	2.8	2.9	0.1	30.0	2.0	40
• late	8.0	250	140	630	3.5	2.5	2.9	0.1	30.0	2.0	30
• stemmy	7.0	260	100	720	3.5	2.4	3.5	0.1	30.0	2.0	20
Rhodes grass											
• early	8.7	200	160	580	3.7	2.7	1.4	0.6	30.0	2.9	40
• late	7.2	250	120	640	3.3	2.6	1.5	0.6	30.0	2.8	30
• stemmy	6.5	280	90	730	2.2	2.0	1.5	0.6	25.0	2.7	20
Setaria											
• early	8.7	180	160	560	2.1	2.7	1.6	3.0	30.0	2.0	40
• late	6.5	250	100	630	2.1	2.7	1.6	3.0	30.0	1.5	30
• flowering	6.0	280	80	730	2.9	2.7	1.6	3.0	30.0	1.0	20
Rye grass											
• early	12.0	170	220	420	4.0	3.0	2.6	4.0	30.0	2.0	33
• late	10.0	230	160	460	4.0	3.0	2.2	4.0	30.0	2.0	26
• flowering	9.0	250	120	480	4.0	3.0	2.2	4.0	30.0	2.0	26
Clover											
• early	11.5	180	230	350	17.0	4.0	2.5	1.1	26.0	2.1	30
• late	11.0	220	180	370	16.0	3.0	2.2	1.1	26.0	2.1	28
• flowering	9.2	230	170	390	15.0	2.5	1.8	1.1	24.0	1.7	26
Lucerne											
• early veg	11.0	220	220	380	16.0	3.5	2.6	2.2	22.0	3.3	27
• late veg	10.0	250	210	400	13.0	2.9	2.4	1.5	25.0	3.1	21
• flowering	9.0	260	170	420	13.0	2.2	3.3	1.4	25.0	2.8	21
Oats											
• early veg	11.3	200	200	580	2.7	1.8	1.9	2.1	20.0	2.0	26
• late veg	10.2	250	170	620	3.0	2.0	1.9	2.1	20.0	2.0	27
• flowering	9.0	270	130	620	3.1	2.4	3.0	2.1	16.0	2.0	27
Rye grass/cover											
• veg	11.3	180	220	350	7.0	3.0	3.1	4.0	30.0	2.0	27
• late	10.0	250	170	440	6.0	2.8	1.8	2.2	25.0	2.5	25
Brassicas	12.0	150	250	260	16.0	4.8	3.6	5.0	24.0	–	–
Prairie grass											
• veg	11.5	200	220	420	6.0	3.6	1.7	1.6	4.0	–	40

Source – Camdairy

Correcting Imbalances

The following section discusses how some nutrient imbalances can limit production.

- Energy

Energy intake is a major limitation to milk production per cow in a pasture based system.

With the exception of high quality temperate pastures the energy content of pastures are lower than cow requirements. This is especially the case for tropical grasses such as kikuyu,setaria and rhodes grass.

At low pasture availability and quality, feeding high levels of supplements increases the costs of producing milk.

- Protein

The protein content of well managed pastures is often high (20-25% DM), and is highly degradable (70-80 per cent).

For most dairy farms in NSW, the protein intake of cows is adequate except when:

- Cows are fed high levels of grain and/or silage in the cows diet (eg more than 6 kg DM/day of either corn silage or grain.)
- The cows milk production is very high (eg greater than 30 litres per cow per day.)
- Cows graze mature grasses or poorly fertilised pastures.

- Minerals

Mineral requirements change with the cows production levels. Most cows require calcium, phosphorus and sodium supplements (Table 2).

Table 2: *Mineral content of dairy pastures compared to the requirements of a 600 kg cows producing 20 L milk/day.*

Mineral	Requirements of a cow producing 20L milk/day	Perennial ryegrass white clover	Biennial ryegrass	Kikuyu
Magnesium (%)	0.25	0.31	0.27	0.29
Sodium (%)	0.18	0.47	0.37	0.10
Potassium (%)	1.0	3.0	3.43	2.89
Calcium (%)	0.6	0.7	0.59	0.42
Phosphorus (%)	0.35	0.3	0.31	0.28

Note:

1. *The availability of Ca in tropical pastures is low.*
2. *The Ca & P levels in pastures vary with soil type, fertiliser rates and season.*
3. *The addition of grain and forage supplements can increase the need for certain minerals.*

- Fibre

Low levels of dietary fibre intake (eg lush pastures and grain diets) can result in low milk fat percentages requiring a roughage supplement (ie 1 to 2 kg per cow/day). These include good quality silage and hay. Feeding sodium bicarbonate (100 – 150 g per cow per day) will also help.

- Additives

There are a vast number of additives for grazing cows. It is important that there is good evidence for their use or you could be wasting your money!

Stock Intake

To make sure your cows are receiving the correct amount of feed it is necessary to accurately formulate their rations. The five steps to ration formulation outlined in Realistic Rations (**DAIRY**LINK) are:

- Understand your cows' dietary needs
- Select pastures and supplements
- Calculate nutrient intake
- Balance your ration
- Monitor and correct shortfalls and imbalances

Strategic use of Supplements

Moving from 6000 – 15000 litres milk/ha and maintaining acceptable levels of milk production per cow can be achieved by strategic feeding of supplements and increasing stocking rates.

Feeding of supplements in relation to pasture quantity and quality shortfalls and animal requirements maximises milk responses to supplements (litres milk/kg supplement). Supplements can also be used as a pasture management tool to improve grazing and pasture management.

"Making a difference"

- The goal of dairy producers is to manage pastures to obtain high intakes of high quality pasture – the lowest cost feed.
- Flat rate feeding of supplements throughout the year, irrespective of pasture availability, is wasteful in terms of pasture utilised and response to supplements.
- Introducing supplements to complement good grazing systems requires
  - Monitoring of pasture availability and quality regularly.
  - Knowledge of stock requirements.
  - Adjusting supplements based on pasture availability and quality.
  - Cows in early and lactation are differentially fed.
  - Forward planning of purchases and storage.
  - Monitoring milk production and body condition scores on a regular basis.

  - Observing cows and manure and making the necessary adjustments eg whole grain in faeces indicates better processing is required.
  - Monitoring milk prices and feed costs.
- At greater than 1—1.5 t/grain/cow/lactation it is important to examine the need for additional proteins and minerals.

RESPONSES TO SUPPLEMENTS

Economic milk responses to supplements can vary considerably. Responses depend on a number of interrelated factors. For example:

- Cow factors – genetic merit, body condition, stage of lactation.
- Supplement factors – type and level of supplement and nutrient balance.
- Feed factors – quality of pastures, substitution and plane of nutrition.
- Price factors – the cost of supplements, the price of milk and milk quality penalties (see Section 3).

Milk responses

Long term responses to hay and silage is approximately 0.70– 0.80 litres milk/kg DM supplement. Long term responses to concentrates can vary from 1.0– 1.8 L milk/kg DM supplement. Long term responses include milk, body weight gain and reproduction responses. Short term responses are mainly milk responses which range between 0.2 - 0.8 L milk/kg DM supplement.

Responses to supplement decline as the level of supplement increases (Table 3. To maintain high milk responses to supplements, pastures need to be adequately utilised.

Table 3: *Expected long term milk yield response of high producing cows to increased levels of grain supplements*

Grain (kg/cow/day)	Litres milk/kg grain fed
0–2	1.4–1.8
2–4	1.0–1.4
4–6	0.8–1.0
6–8	0.6–0.8
> 8	0.4–0.6

Note: *Milk responses in mid-late lactation are only approximately half of early-mid lactating cows.*

Substitution

Cows generally eat less pasture when supplements are fed. Substitution rate is measured as the reduction in pasture intake per kg of supplement fed. The major factors influencing substitution rate is the availability of pasture and the type of supplement. Substitution rates can vary from 0—1 kg DM pasture /kg DM supplement fed. Substitution is lowest at low pasture allowances and highest with high pasture allowances.

"Making a difference"

- Cost effective supplements can optimise the milk production of high production cows. Well managed farms can produce 6500-7000 litres/cow with 5000-5500 litres from pastures and 1500 litres from 1½ tonnes of grain.
- Grain and forage supplements provide the confidence to use high stocking rates (2—3 cows/ha) and high levels of milk production/ha (12000-15000 L/ha).
- Best responses to supplements occur at high levels of pasture utilisation.
- Supplements should complement and not be a substitute pasture.

WHOLE LACTATION PERFORMANCE

High production per cow and per hectare can be achieved in well managed pasture based systems. Some management factors, however that can reduce profitability include fertility, heat stress, milk composition and transition feeding.

Nutrition and fertility

Reproductive efficiency has a significant effect on profitability and is particularly important with seasonal calving herds. Milk solids per cow/year, calves born/year, the number of replacements and the costs of forced culling have a major impact on farm income. Studies show that maximum milk income and income over reproduction costs is achieved when cows calve every 12-13 months.

Nutrition has a direct influence on reproduction. It is generally agreed that high producing cows and herds are under nutritional stress which leads to decreased reproductive performance. Studies support the farmers' belief that the best cows are generally hardest to get in calf.

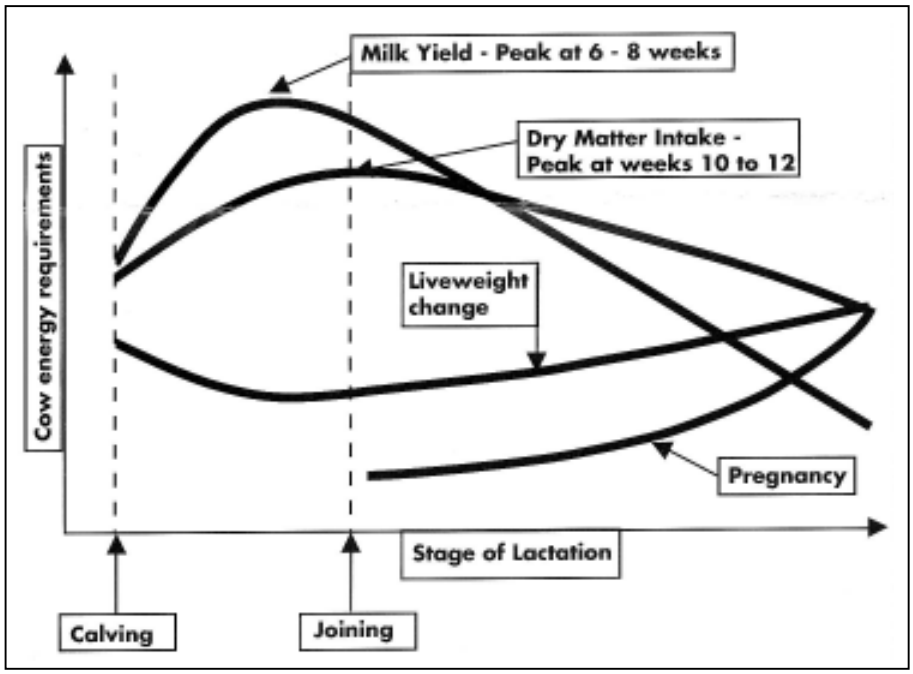
Since heritability of fertility is low it is essential that farmer's concentrate on nutrition and other management factors that affect reproduction performance. It is also essential that farmers closely examine the level of genetics most appropriate to their production system and management.

Transition feeding

To achieve suitable levels of production, cows need to be properly fed from one lactation to the next. Reduced intake before calving causes cows to mobilise body reserves and is closely linked to a poor start to the lactation.

On average, feed intake may decrease 25—35 per cent before calving with a full appetite not reached until after peak lactation (Diag. 1)

***Diagram 1**: Dry matter intake, milk yield and body weight changes and relationships to whole lactation performance*



- Body condition score

Since feed intake is usually 1.8—2.0% of the cows body weight during the dry period, cows should reach a suitable body condition score (BCS 5.5 - 6.5) in late lactation.

Different breeds require different amounts of weight gain to gain 1 BCS (Table 4).

***Table 4:** Weight gain requirements to change body condition score (BCS)*

Breed	BCS
Friesian	42
Friesian Jersey	34
Jersey	26

Particular attention to body condition should occur at 150 days into the lactation to ensure cows are properly fed in the second half of the lactation. Cows in low BCS (3-4) at drying off require extra feed in the dry period to gain sufficient weight prior to the transition period (ie 3 week prior to calving).

Heat Stress

Heat stress affects higher producing cows more than lower producing cows because high producers consume more feed and produce more metabolic heat. Environmental modifications (shade, sprinklers, and fans) to minimise heat stress coupled with a good nutritional program are necessary to maintain dry matter intake (DMI) and milk yield during periods of heat stress.

- Effects on intake

The production of a 600kg Holstein Friesian can decline from 25-27 litres at 20oC to 16.5 litres at 35oC. Maintenance costs increase 20% during extended periods of heat stress. At 40oC, maintenance increases by 32% and dry matter intake falls by 56% compared to 20oC (Table 5).

Energy intake is directly related to dry matter intake (DMI) and practical approaches to increase intake include more frequent feeding, improved forage quality, the use of palatable feeds, good nutrient balance and greater nutrient density of rations.

- Physical movement

During hot weather, walking 1 kilometre can increase a cows body temperature by 1oC for 6 - 10 hours. The effect of exercise on body temperature can be reduced by limiting the amount of walking to paddocks, providing sufficient pastures, by grazing cows during the cooler hours, providing shade and supplementing forages.

- Water is critical

Water is closely linked to performance with cows consuming 1 litre/kg DMI and 4–5 litres each litre of milk produced. In hot weather, water consumption can increase by 30% for low producers and 50% for high producers (Table 5).

Practical considerations include the supply of unlimited quantities of clean water under shade within easy walking distance for stock.

Table 5: *Effect of temperature on intake, milk production and water intake*

Temp °C	% of MR*	DMI needed kg/day	Expected DMI (kg/day)	Expected milk (L/day)	Water intake L/day
25	104	18.6	17.7	25	86
30	111	18.9	16.9	23	92
35	120	19.4	16.7	18	140
40	132	20.2	10.2	12	123

(*) MR = Maintenance requirements

Concentrates and pastures

Reducing pasture intake and increasing concentrates (ie less bulk and more energy density) often results in digestive upsets and reduced milk yield, higher costs and hence reduced profits. It is preferable to provide good quality forage supplements with quality pasture available for grazing in the cooler hours.

- Mineral supplementation

Extra minerals need to be fed during hot weather. Suggested levels of these minerals in hot weather are:

- Potassium (K) : 1.6% of DMI
- Sodium (Na) : 0.45% of DMI
- Magnesium (Mg) : 0.35% of DMI

Milk composition

Payment schemes based on volume have encouraged lower components in milk. Increasingly, payment schemes for milk will be based on milk compositional value. Penalties will apply to high volume - low test milk. This emphasis on milk constituents has major implications to feed management.

- Changing milk fat content

Fat percentage of milk is the most variable constituent of milk. Dietary changes which decrease fibre intake and increased intakes of grain are often associated with lower milk fat levels.

Feeding highly unsaturated fats or fatty acids also reduces milk fat per-cent.

- Changes in milk protein content

Nutritional factors that affect percentages of milk protein include:

- Energy (soluble carbohydrates) has been clearly shown to be the primary nutritional factor that affects milk protein per cent.
- Underfeeding results in a drop in protein and feeding above cow requirements tends to increase milk protein content.
- Feeding high proportions of concentrates relative to forage can result in a slightly higher milk protein levels.
- Added dietary fat usually depresses milk protein per cent.
- Where dietary protein levels are acceptable, moderate increases in protein content of the diet has minimal effect on milk protein percent.

"Making a difference"

Whole lactation performance

- High producing cows must be properly fed from one lactation to the next lactation.
- Rations for cows need to be adjusted at different stages of the lactation (ie early, mid. late) and levels of milk production.
- Proper feeding of cows before and after calving improves feed intake and milk production in early lactation.
- Do not over-condition dry cows. Over conditioned cow at calving (BCS 6+) have poor appetites, low peak and lactation yields more metabolic problems and poor reproduction performance. Aim for a BSC of 5.5 - 6.0 at calving.
- Each additional BCS between 4 - 6 provides an additional 250-300 litres of milk/lactation (ie 2 BCS = 600 litres per lactation).
- Reduced feed intake and excessive weight loss of high producing cows in early lactation is closely linked to poor reproduction.

Heat stress

- During hot weather some form of cooling is necessary to maintain feed intake, milk production and fertility.
- Abundant good quality drinking water essential.
- Diets that minimise "heat loads" and optimise milk production include high quality roughages and pastures and moderate levels of grain.
- Balanced rations are essential to prevent digestive problems during heat stress.
- Additional K, Na and Mg should be fed during summer.

Milk composition

- Genetic potential and stage of lactation have major effects on milk composition and responses to feed supplements.
- Proper feeding of lactating cows and dry cows allows them to meet their genetic potential for milk production and composition.
- Don't buy on $ tonne basis. Buy on a cost per unit of energy and/or protein basis.
- Strategic feeding of supplements in well managed grazing systems appears to be the most economic method to achieve high levels of profitable production (ie yield and composition).
- Feeding supplements provide variable short term changes in milk composition.
- Long term changes require giving full consideration to both herd and feed management.

PLANNING CHANGE
(FORM 2A)

Supplementing Pastures for Profit

(Performance Checks)

Key Management Area (KMA)	Your farm	Action		Things to Consider
		OK (✓)	Check (?)	
Pasture Imbalances • >3.4% butter fat and 3.0% milk protein milk composition				• Level of feeding • Quality of pastures • Dry cow preparation • Ration balancing • Loss of condition • Level of energy intake • Type of supplements
Responses to supplements • Regular diet checks (3 x's/year)				• Quality of concentrates • Quality of roughages • Level of feeding • Cost of supplements • Pasture intake • Pasture utilisation • Level of supplements • Type of supplements • >1:1 milk:grain price ratio • Unit cost of energy and protein
Whole lactation management • BCS at drying off 5.0-5.5 • < 1½ BCS loss in first 100 days (1-8 scale) • BCS at mid lactation 4.0-4.5 • BCS at calving 5.5-6.0 • Target growth rates of heifers				• Feed planning • Feed budgeting • Feed allocation • Feed allocation • Ration balancing • Ration balancing • Monitoring weight change (ie BCS)
Possible opportunities to improve profits:				

PLANNING CHANGE
(FORM 2B)

Supplementing Pastures for Profit

Using your knowledge and key performance indicators please consider the following questions:

- What are your strengths in feed management?

- What are your feed management opportunities?

- What do you need to change?

- What do you need to change first?

- How will you make the changes?

- What will you achieve by changing?

PLANNING CHANGE
(FORM 2C)

Supplementing Pastures for Profit

a) Examples of ways to increase the responses to feeding supplements, balancing nutrient intake from pastures and improve whole lactation performance.

Key management areas (KMA)

Pasture imbalances eg	Responses to supplements eg	Whole lactation performance eg
1. pasture management	Type of supplement	Feed budgeting
2. grazing management	Nutrient analyses	BCS monitoring
3. feed planning	Ration formulation	Shade and water
4.	Knowledge of cows requirements	Balanced rations

b) Now you consider ways to improve profits from feeding supplements using the following steps:

1. Identify what things you will need to change
2. What steps are necessary to make these changes?
3. How will you know what has changed?

KMA	1 (What)	2 Steps	3 (Change)
Pasture Imbalances			
1			
2			
Responses to supplements			
1			
2			
Whole lactation performance			
1			
2			

PLANNING CHANGE
(FORM 2D)

Key Feed Management Tools and Packages

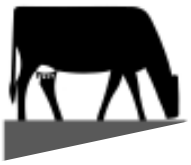
PACKAGE	PURPOSE
Feed Allocation (Manual and DSS)	Previously outlined
Feed Planning (Manual and DSS)	This is a comprehensive package which examines the capacity of the farm and feed requirements of the herd. Key aspects of the package include planning your feed supply to meet your herd requirements. This package closely relates to and supports **DAIRY**LINK - Managing Pastures.
DAIRYLINK (Manual and Tutorials)	This comprises of a series of 5 integrated technical packages that look at ways to improve the performance of feed, heifer and pasture management. These farmer friendly packages can either be used by individual farmers or as tutorials. 1. *Establishing Pastures*. This package looks at ways to establish and produce pastures and forage crops for milk production. It discusses factors which affect establishment and survival and ways to increase pasture production. 2. *Managing Pastures*. The emphasis of this package is to help farmers understand the principles behind good pasture management, particularly grazing management. The package examines ways to increase pasture consumption through efficient grazing management of ryegrass, lucerne, white clover and kikuyu. 3. *Conserving Feed*. Fodder conservation is a vital tool in the management and utilisation of pastures. This package looks at when, and how to harvest, conserve and feed out hay and silage so as to maximise the benefits of conserved forages. The package links well with the proposed national project on silage. 4. *Realistic Rations*. This package looks at the relationship between feed management and cow performance. It is designed to allow farmers to gain a better appreciation of stock requirements and takes the mystery out of balancing rations for heifers, dry cows and milking cows. 5. *Growing heifers*. This package can be used in conjunction with a computer program to examine the nutritional requirements of calves, weaners, and replacement stock to reach growth targets set by the farmer.

PLANNING CHANGE
(FORM 2D)

Key Feed Management Tools and Packages
(continued)

CamDairy (Realistic Rations and DSS)	This computer program has been developed by Sydney University and NSW Agriculture. The program is designed to help farmers formulate least cost rations and predict milk performance. The program considers cow, herd and feed factors and milk prices to optimise or maximise margins above feed costs. It allows farmers to compare different types of feeds to minimise feed costs (cents/litre). CamDairy allows farmers to acquire skills in ration formulation and complements the nutritional principles discussed in: **DAIRY**LINK Realistic Rations.

SECTION 3



Profitable Pasture Systems

BACKGROUND

Feed related costs are typically 60% to 70% of variable costs and 30% to 40% of total farm costs. It is therefore possible to make a significant impact upon farm profitability by altering feed management strategies.

Higher levels of pasture utilisation, strategic use of supplements and the nutritional balancing of the cow's diet can help achieve savings in feed related costs on a cents per litre basis.

CHALLENGES

Feed management represents a significant challenge to farm managers, with its direct influence on production and farm profitability.

The keys to improving profits from pasture based systems include:

- Identifying cost effective technology and management systems
- Maximising the use of the capital base
- Evaluating management practices

Selecting the appropriate production system and matching the herd feed needs to the grazing system needs to be planned, monitored and evaluated.

Management of profitable pasture based systems requires the analysis of cost effective systems, monitoring productivity and profitability and scrutinising the partial budgets of different production options.

COST EFFECTIVE TECHNOLOGIES

Seasonal and Batch Calving

Changes to the milk market mean that farmers will need to examine various production strategies to improve profitability. A potential strategy is to more closely match feed demands with pasture growth.

Batch calving or seasonal calving strategies have the benefit of allowing farmers to match the herd's peak feed demand with peak pasture production. The opportunity to shift calving patterns will obviously depend on supply arrangements with the processor and the seasonal changes in the price of milk paid by the processor.

Seasonal production has a number of advantages compared to year-round production,

including:

- matches herd feed demand with pasture growth,
- reduction in the amount of fodder conservation required,
- higher utilisation and higher stocking rate,
- simpler to feed according to stage of lactation,
- possibly reduced supplementation,
- several weeks break from milking,
- breeding and calf rearing tasks are restricted to a short period of the year, this can improve the productivity of staff carrying out these tasks.

Disadvantages of seasonal production include:

- necessitates tight calving interval,
- variable income,
- milk shed and vat must be matched to peak production period.

Batch calving allows farmers to obtain most of the benefits of seasonal production systems while still maintaining production and income for the entire year. The number of batches can vary from two or more and match pasture peaks or milk price peaks.

Identifying the Economics of Feeding

Determining the economic benefit from a feeding strategy is complex. Several simple ratios can be used as 'rules of thumb' to identify the possible cost benefit from a feeding strategy. The immediate response to feeding is measured in milk production however benefits also accrue through improving cow condition score for breeding and health and in improving milk components.

- **Grain : Milk ratio and Milk : Feed price ratios**

With a substitution of 0.5 and an average milk response of 1kg milk/kg DM supplement, an early lactation cow to produce approximately 30 litres of milk when fed high quality pasture and 8 kg of supplements. This is grain : milk ratio of 1.3 : 5.

A milk : feed (M:F) price ratio is the comparison between milk and supplement price eg at 18 cents milk price and grain $180/tonne DM the M:F ratio is 1:1. At 26 cents/ litre of milk and grain at $176/tonne DM the M:F ratio is approximately 1.5:1. This ratio allows you to quickly determine whether the feed price is likely to be economic in relation to the milk price.

Table 1 presents a summary of milk and economic responses using fairly typical feed costs and milk prices.

Table 1: *Expected responses of early lactation 600 kg cows fed grain*

Pasture		Grain		Total		Milk		INC/FC
DM/kg	Cost$	DM/kg	Cost$	DM/kg	Cost$	Litres	$	$
18	1.19	0	0	18	1.19	21	5.48	4.27
17	1.12	2	0.35	19	1.47	23	5.98	4.51
16	1.06	4	0.70	20	1.76	25	6.50	4.74
15	0.99	6	1.05	21	2.04	27	7.02	4.98
14	0.92	8	1.40	22	2.32	30	7.80	5.48

Note 1: - considers:-

a. Pasture cost 6.6c kg DM
b. Grain cost 17.6c/kg DM
c. Substituion rate of 0.5
d. Milk price 26c/litre
e. INC/FC - income minus feed cost

Note 2: - does not consider:-

a. The costs of unused pasture
b. Possible benefits of increased stocking rates
c. Weight change and reproduction
d. The lower price of extra milk
e. Reduced pasture costs due to increased pasture utilisation

Table 2 is a summary of expected profit responses with changing milk : feed ratio prices

Table 2: *Milk and profit responses to grain supplements*

	Early-mid lactation	Mid-late lactation
Expected milk response (L/milk/kg grain)	1.0 - 1.2	0.4 - 0.6
Milk : Feed price ratio		
>1.5 : 1	Profit	Profit
1.25 : 1	Profit	Very marginal
1.0 : 1	Marginal	Loss

Note

1: *Does not consider long term benefits on body condition and reproduction.*

2: *Ratios above 1:1 indicate that the milk responses are high and/or the price of milk is greater than the price of grain.*

Cost effective supplements

The suitability of supplementing feeds depends on three key factors:

- Nutritional – knowledge of its ingredients and capacity to meet animal requirements and balance pastures
- Economic – to provide a diet of least possible cost and help to meet production and profitable milk responses.
- Practical – rations with minimum health problems, labour input and readily available.

To determine the least expensive source of energy, protein on fibre they must be examined and a cost per unit dry matter basis. For example, the unit cost of energy (cent/MJ) is as follows:

Calculation Involves a 3 step process	Example WHEAT (ME = 13 MJ/kg DM, DM = 90%, $180/tonne)
Step 1 $\frac{\$/\text{tonne}}{1000}$ = $kg (as fed)	**Step 1** $\frac{180}{1000}$ = $0.18/kg
Step 2 $\frac{\$/\text{kgx}100}{1000}$ = c/kg DM	**Step 2** $\frac{0.18\text{x}100}{0.90}$ = 20c/kg DM
Step 3 $\frac{\text{c/kgDM}}{1000}$ = c/MJ DM	**Step 3** $\frac{20}{13}$ = 1.53c/kg DM

Table 3: *Comparative cost of energy supplements (cents/MJ ME)*

Feedstuffs	**Cost/tonne**							
	100	**120**	**150**	**170**	**180**	**190**	**200**	**220**
13.0 MJ/kg DM eg Barley	0.85	1.02	1.28	1.45	1.53	1.62	1.70	1.88
12.0 MJ/kg DM eg Oats	0.92	1.11	1.38	1.57	1.66	1.75	1.85	2.03
14.00 MJ/kg DM eg Maize	0.79	0.95	1.19	1.34	1.42	1.50	1.59	1.74
13.5 MJ/kg DM eg Wheat	0.82	0.98	1.23	1.39	1.48	1.56	1.64	1.81
10.5 MJ/kg DM eg Bran	1.05	1.26	1.58	1.79	1.90	2.00	2.11	2.32
12.5 MJ/kg DM eg Pellets	0.88	1.06	1.33	1.51	1.60	1.68	1.77	1.95
12.5 MJ/kg DM eg Molasses	1.06	1.28	1.60	–	–	–	–	–

Note 1: *Assumed that grains are 90% DM and molasses is 75% DM*

Note 2: *For comparisons the costs/tonne need to be compared on a cents/MJ ME basis*

Table 4: *Comparative costs of protein supplements ($/kg CP)*

Feedstuffs	**Costs/tonne**							
	200	**250**	**300**	**320**	**340**	**360**	**380**	**400**
	$/kg CP							
22% CP eg Copra	1.73	2.16	2.59	2.76	2.94	3.12	3.29	3.43
35% CP eg Sunflower	1.44	1.89	2.16	2.30	2.45	2.60	2.74	2.86
40% CP eg Rapeseed	1.33	1.66	1.99	2.13	2.26	2.40	2.53	2.64
45% CP eg Cottonseed	1.22	1.52	1.83	1.95	2.07	2.20	2.32	2.42
50% CP eg Soyabean	1.11	1.38	1.66	1.77	1.88	2.00	2.11	2.20
Cost 1kg DM protein meal	2.22	2.77	3.33	3.55	3.77	4.0	4.22	4.40

Note:

1. *Assumed that grains are 90% DM*
2. *For comparisons the cost/tonne needs to be compared on a $/kg CP basis*

- Fodder Purchases

The cost of purchasing hay should also consider freight and storage costs. Hay should be purchased on a $/tonne basis rather than $/bale (Table 5).

Table 5: *Effect of bale weight on price tonne*

Bale Price $/bale	Bale weight kg	No of bales/tonne	Actual price $/tonne
5	20	50	250
5	25	40	200
5	30	33	167

Note:

1. *If homegrown conserved feed is not available hay purchases can be expensive and disappointing due to the variable quality of hay*

2. *Nutritional values of conserved feeds vary considerably compared to grains*

3. *Purchased roughages are generally expensive sources of energy and protein*

4. *Roughages purchased as a fibre source should be fed in low quantities (ie 2-3 kg/animal/day)*

5. *Strategic buying in terms of surplus supply may be a suitable alternative to homegrown stored forages.*

6. *Partial budgets can be used to determine the economic feasibility of providing sufficient storage to purchase low cost hay.*

The choice of a feed should also consider the following:

- Time involved in handling and transporting
- Processed versus unprocessed costs
- Milling and storage facilities
- Safety feeds to avoid 'off feed' problems
- Regular and reliable source of quality feeds
- The values and possible spoilage factors.

PRODUCTIVITY AND PROFITABILITY

Reduced Pasture Costs

Pasture utilisation is a critical indicator of pasture and feed management. Pasture utilisation is influenced by a number of management factors including stocking rate, grazing management and pasture quality and level of supplements fed. Improving the level of pasture utilisation dilutes the cost of pasture on a kg of DM basis.

The diluting effect of utilisation on the cost of pasture consumed is illustrated in Table 6.

***Table 6**: Improving pasture utilised reduces effective cost of pasture fed*

Feed Grown (kg DM/ha)	Feed Used (%)	Feed Consumed (kg DM/ha)	Pasture costs ($/ha)	Effective cost of pasture consumed ($/kg DM)
7000	50	3500	600	0.17
7000	70	4900	600	0.12
10000	70	7000	700	0.10
12000	70	8400	800	0.095

Note:

1. Pasture costs have risen slightly to allow for increase pasture production.

2. At high levels of utilisation (70% plus) supplements can be used to further increase milk production.

Grain versus Fertiliser

On farms where pasture growth is low there is significant capacity to decrease feed costs by increasing milk from pasture or replacing grain with grass. This can be achieved through the strategic use of fertiliser, particularly nitrogen which provides quick pasture growth responses.

Table 7 shows a possible comparison of fertiliser inputs compared to grain.

***Table 7:** Comparison of cost of feed energy provided by nitrogen fertiliser or grain.*

Ryegrass response to	Energy provided[1] (MJ ME)	Costs of N[2] ($/kg)	Grain equivalent cost[3]
18 kg pasture (Autumn & Spring)	151	$0.99	$1.89
7 kg pasture (mid-Winter)[4]	59	$0.99	$0.74

Note:

1. Assumes 70% of pasture grown is utilised.

2. N fertilzer is Urea at $455/t (46% N).

3. Assuming grain is 12 MJ ME/kg DM at $150/t.

4. N fertilizer during winter increases tillering and plant vigour assisting in subsequent spring production.

PARTIAL BUDGETS FOR DIFFERENT SCENARIOS

Using Partial Budgets

Partial budgets can be used to determine the viability of proposed changes such as:

- Modifying a current activity eg contract rearing heifers,
- Expanding an activity eg increasing herd size,
- Introducing a new activity eg conserved feed vs grain.

STEP 1 Calculate LOSSES due to the proposed change – this includes extra costs and revenue foregone.

STEP 2 Calculate GAINS due to the proposed change – this includes cost savings and additional revenue.

STEP 3 Calculate "NETT GAIN" – GAINS minus LOSSES

STEP 4 List "NON-DOLLAR" factors due to the proposed change – increased management skills, time, risk

STEP 5 Calculate CAPITAL COSTS due to the proposed change –

Total new-capital outlay (A)
Total of capital items sold (B)
Net capital cost (ie A-B) = C

$$\% \text{ rate of return on extra capital} = \frac{D \div C}{100}$$

Example Partial Budget

Increasing the number of milkers by rearing heifers off-farm.

Removing heifers off-farm will free 15 ha for 25 additional milkers. Capital requirements include pastures renovation ($3000)

Capital requirements		
Extra 25cows on area that heifers are run		$ 25 000
Pasture renovation @ $300/ha		$ 4 500
Vat (2nd hand vat to increase capacity)		$ 6 000
Total Capital		**$ 35 500**
LOSSES		
Extra Costs		
Heifer rearing 50 heifers @ $5/hd/wk		$ 13 000
Cow feed costs @ 7 c/L		$ 10 500
Other variable costs @ 2 c/L		$ 3 000
Extra labour costs @ 3 c/L		$ 4 500
Depreciation of vat @ 10%		$ 600
Loss of Income		0
	LOSSES	**$ 31 300**
GAINS		
Extra Income		
Milk 150 000 L @ 25 c/L (net)		$ 37 500
Cattle sales		
Cull cows 6@ $500/hd		$ 3 000
Heifers 5 @ $250/hd		$ 1 250
Bull calves 12 @ $60/hd		$ 720
Costs Saved		
Heifer supplementary feed costs 50 @ $200/hd		$10 000
	GAINS	**$ 42 470**

NET GAIN = $42 470 - $31 300 = $ 11 170

Return on Extra Capital = 11 170/ 35 500 x 100
= 31%

Non monetary factors:

* Additional management effort

* Impact on pasture utilisation

Importance of pastures and feed management

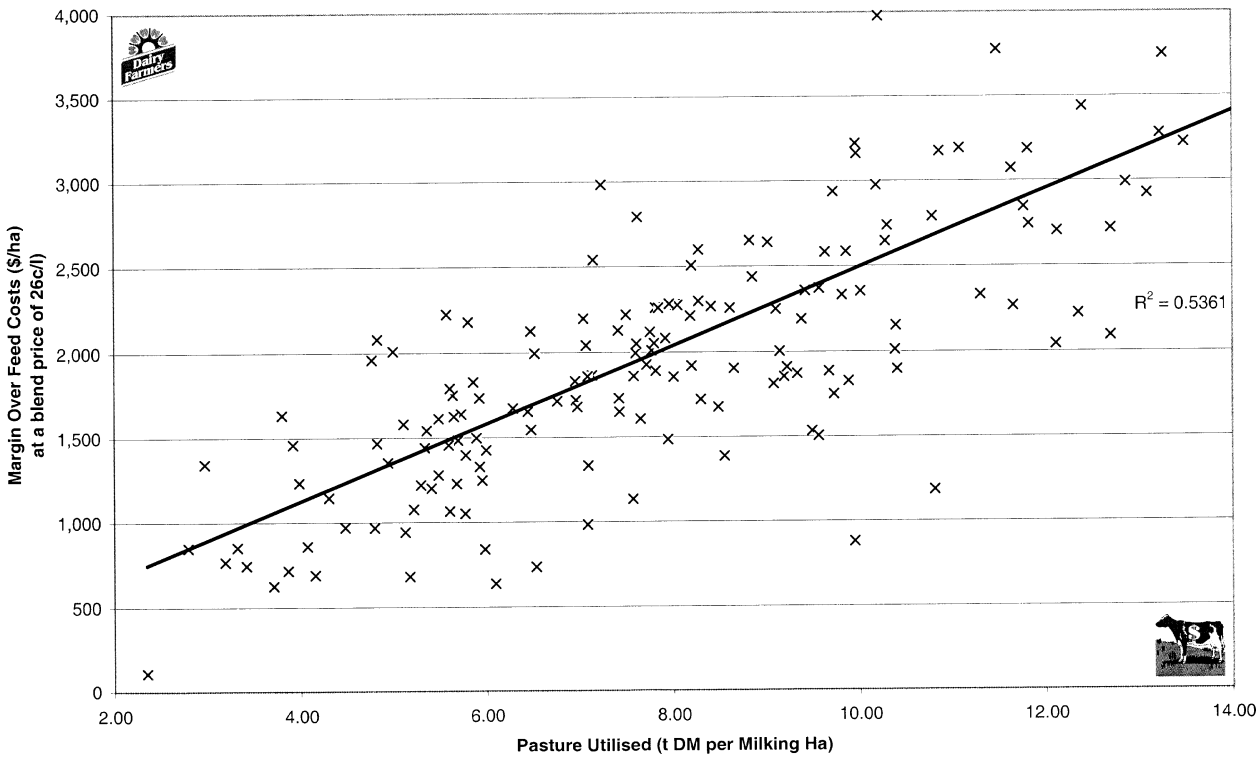
Benchmarking programs (eg., Dairy Best Business) demonstrate the importance that should be placed on feed management in terms of farm productivity and farm returns. Graphs 1 and 2 demonstrate the relationship between margin over feed costs and production per milking hectare on NSW farms. The effect of differing quotas has been removed by using a single milk price of 26c/L.

The following graphs show that there is a large variation between individual farm performances, which would be due to numerous management factors. To make use of comparative analysis information it is important to investigate these management factors to determine why some farms' returns are better than others.

However it is important to remember that gross margins (including margins over feed costs) provide only a partial picture of the farm business and do not account for fixed costs on farms which are a major factor in overall farm profitability.

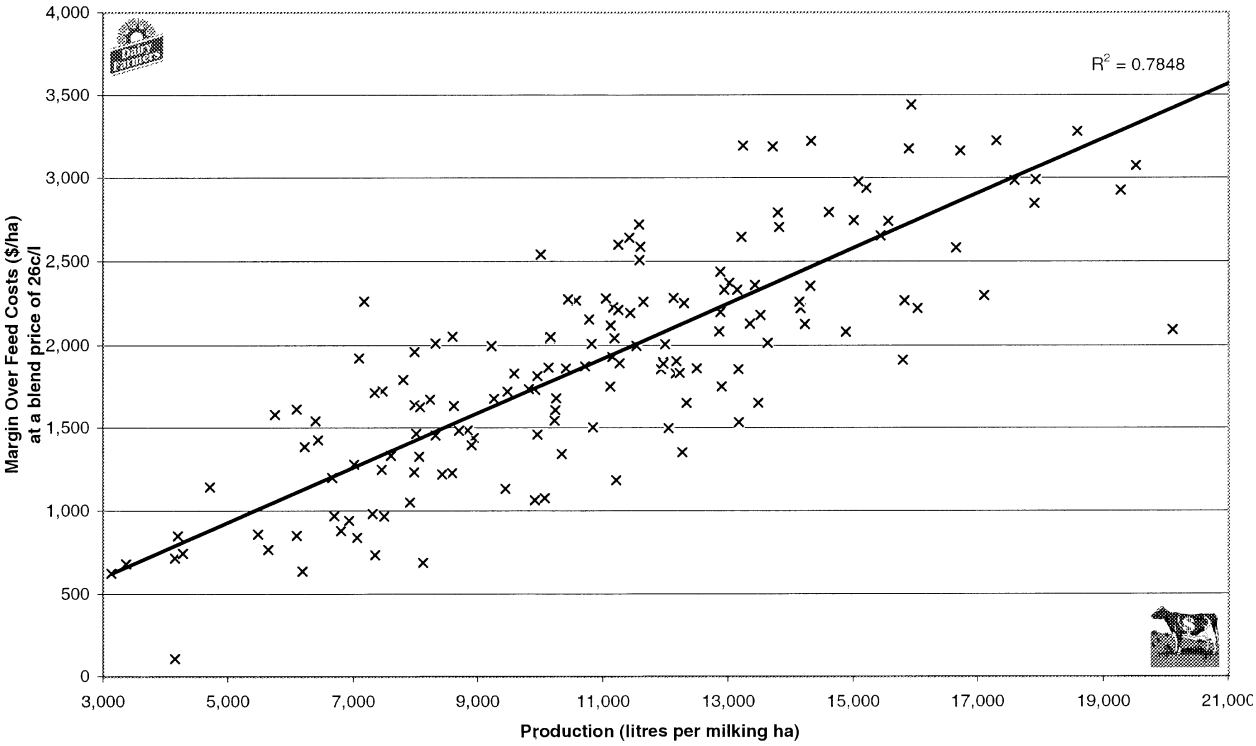
Graph 1 shows that increasing pasture utilisation (t Dm per milking hectare) is associated with an increase in Margin over Feed Costs on a per hectare basis. From this data an increase in pasture utilisation from 6 to 8 tonnes DM per ha (33% increase) is associated with an increase in Margin over Feed Costs from $1600/ha to $2050/ha (28% increase). Factors such as stocking rate, fertiliser, irrigation and the management of pasture substitution with supplements would all influence this result.

Graph 1: *Increasing dairy margins are achieved with increasing levels of pasture utilisation per hectare.*



In Graph 2 Margin Over Feed Costs ($/ha) improve with increasing milk production per hectare. This may be due to increasing pasture production and utilisation as well as other factors such as stocking rate and well managed use of supplements.

Graph 2: *Higher margins are associated with higher levels of milk production produced per hectare.*



"Making a difference"

Feed related costs have a major influence on farm profitability

Feed related costs are the biggest and most important variable cost (typically 60% to 70% of total variable costs).

High levels of pasture utilisation and production per ha can increase the margin over feed costs and decreases unit costs of production.

Maximising paddock feed is a most important way to produce low cost milk

Despite the use of supplements low cost farms produce the greatest proportion of milk from pastures.

Most profitable farms produce more milk from pasture and optimise the use of supplements.

There is a need to control the use of supplements to make the best use of the cheapest feed–pasture.

High production per cow or per hectare

Increasing the feed costs/cow does not necessarily increase the unit costs of milk production (c/L) with cows that are predominantly fed pastures and strategically fed supplements.

High margins are achieved through a combination of high production per cow and high stocking rates.

Optimising farm production will increase margins over feed costs

By increasing the production and utilisation of pastures more milk production dilutes the costs of production, ie, reduces the unit costs of production (c/L), particularly fixed costs.

Low cost farms have a combination of many management factors

a) Pasture Production and Utilisation

- strategic fertiliser use and irrigation where available
- knowledge of the principles of good grazing management of temperate and tropical pastures
- good farm layout
- monitoring pasture growth and intake
- feed planning and fodder budgeting

b) Feeding supplements

- knowledge of stock requirements
- balancing pasture shortfalls with the appropriate supplements
- balancing rations on a seasonal basis
- purchasing feed on a unit cost basis

PLANNING CHANGE (FORM 3A)

Profitable Pasture Systems

Using your knowledge and key performance indicators please consider the following questions:

- What are your strengths in farm management?

- What are your farm management opportunities?

- What do you need to change?

- What do you need to change first?

- How will you make the changes?

- What will you achieve by changing?

PLANNING CHANGE (FORM 3B)

Profitable Pasture Systems

(Performance Checks)

Key Management Area (KMA)	Your farm	Action		Things to consider
		OK (✓)	Check (?)	
Cost Effective Technology Unit cost of Metabolisable Energy Unit cost of Protein Grain:Feed cost ratio (>1.5:1) Grain:Milk ratio				See Section 1 & 2
Pasture Production Pasture utilisation (>10t DM/ha from pasture – kikuyu and/or irrigated ryegrass) Milk from pasture				See Section 1 & 2
Profitable Systems • Knowledge of production costs • Farm analysis skills • Monitoring system				Stage 1 Farm audit Stage 2 Farm analysis Technology options Sources of finance Business plans
Possible opportunities to improve profit:				

PLANNING CHANGE
(FORM 3C)

Farm Management – Profitable Pastures

a) List the opportunities to improve pasture production and consumption on your farm.

Key management areas (KMA)		
Cost Effective Technology	**Productivity and Profitability**	**Partial budgets for different scenarios**
1.		
2.		
3.		
4.		

b) Now you consider ways to improve profits from feeding supplements using the following steps:

1. Identify what things you will need to change
2. What steps are necessary to make these changes?
3. How will you know what has changed?

KMA	**1 (What)**	**2 Steps**	**3 (Change)**
Cost effective technology			
1			
2			
Productivity and profitability			
1			
2			
Partial budgets/scenarios			
1			
2			

PLANNING CHANGE (FORM 3D)

Key Farm Management Tools and Packages

PACKAGE	PURPOSE
Benchmarking programs	Various benchmarking programs exist throughout NSW. These are provided by dairy processors and private consultants. these programs benchmark physical and financial resources of the dairy farm business. They involve various levels of personal consultations with dairy advisers and group based workshops providing interpretation of the benchmarking information as it relates to the individual farm business. The major benchmarking programs include. • Bega Dairy Benchmarking • Dairy Best business • Norco - Farming for Profit
Farming for the Future (FFF)	The FFF "Planning Your Future' is a whole farm management and planning program based upon a flexible workshop series. The program is designed to assist in the development of personal business plans and to plan for a viable future. *Workshops include:* • Introduction to planning for your business • Family and employees • Business resource assessment • Physical and land resource assessment • Enterprise assessment • Enterprise options • business planning
DairyCheck Stage 1	Farm Audit Manual provides a picture of your: • Dairy enterprise • Management strengths and opportunities • Technical options and alternatives

DAIRY DO IT!

An initiative of the NSW Government and Dairy Industry

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