Farmlands
Dairy Nutrition Guide

Your complete guide to dairy nutrition.

Farmlands

Farmlands Dairy Nutrition Guide

As always here at Farmlands we want to help farmers achieve the best possible results through efficient and well planned farming practices. That is why we have developed PLAN365, a tool which promotes thinking ahead and planning on-farm throughout the 365 day cycle.

Therefore in conjunction with Inghams, Viterra/NRM and DairyNZ we have developed the Farmlands Dairy Nutrition Guide which contains a wealth of handy information.

We recommend you keep this guide on hand whenever you need it and of course take the opportunity to call into your local Farmlands branch where you can chat with one of our knowledgeable staff about the best decisions for your farm and the best products to help you get the best results.

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Introduction

As every New Zealand dairy farmer is aware, nutrition plays a vital role in the health and productivity of a dairy herd.

Over the years it has become more and more apparent that the introduction of supplements in the diet of dairy cows can vastly improve their health and subsequent milk production.

Implementing a suitable nutrition programme is a key aspect of achieving the best results from a dairy herd. Adequate nutrition will lead to an increase in milk production, and also improve the reproductive health of the cow. The age of a cow, their current stage of production, pasture nutritional value and pasture availability are all factors that affect which supplements are required, and in what quantities.

Five farm production system definitions:

As New Zealand pastoral farming is about profitably balancing feed supply and demand, five production systems have been described by DairyNZ primarily on the basis of when imported feed is fed to dry or lactating cows during the season and secondly by the amount of imported feed and/or off farm dry cow grazing. The definitions do not include grazing or feed for young stock.

System 1 - All grass self contained, all stock on the dairy platform
No feed is imported. No supplement fed to the herd except supplement harvested off the effective milking area and dry cows are not grazed off the effective milking area. This may include home grown maize silage which many would consider a supplement.

System 2 - Feed imported, either supplement or grazing-off, for dry cows
Approx 4-14% of total feed is imported. Large variation in % as in high rainfall areas and cold climates such as Southland, most of the cows are wintered off.

System 3 – Feed imported to extend lactation (typically autumn feed) and for dry cows
Approx 10-20% of total feed is imported. Feed to extend lactation may be imported in spring rather than autumn.

System 4 – Feed imported and used at both ends of lactation and for dry cows
Approx 20-30% of total feed is imported onto the farm.

System 5 – Imported feed used all year, throughout lactation and for dry cows
Approx 25-40% (but can be up to 55%) of total feed is imported.
Note: Farms feeding 1-2 kg of meal or grain per cow per day for most of the season will best fit in System 3.

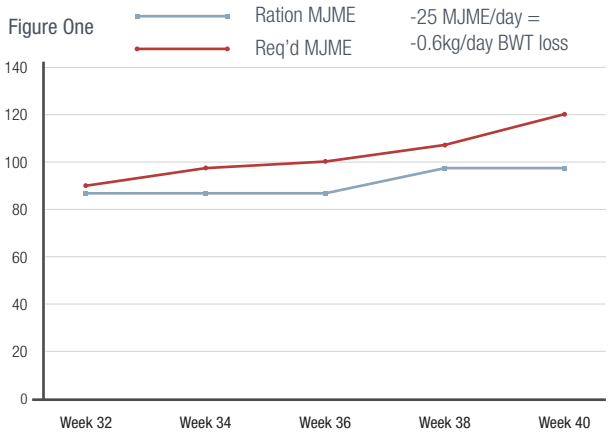
SYSTEM	2002	2006
1	41	12
2	31	32
3	77	35
4	11	17
5	1	5

Source: DairyNZ Economic Survey Data 2002-2006

As illustrated by the table above, the situation in the last ten years has seen farms move up the feeding system scale, with the majority of farmers now feeding some form of supplements to their herd. With the many options for feed on the market, what to choose can be confusing. In order to make the decision easier, knowing the requirements of the cow at a certain point in time is essential.

In the period of precalving, it is important to meet the nutrient demands of the cow in order to minimise any potential weight losses. The diagram below (Figure One) shows the cow's actual requirements for energy and the energy in a typical ration at that time. There can be a shortfall in energy of 25 MJ ME/day, leading to a live weight loss of 0.6kg/day.

Figure One



For fresh cows, (i.e. cows recently calved and still in their first flush of lactation), it is important to encourage practices that allow the rumen to adapt to a change in feed inputs. For example: If moving from a predominantly pasture based diet to one including starchy materials, farmers are encouraged to introduce the starch gradually to allow the rumen bug population to change. Starch is important in the diet. The volatile fatty acid (VFA) from starch is called propionate, a glucose precursor that leads to more protein in the milk. Pay careful attention to balancing macro mineral requirements – in particular; calcium, phosphorus, magnesium and sodium. Always maximise dry matter intake (DMI), make every effort to bring peak production as far forward in the lactation as is physically possible, and do not let fresh cows go hungry.

To meet peak production requirements, farmers need to pursue optimal NDF concentration (neutral detergent fibre). This is achieved through maximum dry matter intake and nutrient density.

System 4 and 5 farmers should observe cow behaviour and dung consistency, and use rumen buffers in the diet before encountering issues with sub acute ruminal acidosis (SARA). SARA occurs when the pH drops to <5.9 in the rumen. The environment is then not ideal for fibre digesting bacteria, therefore the amount of digestion of fibrous material reduces. By consequence, dry matter intake drops and feed conversion efficiency is lowered.

Body condition scoring in New Zealand

Dairy farmers can also use visual means to assess the nutritional health of their herd.

Assessment of a cow's body condition score (BCS) gives a visual estimate of her body fat reserves. This in turn provides useful information on the outcome of her previous feed levels, her current health status, and her future feed requirements and productivity.

Assessing BCS does not need to involve all cows in the herd. A random sample of 20% of the herd is sufficient to ascertain both the average herd BCS and the proportion of cows that are too thin or too fat.

The four crucial times of the year to measure BCS are end of mating, late lactation, two weeks pre-calving, and two weeks before mating starts. These are strategic decision-making times for implementing options for managing herd condition.

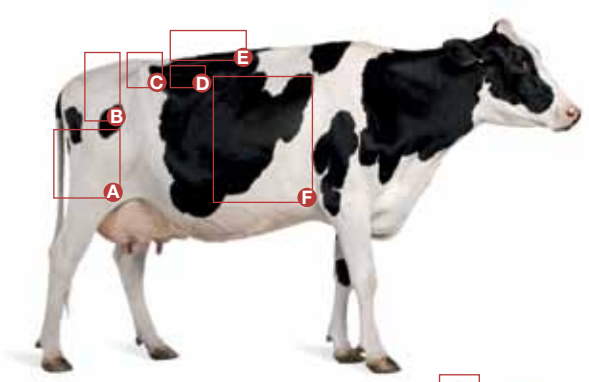
The BCS method described below provides a consistent way of assessing cow condition.

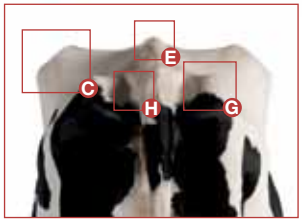
- A BCS scale of 1 to 10 is used in NZ
- If the BCS of any animal falls below 3 (on a scale of 1-10), urgent action must be taken to improve condition
- A cow with a BCS greater than 6.0 is considered obese
- 1 BCS unit change = 6.58% of cow liveweight (lwt)

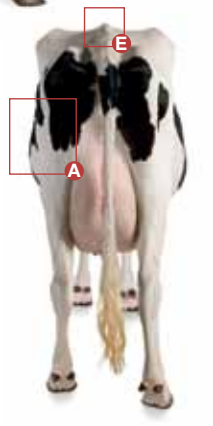
Jersey
(425 kg lwt)**:** 1 BCS unit change = 28 kg lwt
Crossbred
(475 kg lwt): 1 BCS unit change = 31 kg lwt
NZ Holstein-Friesian
(500 kg lwt): 1 BCS unit change = 33 kg lwt
Overseas Holstein-Friesian
(550 kg lwt): 1 BCS unit change = 36 kg lwt

Source: DairyNZ

Critical points for body conditioning scoring







- **A** Thigh
- **B** Rump
- **C** Hips
- **D** Short Ribs
- **E** Backbone
- **F** Long Ribs
- **G** Pins
- **H** Tailhead

	BCS	3.0	4.0	5.0	6.0
C	Hips				
D	Short Ribs				
E	Backbone Rearview & Side Profile				
F	Long Ribs				

Critical points for body conditioning scoring (cont)

	BCS	3.0	4.0	5.0	6.0
A	Thigh				
B	Rump				
G	Pins				
H	Tailhead				

Body Condition Score (BCS) is the only practical measure of the medium to long-term nutritional state of a dairy cow.

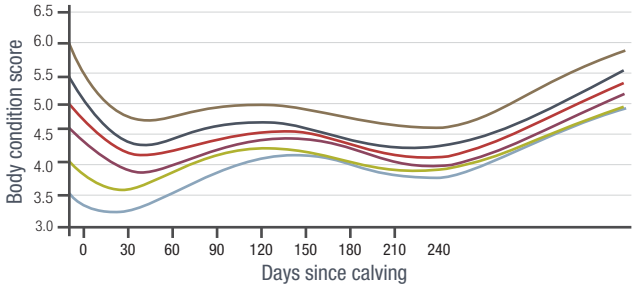
- The three targets to remember are:
  - BCS 5.0 to 5.5 at calving,
  - greater than BCS 4.0 at mating, and
  - losing no more than 1.0 BCS unit in early lactation.
- These targets result in the most milk production, healthiest cows, lowest animal health costs, and best fertility results.
- The number of cows in a herd that are too skinny, and how they are treated, is more important than the average herd BCS.
- Nutrition during early lactation has little effect on BCS. Therefore, the only way to achieve these three targets is to ensure that mature cows calve at BCS 5.0 and young cows (first and second calvers) calve at 5.5.
- Failure to monitor BCS is the first barrier to achieving these targets.

For a full guide please refer to Condition Scoring Made Easy by DairyNZ available from www.dairynz.co.nz

To prevent the fat from body condition mobilisation from having a negative impact on production of fertility hormones and ovarian activity, it is necessary to limit Body Condition Score loss and return cows to a positive energy balance as soon as possible.

During mid lactation, the cow should be provided with sufficient nutrients to keep post peak decline levels below 5% month on month. A flat lactation curve following peak production is definitely a sound goal; not a spike to peak milk followed by a rapid decline. Keeping pastures in the vegetative growth phase allows maximum dry matter intake and milk production. If pasture quality does decrease, farmers should increase the protein in supplementary feeds to encourage cows to partition energy into lactation, rather than body condition at this stage of lactation.

In late lactation, farmers are advised to employ feeding strategies that will allow them to dry off the herd in the condition they want to calve them in. Or allow a high energy /low protein total ration balance, if more than 0.5 of a BCS needs to be put on in the final two months of lactation.



Continue to supplement calcium (apart from the weeks close to calving), phosphorus and vitamin B3 to ensure bone remodelling is taking place for skeletal health now and calcium reserves at next calving. Build the immune status of the herd by supplementing quality sources of copper, cobalt, selenium, zinc, manganese and iodine. This will provide the cows with a sound health platform on which to build the next lactation.

Milk production

It has been well established that milk yield is affected by the BCS in which a cow calves, and by the amount of condition she loses after calving.

New Zealand data indicates that milk solids (MS) yield increases as calving BCS increases (Table 1). However, the increase in MS with increasing calving BCS gets smaller as the cow gets fatter. Increasing calving BCS from 3.0 to 4.0 and 4.0 to 5.0, increases MS production by 17 kg/cow and 12 kg/cow, respectively, irrespective of cow breed. In comparison, the difference between a cow calving at 5.0 or 6.0 is only 6 kg MS[1].

Cows naturally lose BCS in early lactation to support the increased milk production. A cow that loses 0.5 BCS units postcalving produces 2.2 kg MS more than cows that only lose 0.25 BCS units, and a cow that loses 1.0 BCS unit produces 2.75 kg MS more than a cow losing 0.5 BCS units. However, MS production declines if cows lose more than 1.5 BCS units[1].

To maximise milk production, cows should calve at BCS 5.0 for mixed aged cows, BCS 5.5 for first and second calvers and not lose more than 1.5 BCS units post-calving.[1]

Table 1: The effect of calving BCS on the marginal increase in MS production over a full lactation. [1]

	3.0 to 3.5	3.5 to 4.0	4.0 to 4.5	4.5 to 5.0	5.0 to 5.5	5.5 to 6.0
Increase in milk fat (kg)	5.2	4.5	3.7	2.9	2.2	1.4
Increase in milk protein (kg)	4.0	3.4	2.8	2.2	1.7	1.1
Increase in MS (kg)	9.2	7.9	6.5	5.2	3.8	2.5
Value ($)* - $5/kg MS	46.18	39.46	32.73	26.00	19.27	12.55
Value ($)* - $6/kg MS	55.42	47.35	39.27	31.20	23.13	15.05
Value ($)* - $7/kg MS	64.66	55.24	45.82	36.40	26.98	17.56

*assumes $/kg protein = $/kg fat

[1] Source: DairyNZ

Reproduction

New Zealand data indicates that cows calving at BCS 4.0 compared with BCS 5.0 are 7% less likely to be cycling at the PSM[1].

Cows that have not started cycling by the PSM have a 16% lower 6-week in-calf rate, and a 6% greater empty rate[1]. Anoestrous treatment of non-cyclers will advance the timing of pregnancy, but will not necessarily improve the 6-week in-calf rate and final empty rate[1]. Non-cyclers are, therefore, a 'subfertile' group and BCS at calving is a significant risk factor for non-cycling. Thin cows at calving do not lose as much body condition as fatter cows, but still tend to be thinner at PSM (e.g. cows calving at BCS 4.0 tend to be BCS 3.5 at PSM, while cows calving at 5.0[1] tend to be BCS 4.0 at PSM). Because of this, cows calving at BCS 4.0 will have a 2-4% lower 6-week in-calf rate and a 1-2% greater empty rate than if those cows had calved at 5.0[1].

Cows with BCS 5.0-5.5 at calving and BCS 4.0-4.5 at mating are more likely to get pregnant than cows outside these targets. Therefore, calving at BCS 5.0-5.5 and ensuring that cows lose no more than 1.0 BCS unit post-calving will maximise their chances of getting pregnant[1].

[1] Source: DairyNZ

Cow health

Calving BCS and the amount of weight a cow loses between calving and PSM will likely influence cow health. Recent data from DairyNZ imply that thin cows in early lactation (BCS 3.5 or less) are more likely to have a uterine infection six weeks after calving. These findings are consistent with previous research in Israel[1]. In addition, first and second calvers have an increased risk of mastitis in early lactation when thin at calving[1].

Very fat cows (>BCS 6) at calving are at risk of milk fever, ketosis, difficult calvings and, as a result, still-born calves[1]. In New Zealand, however, these problems are not normally a result of excessive BCS[1].

Thinner cows in early lactation are more likely to have a uterine infection, while fatter cows are more likely to have a metabolic disorder at calving. A calving BCS of 5.0-5.5 ensures cows are as healthy as possible in early lactation[1].

Sex ratio of calves

A recent discovery at DairyNZ is that the fatter a cow is at calving (i.e. BCS 5.0 vs 4.0) then the more likely she is to have a heifer calf the following year. Most people believe that there is a 50:50 chance of a cow giving birth to a bull or a heifer. However, birth sex ratio is normally skewed slightly towards bulls (52% of calves are bulls). These data, therefore, highlight that herds calving at BCS 4.0 will have 4% fewer replacement heifers than cows that calve at 5.0[1].

A cow that calves at BCS 5.0-5.5 is more likely to have a heifer calf the following year than one that calves too thin[1].

[1] Source: DairyNZ

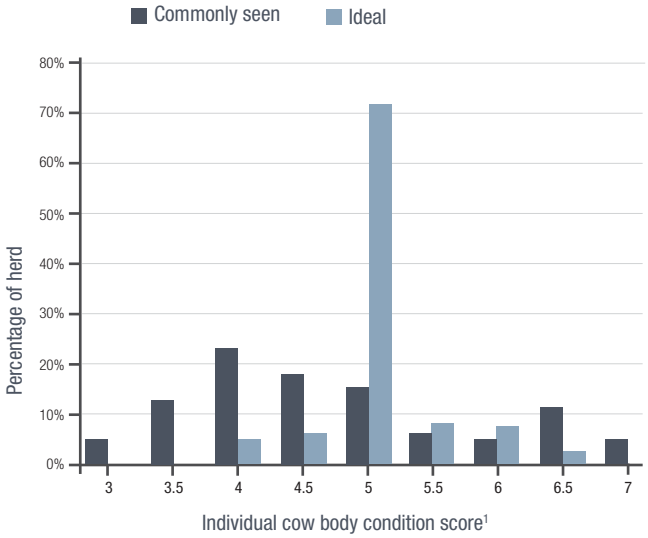
Body condition score targets

All these results point to a target BCS of 5.0 at calving for mature cows (5.5 for first and second calvers), 4.0 at PSM, and a BCS loss of no more than 1.0 BCS unit after calving. These targets result in cows producing the most milk, being most healthy, cycling as early as possible, and having the greatest chance of getting in calf early in the breeding season[1].

The level of feeding or type of feed that cows receive in early lactation has been demonstrated to have very little effect on BCS 9. Therefore, the most effective way to achieve all these targets is by calving cows at BCS 5.0-5.5[1].

Most cows that calve at BCS 5.0-5.5 will not lose more than 1.0 BCS unit after calving and will be greater than BCS 4.0 at mating. Cows that lose more than 1.0 BCS unit after calving will produce more milk when offered supplement, and will not partition supplementary feed towards BCS replenishment[1].

Table 1: Commonly seen vs. ideal BCS variation within herd at July



[1] Source: DairyNZ

Nutrition

General nutrition

Energy and protein

Energy is the key driver of milk production. In practice high protein pastures meet the protein requirements for high milksolids production. The table below shows when protein may limit production for cows fed high quality pasture.

Nutrients first – limiting milk production on high quality pasture diets[1].

kg milk/cow/day	Approx.kg MS/cow	Nutrient first limiting milk production
20	1.6	Energy (protein in pasture >18%)
25	2.0	Energy (protein in pasture > 24%)
30	2.4	Energy and protein
35	2.8	Protein

Fibre

Fibre is the primary source of energy for grazing animals, but is also required to stimulate chewing and saliva production.

Neutral Detergent Fibre (NDF) is the most common measure of fibre used for animal feed analysis. It measures more than 90% of the structural components in plant cells (i.e. lignin, hemicellulose and cellulose).

For cows grazing only high quality pasture the minimum NDF requirements are 28-32%[1].

In diets containing large amounts of finely ground grain and by-products or precision chopped silages, recommended fibre levels have been further refined to include the term "effective fibre"(eNDF). This term is used to describe the fibre that is most effective at promoting chewing. For example, the fibre in fresh pasture or silage (pasture, cereal or maize) is very effective and the fibre in cereal grains is 0% effective in promoting chewing. However, currently there is no accurate way to measure eNDF of long forages (fresh pasture, or grass or cereal silage), hence eNDF figures have not been included in the feed table.

[1] Source: DairyNZ

Nutritional guidelines for all pasture, pasture + supplement, and total mixed ration (TMR) diets[1].

Protein Good quality all-pasture diets		**Protein content of diet required % DM**
kg milk/cow/day	**kg MS/cow/day**	
20	1.6	18
30	2.4	24
Pasture + supplement, TMR		
kg milk/cow/day	**kg MS/cow/day**	
20	1.6	16 (65% degradable, 35% bypass, 32% soluble)
30	2.4	18 (65% degradable, 35% bypass, 32% soluble)
As a general rule for all diets		
Early lactation		18
Mid lactation		16
Late lactation		14
Dry cow		12
Fibre		**(% Diet DM)**
As a general rule for all diets		
Minimum NDF		35
Minimum effective fibre (eNDF)		17
Pasture + supplement, TMR		
Minimum NDF		27-33
Minimum effective fibre (eNDF)		20
Minimum ADF		19-21
Soluble carbohydrate		**(% Diet DM)**
Pasture + supplement, TMR		
Maximum total soluble carbohydrate		38
Maximum starch		30
Fat		**(% Diet DM)**
Pasture + supplement, TMR		
Maximum additional unprotected fat		3
Maximum additional protected fat		3
Macro minerals		**(% Diet DM) Mineral content of diet requirement (%DM)**
All diets for hight production (2kg MS/cow/day)		
Calcium		0.6 - 0.8
Phosphorus		0.3 - 0.35
Magnesium		0.22 - 0.28
Potassium		1.0+
Sulphur		0.23
Sodium		0.20
Chlorine		0.25

[1] Source: DairyNZ

Feed choices

Nutrition Key:

P	Crude Protein	**SS**	Soluble Sugars
F	Fat	**S**	Starch
NDF	Fibre	**ME**	Metabolisable Energy

NB: All nutritional values are 'typical analysis' and dry matter basis. All ME values are estimated.

Compound feeds

TOPCOW Maxum

Topcow Maxum is high energy – high starch, low protein designed to provide what the high producing cow requires during lactation, particularly in the early to mid stages. Formulated to help cows gain more from high protein, low dry matter pastures and supplements. No Palm Kernel is used in this product.

Pelleted to minimise salmonella risk, increase digestibility, and avoid wastage through spilling. High dry matter levels, providing concentrated nutrients (i.e. 1 kg of pellets compares to 3-4kg of silage products). Balanced energy that comes from more than one source providing short, medium and long term breakdown of nutrients in the rumen.

P = 12% **F** = 6%
NDF = 19.5% **ME** = 13.8mJ/kg

TOPCOW Dairy

A high energy, low protein pellet to supply concentrated energy to cows throughout lactation. Formulated to maintain BCS and enhance milk response post calving in dairy cows. Includes Magnesium Oxide at 15kg/tonne. Balanced ration includes Palm kernel (maximum 20%) as well as energy and protein provided from grains and protein meals.

Formulated to help cows gain more from high protein, low dry matter pastures and supplements. Pelleted to minimise salmonella risk, increase digestibility, and avoid wastage through spilling. High dry matter levels, providing concentrated nutrients (i.e. 1 kg of pellets compares to 3-4kg of silage products). Balanced energy that comes from more than one source providing short, medium and long term breakdown of nutrients in the rumen.

P = 12% **F** = 5.8%
NDF = 23% **ME** = 12.9mJ/kg

TOPCOW Seasonal

A budget feed designed for periods of seasonal feed shortages. Balanced rations that include Palm Kernel (maximum 30%) as well as energy and protein provided from grains.

Reformulated through the season to reflect the current conditions. Pelleted to minimise salmonella risk, increase digestibility, and avoid wastage through spilling, also available as a blend. High dry matter levels, providing concentrated nutrients (i.e. 1 kg of pellets compares to 3-4kg of silage). Balanced energy that comes from more than one source providing short, medium and long term breakdown of nutrients in the rumen.

P = 12% **F** = 5.8%
NDF = 23% **ME** = 12.9mJ/kg

Lely Inghams FEEDS & NUTRITION

TOPCOW Boost

High protein compound for dairy cows with diets lacking in protein or high in maize silage.

Pelleted to minimise salmonella risk, increase digestibility, and avoid wastage through spilling, also available as a blend. Balanced protein and energy that comes from more than one source providing short, medium and long term breakdown of nutrients in the rumen.

P = 12% **F** = 5.5%
NDF = 33% **ME** = 12mJ/kg

Lely Inghams FEEDS & NUTRITION

NRM Elite Dairy Pellets

Elite Dairy Pellets have a high grain inclusion and hence high starch levels making the diet most suitable to complement pastures high in protein. This provides fuel for the rumen microbes to produce microbial protein, driving milk yeild and milk protein content. Fat content of the diet contains 2% bypass fat.

The pellets are designed to be fed at 3kg/cow/day through an in shed feeding system. Bovatec, Magnesium Oxide and/or Zinc Oxide can be added. Molasses and dairy flavour give a palatable feed.

P = 11.5% **F** = 5%
NDF = 20% **S** = 45%
ME = 12.5mJ/kg

NRM

NRM Premium Dairy Pellets

Premium Dairy Pellets have a moderate starch level and as with all NRM dairy pellets, the inclusion of multiple starch sources differing in rumen degradation rates provide a consistent fermentation pattern and energy supply over time. Fat content of the diet includes 1% bypass fat. The molasses and dairy flavour give a palatable feed. The pellets are designed to be fed at 3kg/cow/day through an in shed feeding system. Bovatec, Magnesium Oxide and/or Zinc Oxide can be added.

P = 12.5% **F** = 6%
NDF = 35% **S** = 30%
ME = 12.5mJ/kg

NRM

NRM Standard Dairy Pellets

Standard Dairy Pellets are an economical option to improve DMI with a concentrated, nutrient dense feed source. The pellets are a useful addition in times of feed shortage to provide a balanced input of energy and other nutrients.

The pellets are designed be fed at 3kg/cow/day through an in shed feeding system. Bovatec, Magnesium Oxide and/or Zinc Oxide can be added. Molasses and dairy flavour give a palatable feed.

P = 15% **F** = 6%
NDF = 45% **S** = 18%
ME = 12.5mJ/kg

Case Study - Supplementary Feed

Traditionally we had relied on pasture and prior to starting supplementary feeding we were producing 106,000 kg MS peak milk at 1.75 MS/cow/day.

Since the introduction of supporting our pasture with a balanced programme of supplementary feed, this year we expect to produce 157,000 MS. Even with the smaller cows we have experienced a peak milk return of over 2.1 MS/cow/day.

This equates to 460 kg MS/cow/year which is over 1 kg MS/kg liveweight. Cow condition prior to commencing feeding was 4.2, now our girls are even healthier and performing better at their current condition score of 4.5. Literally this means more fat on their back and milk in the vat.

Mark Coppard
Okoroire

Blends

NRM Basic Dairy Blend

The NRM Basic Dairy Blend is made from a highly palatable composition through inclusion of molasses and dairy flavour. The blend is a useful addition in times of feed shortage to promote a balanced input of energy and other nutrients.

The Basic Dairy Blend diet is either mash blend or pellet/grain/palm kernel blend, depending on site of production. The blend is designed to be fed at 4kg/cow/day. Bovatec, Magnesium Oxide and/or Zinc Oxide can be added.

P = 14.5% **NDF** = 45%
S = 14% **ME** = 12.5mJ/kg
F = 7.2%

NRM Peak Dairy Blend

The NRM Peak Dairy Blend is made from a highly palatable composition through inclusion of molasses and dairy flavour.

Fat content of the diet includes 1% bypass fat. This blend includes a production module which improves dairy cows' ability to metabolise protein efficiently. The end result is an increased supply of metabolisable protein with an energy sparing effect. Bovatec, Magnesium Oxide and/or Zinc Oxide can be added.

P = 14% **NDF** = 42%
S = 18% **F** = 7%
ME = 12.5mJ/kg

NRM Prestige Dairy Blend

The Prestige Dairy Blend is a higher starch diet, containing 1.5% bypass fat, made from a highly palatable composition through inclusion of molasses and dairy flavour.

This blend includes a production module which improves the cow's ability to metabolise protein efficiently. The end result is an increased supply of metabolisable protein with an energy sparing effect. The blend is designed to be fed at 4kg/cow/day. Bovatec, Magnesium Oxide and/or Zinc Oxide can be added.

P = 12% **NDF** = 31%
S = 30% **F** = 7%
ME = 12.5mJ/kg

Source Pro Max Meal

Source Pro Max is a high quality protein meal designed to promote peak production, particularly beneficial when feeding in conjunction with maize silage. Minerals with Bovatec or Rumensin or Hi 5 Trace minerals can be added.

P = 21% **DM** = 88%
ME = 11.8mJ/kg

Source Fertility Max Meal

Source Fertility Max is a high energy meal containing a range of energy sources, specifically designed to assist fertility performance during mating. Contains Megalac protected fat to satisfy the energy demands of high yielding cows. Ideally should be fed for three weeks prior to and throughout mating.

Minerals with Bovatec or Rumensin or Hi 5 Trace minerals can be added.

P = 13.7% **DM** = 86%
ME = 13.9mJ/kg

Source Milk Max Meal

Source Milk Max is a blend of starch, oil and protein, designed to match spring pasture conditions and obtain an optimal start to early lactation. Minerals with Bovatec or Rumensin or Hi 5 Trace minerals can be added.

P = 14.3% **DM** = 85.1%
ME = 12.1mJ/kg

Raw Materials

Canola Meal

Canola works well in diets low in rumen degradable protein, eg. in diets with over 40% of the diet in low protein feeds as maize silage, stalky grass silage or grain. It is relatively high in the amino acids histidine, threonine and the sulphur-containing amino acids methionine and cystein, which makes it a good combination with other protein sources like soya bean meal. Canola meal can be fed mixed with silage in the paddock or on the feed pad. It can also be fed via the grain feeding system in the dairy shed, by itself or mixed with other ingredients.

P = 36.5% **F** = 10.5%
NDF = 24% **DM** = 93%
ME = 10.9mJ/kg

Available as part of a blend from

Cottonseed Meal

Cottonseed Meal is a higher protein supplement, recommended for summer feeding when protein levels in pasture start to drop off. The meal is obtained from the extraction and grinding of cotton seed. Requirements will differ depending on your situation at the time, consult your nutritionist.

P = 43% **F** = 2%
NDF = 23.7% **DM** = 88%
ME = 12mJ/kg

Palm Kernel Meal

Palm Kernel Meal is a simple, safe feed, suitable for feeding dairy cows in times of feed shortage. Moderately fast fermentable NDF, moderate protein and very low starch levels make it ideally suitable to be fed in conjunction with high starch low protein supplements like maize silage or grains. Normal feed out rates are 2-3 kg DM, higher rates up to 6kg DM are possible in case of serious feed shortage.

P = 17% **F** =8%
NDF = 65% **DM** = 90%
ME = 11.5mJ/kg

Soya Bean Meal

Soya beans are a high protein legume and are the most commonly used protein supplement in daily diets throughout the world. Soya Bean Meal is palatable, nutrient dense, high in digestibility, and consistent protein source. It is used to balance out low protein pasture and/or supplements. Soya Bean Meal can be mixed with silage in the paddock or on the feed pad. It can also be fed via the grain feeding system in the dairy shed.

P = 47% **F** = 1.6%
NDF = 12.3% **DM** = 89%
ME = 12.7mJ/kg

Available as part of a blend from

Sunflower Meal

Sunflower Meal is derived from sunflower seeds through solvent extraction and grinding of non dehulled sunflower seeds. It is best suited to ruminant rations within which it can help reduce acidosis by its fibre contribution. Sunflower Meal is rich in sulphur containing amino acids and phosphorus, and has good protein levels, but lower lysine content than soya.

P = 28% **NDF** = 41.1%
S = 1.7% **DM** = 88%
ME = 10.3mJ/kg

Tapioca Pellets

Tapioca Pellets are starch rich, providing fast fermentable rumen available energy. The starches provide fuel for propionate producing bacteria driving milk yield (in particular protein yield), cow condition, and reproductive performance. Because it is a starch-rich feed, tapioca is used as a substitute for cereals in practically all livestock rations.

Tapioca pellets are best fed in conjunction with moderate and slow fermentable carbohydrates to prevent acidosis issues and to provide consistent ruminal fermentation over time.

Viterra offer Tapioca Pellets blended with PKM with the flexibility of changing your straight PKM contract to a PKM/ Tapioca Blend

SourceNZ offer Tapioca Pellets blended with multiple raw materials and additives to meet your herds nutritional requirements.

P = 2.2% **F** = 0.5%
NDF = 11.1% **S** = 65%
ME = 13mJ/kg **DM** = 87.3%

Available as part of a blend from

Condensed Distillers Syrup

Condensed Distillers Syrup is extremely high in carbohydrates and has a pleasant fermented odour and acidic taste are desirable to ruminants, although some herds may need a little encouragement initially, as is the case with most feed changes. It is an extremely price effective form of energy and protein that has been known to deliver an excellent production response. This product blends readily with other liquid feed products such as molasses. It is suitable for feeding in-shed, in troughs at the exit race or in TMR's.

P = 18% **F** = 7%
NDF = <1% **S** = 62%
DM = 42% **ME** = 15mJ/kg

Cows need feed! OSP

Dried Distiller Grains with Solubles

Dried Distiller Grains with Solubles is an excellent source of digestible protein and energy for cattle that is rich in cereal and residual yeast protein, minerals and vitamins. It can be mixed with silage and other feeds in the paddock or on a feed pad. Due to its free flowing nature, it is able to be fed via a grain feeding system in the dairy shed. Being highly palatable, DDG-S are best fed in an environment where intakes can be controlled.

P = 29% **F** = 5%
NDF = 33% **DM** = 92%
ME = 12.7mJ/kg

Available as part of a blend from

Wheat Bran Pellets

Wheat Bran Pellets are a source of starch and sugars for ruminant animals, the carbohydrates that are needed in the push for production gains. The starch in Wheat Bran Pellets is converted to propionic acid in the rumen (a volatile fatty acid) which supplies the rumen with energy and acts to promote fat reposition (fattening).

Wheat Bran Pellets are best fed in conjunction with a source of by-pass protein to provide additional energy required for growth and lactation.

P = 17% **F** = 5%
NDF = 35% **S** = 20%
DM = 89% **ME** = 14.4mJ/kg

Available as part of a blend from

Molasses Regular

Agri-Feeds Molasses is derived from Australian cane sugar production. Blackstrap molasses is standardised to Feedgrade molasses maintaining a minimum 79.5° Brix. Rumensin, Magnesium Chloride, Calcium Chloride and/or Zinc Oxide can be added to your Molasses. It's nutritional benefits include;

- Increases appetite to improve milk solid production
- Improves palatability of other feeds including minerals
- Improves reproduction performance by increasing energy levels pre-mating
- Maximises rumen function by increasing microbial population
- Helps maintain body condition by increasing appetite and feed intakes
- Improves in-shed cow movement

P = 8% **SS** = 64%
DM = 74.5%
ME = 12.5mJ/kg

Available as part of a blend from

Molasses Lite Plus

Molasses Lite Plus is a blend of Molasses Regular plus condensed molasses soluble. Rumensin, Magnesium Chloride, Calcium Chloride and/or Zinc Oxide can be added to your Molasses. It's nutritional benefits include;

- Improves the utilisation of high quality, low protein feeds and poor quality, low protein feeds
- Provides moderate levels of sugars that are quickly and extensively fermented in the rumen
- Delivers supplementary non-protein nitrogen (NPN) and sodium
- Provide a synchronized delivery of NPN and fermentable energy

P = 16% **SS** = 64%
DM = 63%
ME = 11mJ/kg

Wheat Pellets

Highly digestible, high in starch, low in fibre. Wheat Pellets, in which whole wheat has been processed, requires caution when fed to ruminants as wheat can cause acute indigestion in animals that are unadapted to it, as such it is recommended that wheat pellets are gradually introduced to the diet.

P (crude) = 13% **DM** = 88.5%
ME = 13.5mJ/kg **S** = 61% **F** = 2.6%

Barley

Barley is high in energy - therefore a benefit for ruminants. It promotes fast growth and supports milk proteins. Barley contains more crude protein levels than corn. When used as an enhancer, lower levels of supplemental protein are required. Careful attention to processing is important to minimise problems associated with acidosis and bloat. Barley is a cost effective substitute for corn.

P = 11% **NDF** = 23%
DM = 9% **ME** = 12.5mJ/kg

Broll

Broll is a coarse product obtained whilst milling wheat flour and is a mixture of bran and pollard. It is a valuable feed for ruminants as a source of slowly degradable carbohydrate. This is a "rumen friendly" product (does not rapidly lower the rumen acidity), which provides the rumen bugs with a source of energy required for them to process the protein from grass and other forages into forms of protein which are useable by the cow for milk production and growth. Broll is a very useful tool for reducing the post peak decline in milk production levels through the summer.

P = 11% **F** = 5% **NDF** = 11.5%
DM = 85% **ME** = 9.5mJ/kg

Additives

Megalac

Megalac is a rumen-protected fat, combining natural plant oil (palm fatty acids) with calcium. The calcium protects the fatty acids, preventing them from breaking down in the rumen and enabling them to pass intact to the acidic (pH 2.5) lower gut for digestion. The combination of rumen protection, high digestibility in the lower gut and high efficiency of energy use explain Megalac's high Net Energy of Lactation (NEL) value. Rumen protection also allows higher levels of energy to be fed without disrupting the rumen, whilst reducing the risk of acidosis. Trial work on farms and at universities and research centres over the last twenty-five years has proven Megalac to increase milk yield, with 18 studies showing an average increase of 2.3 litres per cow per day.

F = 84% **DM** = 95%
ME = 33.25mJ/kg

Available as part of a blend from

Mineral Boost

MineralBoost is a compound granule made up of the minerals calcium, magnesium and sodium chloride. It is designed to be added to animal's diets to overcome mineral deficiencies and therefore maximise production and/or live weight gain while also safe guarding against metabolic disorders such as milk fever. As well as the macro minerals contained within each MineralBoost granule a full product range is available which can include, zinc, Rumensin®, and trace elements in the form of Bioplex** High Five.

Available as part of a blend from

Available mixed with your PKE from

Cow feed requirements

The feed requirement figures are 'eaten' feed demand plus 6% to allow for feed wastage observed under good feeding conditions of pasture in farmlet trials i.e. feed offered. Where feed (pasture or supplement) wastage rates are greater than those stated, feed requirements need to be increased.

Dairy cow annual dry matter requirements

Annual requirements tonnes DM/cow/year at 11.0 MJ ME/kg DM[1].

	Milksolids prodution (kg MS/cow/year)							
Breed	**kg Lwt**	**250**	**300**	**350**	**400**	**450**	**500**	**550**
Jersey	**350**	3.7	4.0	4.4	4.7	5.1		
Jersey	**400**	3.9	4.2	4.6	5.0	5.3	5.7	
J x F	**450**	4.2	4.5	4.9	5.3	5.6	6.0	6.4
Friesian	**500**	4.4	4.8	5.2	5.5	5.9	6.3	6.7
Friesian	**550**		5.0	5.4	5.8	6.1	6.5	6.9

The annual requirements include walking 4 km/day on the flat for 270 days in milk per cow.

Note:

These requirements are greater than the figures used in DairyBase, as DairyBase calculates feed eaten which does not allow for wastage.

- DM requirement with increasing feed quality: subtract 14% per MJ ME above 11.0 MJ ME/kg DM
- DM requirement with decreasing feed quality: add 14% per MJ ME below 11.0 MJ ME/kg DM.

[1] Source: DairyNZ

Lactating cow requirements

Daily energy requirements of lactating cows (MJ ME)[1]

The requirements are calculated for pasture at 11.0 MJ ME/kg DM. For different pasture quality make the following adjustments to calculate ME requirements:

- ME requirements with increasing feed quality: subtract 4% per MJ ME above 11.0 MJ ME/kg DM
- ME requirements with decreasing feed quality: add 4% per MJ ME below 11.0 MJ ME/kg DM.

Maintenance MJ ME/day

Lwt (kg)						
300	**350**	**400**	**450**	**500**	**550**	**600**
40	45	50	54	59	63	68

Milksolids MJ ME/kg MS

Breed			
MJ ME/kg DM	**Jersey**	**J x F**	**Friesian**
10	81	84	86
11	77	80	82
12	74	77	79

Walking MJ ME/km

Flat	Rolling	Hilly/Steep
2.0	3.0	6.0

Pregnancy MJ ME/day

Weeks before calving					
	12	**8**	**4**	**2**	**Annual total**
Jersey	11	18	32	42	2,840
J x F	12	21	37	48	3,240
Friesian	13	23	41	54	3,610

[1] Source: DairyNZ

Liveweight MJ ME/kg Lwt change (Diet ME required or saved)[1]

Dry cows		Milking cows	
Lwt gain	Lwt loss	Lwt gain	Lwt loss
72	-30	50	-37

Example 1:

Daily requirements of a 450 kg J x F cow, producing 2.0 kg MS/day and losing 0.5 kg/day Lwt at 12.0 MJ ME/kg DM	
Maintenance	54
Walking on flat (3 km x 2 MJ ME/km)	6
Milksolids (2.0 kg MS x 80 MJ)	160
Lwt loss (0.50 kg LWT x -37 MJ)	-19
Total MJ ME at 11.0 ME	201
ME requirements reduced by 4% as 12.0 ME fed = 201 x 96%	193
Total kg DM Eaten (193 ÷ 12.0 ME)	**16.1 kg DM**

(Diet ME required reduced by 19 MJ ME from loss of Lwt).

Example 2:

Daily requirements of a 450 kg J x F dry cow, 12 weeks before calving and gaining 0.5 kg/day Lwt (½ CS in 30 days) at 11.0 MJ ME/kg DM	
Maintenance	54
Pregnancy	12
Lwt gain (0.50 kg Lwt x 72 MJ)	36
Total MJ ME	102
Total kg DM Eaten (102 ÷ 11.0 ME)	**9.3 kg DM**

(Diet ME required increased by 36 MJ ME from gain of Lwt).

[1] Source: DairyNZ

Total daily dry matter requirements lactating cows (kg DM/cow/day)[1]

Daily milking cow requirements: kg DM/cow/day at 10.5 MJ ME/kg DM

kg MS/cow/day						
Breed	kg Lwt	0.8	1.0	1.2	1.4	1.6
Jersey	350	10.4	11.9	13.4	14.9	16.4
Jersey	400	10.9	12.4	13.9	15.4	16.9
J x F	450	11.6	13.1	14.7	16.3	17.8
Friesian	500	12.1	13.7	15.3	17.0	18.6
Friesian	550	12.6	14.2	15.8	17.4	19.0

(No walking or Lwt loss or Lwt gain included).

Daily milking cow requirements: kg DM/cow/day at 11.0 MJ ME/kg DM

kg MS/cow/day						
Breed	kg Lwt	1.0	1.2	1.4	1.6	1.8
Jersey	350	11.1	12.5	13.9	15.3	16.7
Jersey	400	11.5	12.9	14.3	15.7	17.2
J x F	450	12.2	13.7	15.2	16.6	18.1
Friesian	500	12.8	14.3	15.8	17.3	18.8
Friesian	550	13.3	14.8	16.3	17.8	19.3

(No walking or Lwt loss or Lwt gain included).

Daily milking cow requirements: kg DM/cow/day at 12.0 MJ ME/kg DM

kg MS/cow/day						
Breed	kg Lwt	1.4	1.6	1.8	2.0	2.2
Jersey	350	12.2	13.5	14.7	15.9	17.2
Jersey	400	12.6	13.9	15.1	16.3	17.6
J x F	450	13.3	14.6	15.9	17.2	18.5
Friesian	500	13.9	15.2	16.5	17.8	19.1
Friesian	550	14.3	15.6	16.9	18.2	19.5

(No walking or Lwt loss or Lwt gain included).

[1] Source: DairyNZ

Dry cow dry matter requirements[1]

Kg liveweight per body condition score (BCS)

kg Lwt/CS = 6.58% of cow Lwt					
Cow Lwt	**350**	**400**	**450**	**500**	**550**
kg/BCS	23	26	30	33	36

Dry cow requirements for one body condition score gain (kg DM/BCS)

		Pasture		Pasture silage		Maize silage		Grain	PKE	Molasses
		Spring	Autumn	Good	Poor	Average	High Grain			
Breed	**kg Lwt**	**MJ ME/kg DM**								
		12.0	**11.0**	**10.5**	**9.0**	**10.5**	**10.8**	**12.5**	**11.0**	**11.5**
Jersey	**350**	115	170	150	210	145	140	100	135	120
Jersey	**400**	130	200	175	240	170	160	115	155	140
J x F	**450**	145	220	195	275	190	180	130	170	155
Friesian	**500**	160	250	220	305	210	200	145	190	175
Friesian	**550**	180	275	240	340	235	220	160	210	190

Note:

Dry matter requirements have been rounded up to the nearest 5. The pasture requirements are based on good feeding conditions. For other feeds there is a small allowance of 6% for wastage. Where wastage rates are higher, the requirements need to be increased accordingly.

The above figures for BCS gain when feeding supplements are under review as of June 2010. For the latest figures refer to DairyNZ Farmfact 1-8 – Feed requirements of dry cows.

Maintenance and pregnancy requirements no body condition score gain (kg/DM/cow/day) 11.0 MJ ME/kg DM autumn pasture

		Weeks pre-calving			
Breed	**kg Lwt**	**12**	**8**	**4**	**2**
Jersey	**350**	5.0	5.7	6.8	7.7
Jersey	**400**	5.5	6.3	7.6	8.5
J x F	**450**	6.0	6.8	8.3	9.3
Friesian	**500**	6.5	7.4	9.0	10.1
Friesian	**550**	7.0	8.0	9.6	10.8

[1] Source: DairyNZ

Maintenance, pregnancy and gaining 1 body condition score in 60 days (kg DM/cow/day) 11.0 MJ ME/kg DM autumn pasture

No BCS gain in last month of pregnancy

		Weeks pre-calving			
Breed	**kg Lwt**	**12**	**8**	**4**	**2**
Jersey	**350**	7.8	8.5	9.7	7.7
Jersey	**400**	8.8	9.5	10.8	8.5
J x F	**450**	9.7	10.5	12.0	9.3
Friesian	**500**	10.7	11.5	13.1	10.1
Friesian	**550**	11.6	12.5	14.2	10.8

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