MEAT & LIVESTOCK AUSTRALIA

APPENDIX C:

LANGUAGE USED IN THE AUSTRALIAN DAIRY INDUSTRY

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Technical papers for the Australian Beef Language
'WHITE PAPER'

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KEY POINTS

- Dramatic change with deregulation has reduced farm numbers by two thirds over 30 years.
- Despite cow numbers reducing by 20% milk production has essentially remained stable with per cow productivity continuing to increase.
- Milk is supplied as a single product and then transformed prior to sale. As with beef carcases and cuts all milk components must be sold in proportion to those supplied.
- The dairy product mix is extensive and highly varied in relation to the proportion of protein, fat and other solids plus water in the products marketed.
- The ruling domestic and international prices for each product create a weighted value for raw milk components and directly influence farm gate pricing.
- The absolute and relative value of milk components will vary with the manufacturer and product mix.
- Each farmer is paid on the basis of components supplied and additional market related factors including seasonality, volume and microbiological standards.
- When coupled with herd test data individual cow values can be calculated.
- The accurate value of individual cows rather than herd average is a major driver of on-farm productivity improvement through improved genetics and management.
- This contrasts to the beef experience where the true value of individual animals is lost within an average sale price with an associated reduced ability to drive improvement.

MILK PRODUCTION

The Australian dairy industry has experienced traumatic change over the past 30 or so years in conjunction with extensive deregulation of the liquid milk market at all levels from farm production to packaging and distribution. This has effectively merged the manufacturing and liquid milk markets which had been largely state based and separate in the past and created a national milk market. While farm numbers have declined by two thirds, from 20,060 in 1983 to 6,398 in mid 2013 (Anon, 2013), those remaining have become larger with average herd size increasing from 90 cows in 1982 to 258 currently (Anon, 2013).

Total dairy cow numbers have fallen from around 2 million (1.88m in 1979/80, 2.176m in 2000/01 (Anon, 2013)) to around 1.6 million currently. The drop in cow numbers has however been offset by continual productivity gains with average per cow production rising from 2,848 litres in 1979/80 to 5,891 litres in 2011/12 (Anon, 2013). The dairy industry is the third largest Australian rural industry valued at $13 billion in the 2012/13 year, producing 9,200 million litres of milk with a farm gate return of $4 billion. Approximately 40% is used in export product with annual export sales of $2.76 billion making Australia the third largest global dairy exporter (Anon, 2013).

MILK UTILISATION

In common with beef cattle the item supplied to the processor – an animal for beef and liquid milk for dairy – comprises multiple components that are unlikely to be an ideal fit for any single desired product mix or market. The processor however must take delivery of the whole and then manage the process to dispose of all components in the pre-determined balance. In beef this equates to marketing the hide, blood, tallow, bone, offal, "sweet" cuts, other primals and trim whereas in dairy the equivalent may be seen as water, the major component and 87% of milk, and solids with protein, fat and lactose the major solids but minerals and micro nutrients also important for nutritional reasons. Essentially both are disassembly processes and the invert of conventional manufacturing.

In dairy the final products often comprise some reassembly of components with a varied number of intermediate steps and often further intermediate by-products such as whey from cheese. While traditional liquid milk manufacture is relatively simple with pasteurisation and standardising of fat, and sometimes protein content, newer products such as Physical™ require further processing capability to adjust component ratios. Large volume traditional manufactured products such as butter, milk powders and cheese have been used in combination to clear all components whereas new highly technical processes are now applied to extract valuable micro-components, somewhat equivalent to blood utilisation in the beef industry. Total utilisation of Australian milk is displayed in Table 1.

Table 1: Percentage utilisation of Australian Milk (2013) (Anon, 2013)

Cheese	33%
Skim milk powder & butter	28%
Drinking milk	27%
Whole milk powder	9%
Other	3%

This broad distribution of product categories can be further viewed in terms of their major components in Table 2 (Anon, 2012). The diversity of component makeup and relative proportion of the primary protein to fat ratio is evident.

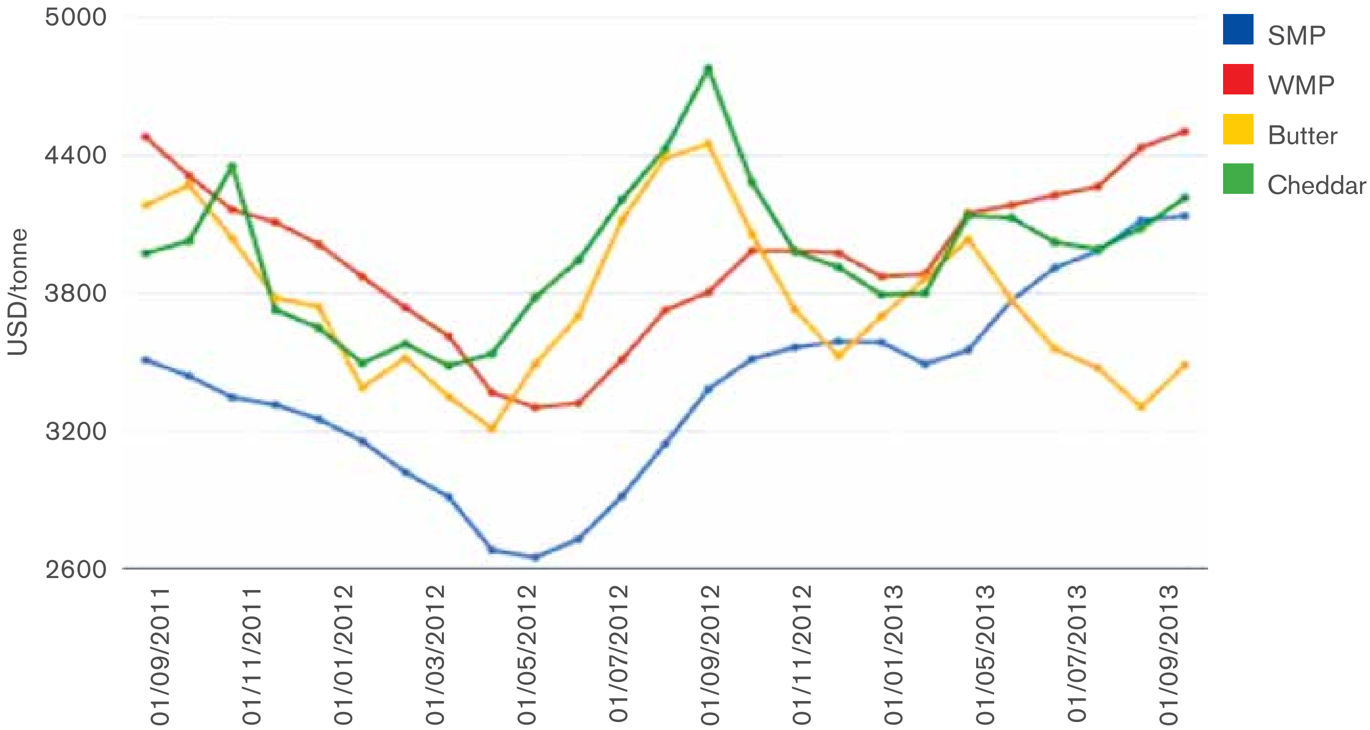
A dairy factory product mix must be tuned to align with raw milk intake by either a complementary mix of product or by trading unwanted components. It can be readily seen that a factory specialising in liquid milk will be best served by farm supply close to the base 3.5% of fat and protein whereas another factory specialising in milk powders would prefer much higher solids milk to reduce cartage and drying costs. The base balance between fat and protein has traditionally been managed by a mix of butter, to utilise fat, and skim milk powder (SMP), to utilise protein, or by production of a mix of cheese types and whey product.

Table 2: Proximate analysis (%) of selected dairy products and associated protein:fat ratios

Product	Water	Protein	Total fat	Carbohydrate	Protein/fat
Milk (regular)	90.5	3.5	3.5	6.3	1.0
Milk (low fat)	93.3	3.8	1.2	6.1	3.2
Milk (skim)	94.2	3.7	0.1	5.0	37.0
Milk (high protein & calcium)	91.6	4.2	1.6	5.6	2.6
Buttermilk	90.7	4.4	2.1	5.6	2.1
Whole milk powder	2.7	27.2	26.3	38.3	1.0
Skim milk powder	3.9	36.3	0.9	50.4	40.3
Yoghurt (natural)	84.8	6.0	4.4	5.0	1.4
Yoghurt (low fat)	86.6	6.8	0.3	6.2	22.7
Blue vein cheese	41.4	20.3	32.4	0.0	0.6
Camembert cheese	52.6	19.5	25.0	0.1	0.6
Cheddar cheese	34.0	24.6	32.8	0.5	0.8
Cream cheese	55.0	8.2	31.9	2.5	0.3
Feta cheese	52.9	17.4	22.8	0.2	0.8
Mozzarella cheese	46.8	26.0	22.5	0.7	1.2
Butter (salted)	15.5	1.1	81.5	0.0	0.013
Ghee	0.0	0.3	99.9	0.0	0.003
Cream (pure)	60.1	2.3	35.9	1.8	0.06
Icecream (Vanilla)	34.4	2.1	5.9	11.5	0.36

While traditionally the price of liquid milk was relatively stable and regulated the relative export demand and pricing of major products such as butter, SMP and cheddar cheese has been volatile leading to dramatic change over time. The following graph provides an illustration of pricing volatility within a relatively short recent period.

Figure 1: USA indicative export prices for major dairy product types (Sept 2011 to Sept 2013) (Anon, 2014)



A classic historic example of the change in relative component values was the transition from farmers selling cream to the factory and having to utilise the skim to feed pigs to a position where cream (milk fat utilised in butter) was later of very low value with the world market awash in EU butter but SMP, made from the skim, in high demand. These market changes in turn dramatically affected the true value of farm milk and prompted an associated realisation that “milk was not milk” but rather a collection of components, the value of which differed widely.

FARM MILK PRICING

Prior to 1980 Australian milk pricing mostly followed a practice of cents/litre for contracted market milk, with associated compositional and hygiene standards, and $ per kg of butterfat for manufacturing milk. Dairy farms were predominantly of one type or the other with manufacturing production concentrated in the south and highly seasonal while market milk contracts required year round production with farms located within range of State based population areas.

This pricing basis encouraged two strongly differentiated farm systems: on the market milk side an almost total dominance of high production, low milk solids, Holstein herds calving year round and requiring substantial supplementary concentrate feeding and, on the manufacturing side, predominantly entirely grass based seasonal calving herds producing higher solids milk from crossbred herds retaining some traditional Jersey or Guernsey content.

Increasing deregulation, growing interstate trade and the abolition of milk contracts, firstly in Victoria, triggered substantial changes in every facet of dairy operation as the industry readjusted to the new economic environment. A critical driver was a change in farm gate milk pricing systems which provided clear market signals to suppliers. Factories that specialised in market milk were concerned regarding year round supply and developed seasonal pricing incentives and supply strategies whereas the large manufacturing co-operatives began paying differential pricing for fat and protein. This immediately drove home the fact that, at that time, while traditional payment was entirely butterfat based, fat was of relatively low value due to global oversupply with principal value being derived from protein. The demand for higher protein milk with a lesser fat percentage was clearly communicated and reacted to by farmer suppliers.

Farm milk prices have continued to reflect market demand at a component level as global supply and demand for alternative products changes. Further pricing components for low cell count (higher microbiological standard) and out of season supply have become the norm as has a volume charge to discourage low solids milk for companies drying a large percentage of intake for milk powder. Specialist product producers have developed individual incentive schemes related to their specific needs. While not perfect the farm gate milk price is largely aligned with market prospects and final performance of the companies. In all cases the “language” of payment directly relates to the milk components utilised and reflects related costs or opportunities through volume, seasonality and bacteriological quality. A further aspect, not seen within the beef sector, is the use of “step ups” where an initial or “opening” seasonal price is stepped up by further payments as product is actually sold and a final value crystallised.

The current 2014 pricing system (Southern Milk Region) from the Murray Goulburn Co-operative, the largest Australian dairy group processing around a third of all Australian milk, provides a working example of farm milk pricing. Table 3 displays the advised base price per kg of fat and protein by month. Two factors are encompassed within this; an advised change of fat to protein pricing ratio to 1:2.2 (protein is currently valued at 2.2 times fat per kg reflecting an increase in relative fat value from historic ratios of 1:3) and a strong indication of seasonal value differences. These arise from product mix changes in each month with fresh high value products such as drinking milk requiring constant production and representing a higher percentage of production in months of lower farm milk supply.

Table 3: Murray Goulburn Southern Region Opening Milk Price 2014/15 (Anon, 2014b).

Month	Butterfat $/kg	Protein $/kg
July	$4.15	$9.14
August	$3.78	$8.33
September	$3.66	$8.06
October	$3.66	$8.06
November	$3.66	$8.06
December	$3.66	$8.06
January	$3.86	$8.49
February	$3.96	$8.73
March	$4.00	$8.81
April	$4.15	$9.14
May	$4.23	$9.30
June	$4.30	$9.47

In addition to the above further incentives in the form of Productivity Incentive (PI), Growth Incentive (GI) and Flat Milk Incentive (FMI) are available to farmers (Anon 2014c). The PI incentive recognises scale efficiencies in milk collection and ranges from $0.02 per kg of fat and $0.05 per kg of protein, for monthly supply from 1,701 to 3,800 kg of fat and protein, to $0.17 and $0.38 per kg of fat and protein where monthly supply exceeds 80,000 kg. The GI recognises the value to the company of increased supply through improved utilisation of company asset capacity. The 2014/15 GI incentive is $0.33/kg for fat and $0.72/kg protein for amounts above the previous 2 years average supply. The FMI, displayed in table 4, can be elected by farmers and provides a further premium or discount relating to the percentage of milk supplied in the off-peak period (July, 50% of August and February plus all March to June production).

Table 4: Murray Goulburn Flat Milk Incentive (Excludes unacceptable milk) (Anon, 2014c)

MonFMI%th	Butterfat Cents/kg	Protein Cents/kg
< 40.00%	-4	-9
40.00% – 40.99%	4	9
41.00% – 41.99%	14	31
42.00% – 42.99%	26	57
> 40.00%	39	86

Other pricing signals include milk collection charges related to the number of collections required and penalties for milk quality ranging from 0% for premium quality milk to 32% for poor quality. In addition statutory levies are deducted from milk proceeds.

This pricing structure transparently reflects factory product return opportunities and production costs. Individual farmers can directly assess their individual position in regard to the incentives and discounts offered and related farm business costs while developing their farm plans and budgets.

The evolvement across the dairy industry of farm gate pricing directly aligned with product demand and relative value has been a trigger for substantial on-farm adjustments to genetics and management. Clear communication using relevant language and transparent pricing systems have been fundamental in this transition.

RETAIL PRODUCT INNOVATION

The retail dairy case(s) has substantially changed over 20 years post deregulation as companies have sought to create points of difference and attract further revenue through consumer demand. Milk is no longer milk with the category incorporating a wide range of packaging types and sizes in addition to alternate fat levels and a growing number of specialty products aimed at niche markets. These have grown from basic variations such as low or high fat and flavours, solids modification through SMP or concentrate addition, enhanced protein and calcium through ultrafiltration, shelf stable UHT products and more recently to lactose free, organic and A2 milk etc. Cream has also grown to a category and yoghurts and dairy desserts expanded exponentially beyond the original vanilla ice cream. These products together with the huge array of cheese types and brands within types combine to create a very contemporary consumer offer occupying considerable retail display space. An important characteristic is that each product is targeted at a specific consumer need and, as a matter of course, expected to perform in a uniform and predicted manner.

DAIRY FARM DATA FEEDBACK AND RESPONSE TO PRICE SIGNALS

In contrast to beef, dairy farmers supply product on a daily basis and have an accurate volume measure of each delivery. The composition of each delivery is determined, from a sample taken at the farm, by laboratory analysis conducted by the processor and, together with further pricing signals such as bonuses for quality and deductions for volume determines the monthly milk payment. While payments are monthly they are not necessarily final with the large manufacturing cooperatives advancing an initial "opening" price and then supplementing this with progressive "step-ups" that add further return as product is sold. The actual final price for manufacturing milk is consequently generally not known at the time of delivery and often spread over a year or more. A degree of trust must exist between the farmer and processor for the system to operate. The factory generated payment detail each month typically provides year to date production summaries and year and month comparisons to the previous year, often in graphical format.

At the point of sale farm milk revenue represents an average value across the herd, a position not dissimilar to selling a line of steers. For many dairy farmers this remains the position but, to the great benefit of the industry, a substantial number, around 40% (S. McRae pers comm), herd test all cows monthly while many with modern milking technology also record individual cow volume at every milking. This expands the overall herd production data into individual cow contributions and values.

The herd test reports provide a wealth of accessible management data at herd and individual cow level. Typical reports include the following:

- Individual cow milk (litres), fat (kg), protein (kg) production on the test day, the previous test day and year to date basis.
- Production reports for cow groups defined by calving period, age and breed.
- Benchmarking to district averages or local research farm production including per hectare comparisons.
- Somatic cell counts for each cow (used in mastitis detection and a payment component).
- Reports on mastitis infections with comparisons to prior periods together with counts and listing of cows above threshold cell count levels.
- Summary reports for all cows within age groups.
- Reports for all cows that have completed their lactation at the last test including their lifetime production history.
- Lists of cows sorted within highest and lowest production index (PI).

The PI is a crucial number driving culling decisions within the individual herd. The PI is a measure of a cow based on her performance in the current lactation, compared to other cows of the same breed in the same herd (Anon, 2009). The calculation takes the current and any previous test day data from the current lactation, adjusts for cow age and estimates the total lactation. The PI for each cow is then estimated with a PI of 100 the average. The PI provides an immediate relative rating of all cows in the herd and is a principal tool for production based culling decisions.

All herd test data is also uploaded to the Australian Dairy Herd Improvement Scheme (ADHIS) database which generates genetic evaluations of all recorded cows and bulls. All Australian data is in turn uploaded to the Interbull database in Sweden which combines data from most significant dairy producing countries. This provides international evaluation and comparison of dairy sires.

ADHIS use the production data to calculate Australian Breeding Values (ABVs) for cows and bulls. In practice three levels of bull ABVs are generated: ABV(g) for unproven young bulls where the ABV is based solely on genomic and pedigree data, ABV(i) for bulls proven overseas but without tested Australian daughters and ABV for proven bulls using Australian milking daughter information (Anon, 2014d).

While at a base level this is similar to beef Breedplan the data is considerably more powerful at industry level due to the typically high percentage of AI, and consequent concentration on a small pool of globally outstanding bulls, but also due to the inclusion of all commercial herd recorded daughters. The proof becomes more reliable as it moves from an ABV(g) to a high reliability ABV where daughter performance predominates. In contrast the majority of beef sires never have recorded progeny and commercial cows are essentially excluded from the principal genetic evaluation process.

Further national reports are generated of elite dairy cows which are further targeted by genetics companies for bull breeding and indexes such as the Australian profit ranking (APR) generated by combining the production indexes with other factors including type measures, disease resistance, temperament and longevity.

Dairy farmers who do not participate in herd testing also make progress via access to the same bank of proven AI sires and continual attention to other management aspects including nutrition and related pasture management strategies. Those working at the elite end further multiply the rate of genetic progress, estimated at an overall industry average of 3% per year (S. McRae *pers comm*), by multiplying the impact of elite cows through embryo transfer.

The powerful combination of a payment system directly related to final consumer product value and tools that provide detailed financial knowledge at individual cow level with allied accurate genetic data continually drive productivity improvement across the dairy industry. While the past 30 years, at least, have been traumatic and profitability still periodically challenged there is no doubt that industry survival reflects continual productivity improvement at farm level. A typical 1980s dairy herd could not survive in the current environment.

DAIRY IMPACT ON BEEF PRODUCTION

The dairy herd contributes to overall Australian beef production through cull cows, heifers and male offspring. Currently around 98% of male calves are sold within a week of birth for bobby veal (S. McRae pers comm). Consequently any large scale shift from sale of bobby calves to growing out male calves as bulls or steers has potential to further impact the beef market. It is assumed that a majority of the 709,000 (Anon, 2014e) calves slaughtered in 2013/14 were of dairy origin and loosely aligned to dairy cow numbers of 1.67 million at June 2013 (Anon, 2014f). While dairy cattle are typically disdained by beef producers across the globe consumer based eating quality studies consistently find at least equal eating quality outcomes.

In recent years there has been a strong export demand for live dairy heifers. Given that a 6 month old Australian dairy heifer may bring $1,800 (S. McRae *pers comm*) on farm at present few will enter the beef supply chain but the availability of live export markets and related pricing may be volatile, creating potential for increased transfer to the beef supply chain. Due to production pressure, conception standards and competition from superior heifer genetics many dairy cows are sold for meat at 6 years of age or less (S. McRae *pers comm*). While a traditional source of 95% CL grinding beef, economic signals could readily transform many of these carcases to higher value outcomes through pre slaughter fattening.

The percentage of beef bull semen used in joining dairy heifers and cows varies widely but, should sexed semen become sufficiently reliable, could expand considerably with consequences for beef quality and tonnage. The normal use of AI as a primary joining method in dairy enterprises provides an avenue for rapid genetic progress and market response.

While Australian beef cow numbers are substantially larger than dairy (90% vs 10% (Anon, 2014f)) the reverse is true in many countries where beef production is largely a by-product of dairy, New Zealand becoming a regional example with dairy cattle numbers (6.59m head) substantially above those of beef (3.69m head) (Anon, 2014g). New Zealand breeding cow numbers are even more spread with 5.1 million dairy and 1 million beef cows at June 2013 reflecting a 20% decline in beef cattle numbers and a 29% growth in dairy over the 10 year period to 2013 (Anon, 2014g). Poland provides a more extreme European example with dairy cows comprising 95% (Anon, 2014h) of female breeding cattle. In both situations the majority of male dairy calves remain as bulls with associated implication for the overall beef supply. In both countries the driving force behind the numbers is relative profitability.

POSSIBLE BEEF PARALLELS

As discussion points the following possible parallels from dairy to beef are advanced:

1. The “language” used in describing dairy products, milk components, animal characteristics, health measures and genetic ratings is clear and uniform. In most cases it is also common internationally facilitating global trade of both consumer products and livestock genetics.
2. Similar uniformity could facilitate beef trading if the Australian language accurately reflected consumer outcomes and was accepted as a voluntary international standard.
3. Beef carcase “components” could be viewed as MSA 3*, 4* and 5* and also include trim, hide or offal components if deemed appropriate.
4. A combination of reliable weight (yield) in conjunction with “beef component” prices would provide value based payment and an accurate individual animal measure.
5. Production responds to payment so that value based payment would be expected to lead to substantial management change at farm level.
6. Pertinent evidence is provided at a macro level by observation of International grading and payment systems; High muscle lean European breed cross bulls in response to EUROP payment; Wagyu crosses and extreme marbling in response to JMGA grading.
7. Accurate individual animal payment rather than average values could drive innovation and consistent productivity and herd improvement across the beef industry.
8. Dairy and beef herds are both cattle; similar rates of productivity gain should be possible with genetic and many management tools common to both industries.

SUPPLY DIFFERENCE TO BEEF

While a number of parallels between beef and dairy are drawn above there is one important difference that may also be relevant: milk must be delivered to a processor daily, or at most every second day. This fundamental requirement creates a smoother supply to the processor and less day to day price fluctuation. While dairy farmers can and do change processors this represents a major decision not taken lightly and in general infrequently. There are only a small number of processor options in most regions and relationships tend to be medium to long term. Whereas a beef producer may hold over cattle to utilise a good season or in anticipation of higher prices a dairy farmer cannot do the same with milk. It is far easier for the beef producer, mostly with a few irregular sale consignments per year, to “play the field” and market to a range of alternative processors.

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