

RuminOmics Workshop

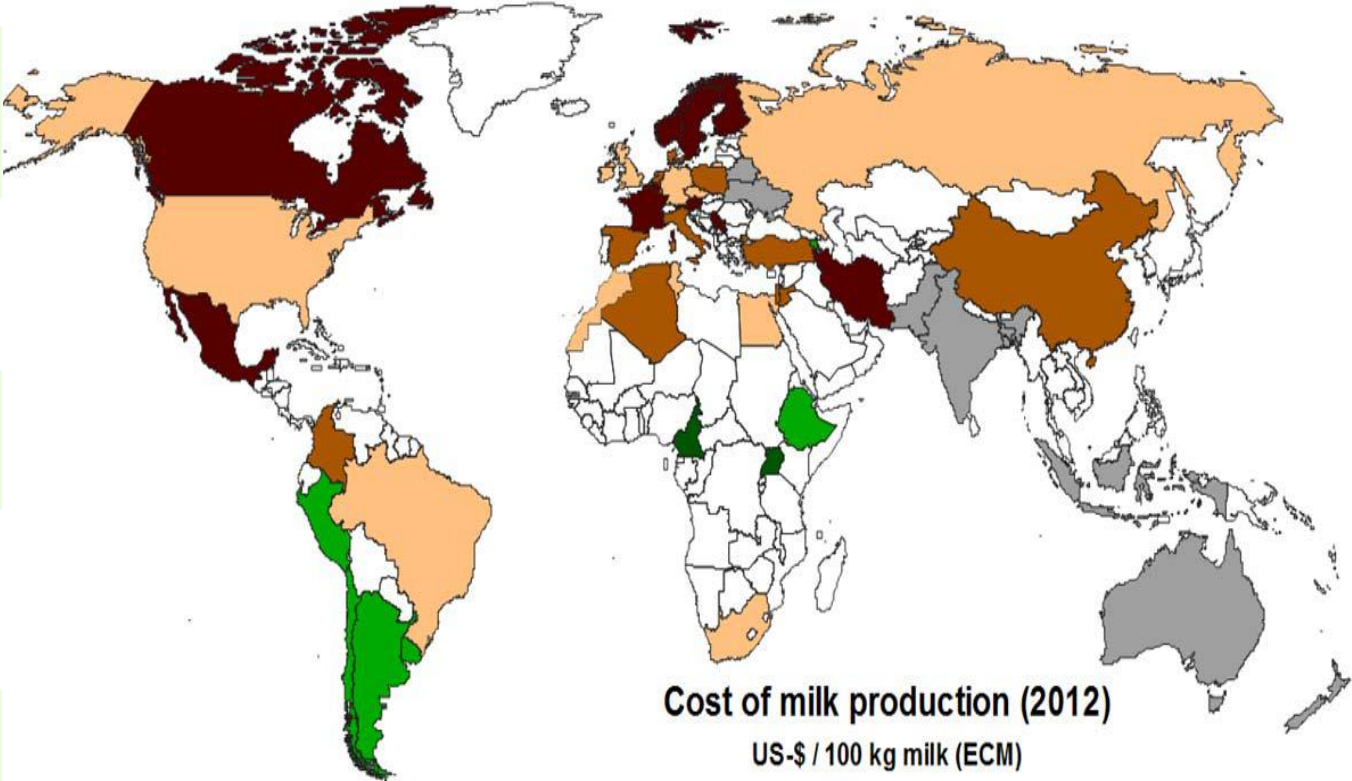
Dairy Overview

David Keiley SAC Consulting : Dumfries

SAC Consulting is a division of SRUC

Leading the way in Agriculture and Rural Research, Education and Consulting

Cost Of World Milk Production 2012.



Cost & Scale Of Milk Production -2012-2013

Country	USD/100kg ECM	Cow Numbers
Argentina	28	170
NZ	35	340
Germany	42	106
USA	44	500
China	51	340
Poland	53	65
Average	46	



Cost & Scale Of Milk Production -2012-2013



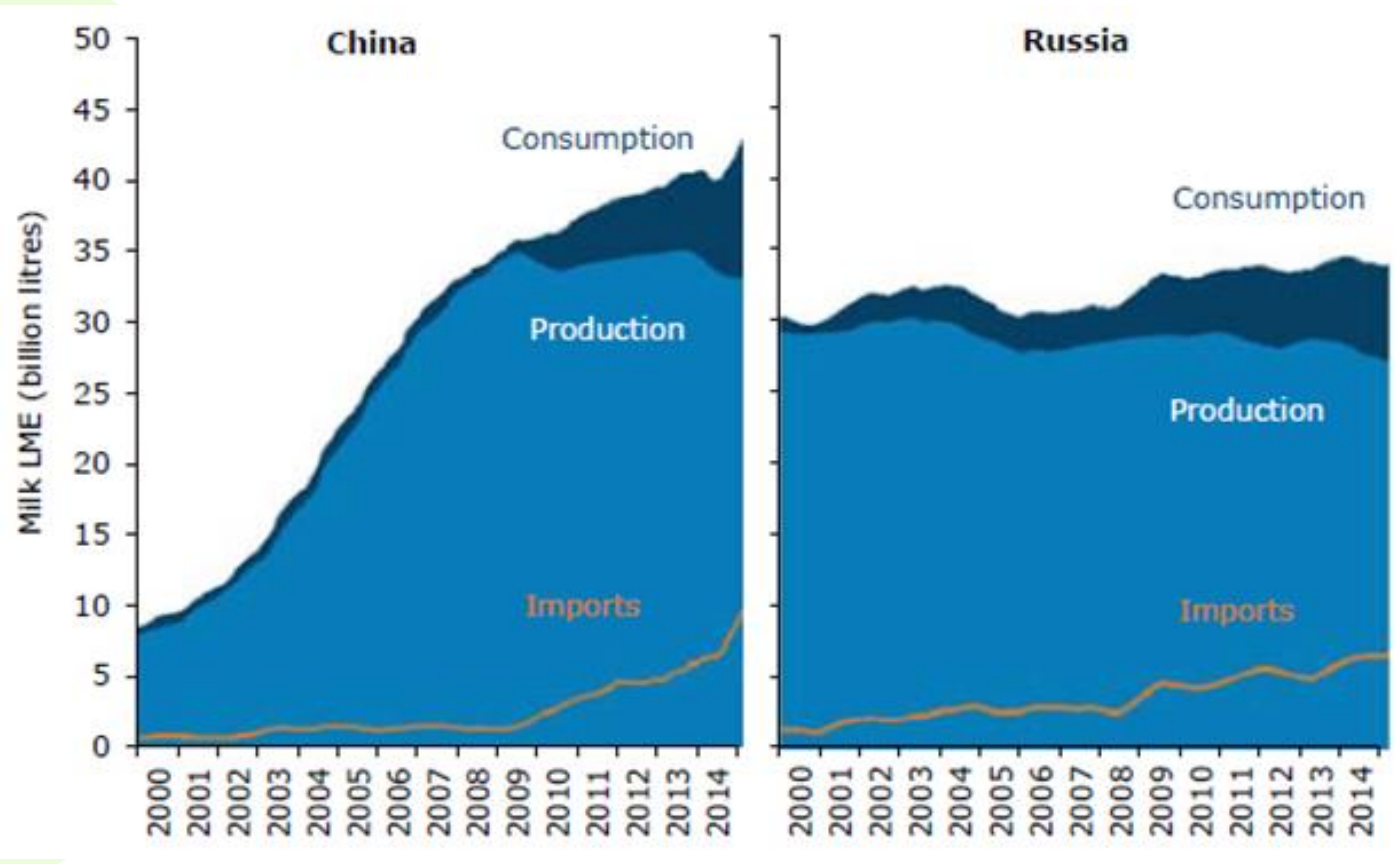
- Sample Size – 178 Farms in 51 Countries
- Range 4-128 USD/100kg ECM
- Japan 128 USD/100kg ECM
- Cameroon 4 USD/100kg ECM
- 122 Million Milk Producers
- 363 Million Cows and Buffalos
- Average Yield 2,100 litres ECM/cow
- Average 3 cows per Herd

Pot of Gold at the end of the Rainbow !!

- China Consumption per capita = 23kg
- UK Consumption per capita = 110 kg
- US Consumption per capita = 200 + kg



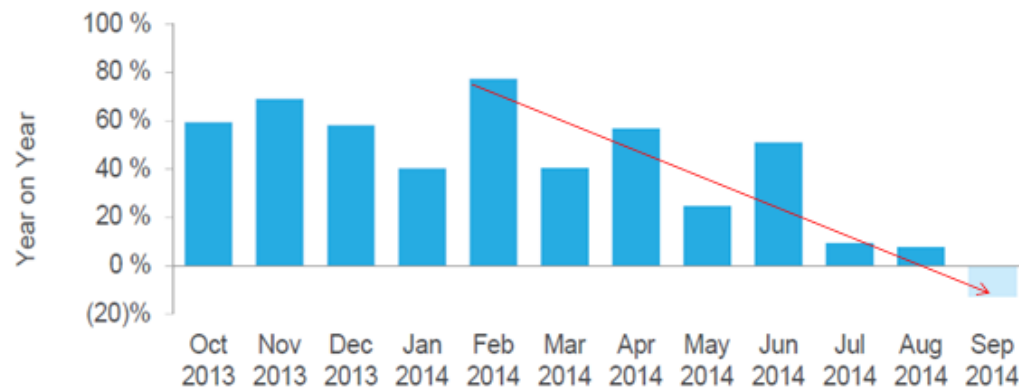
Expected Import Requirements China & Russia



Actual Dairy Imports China & Russia

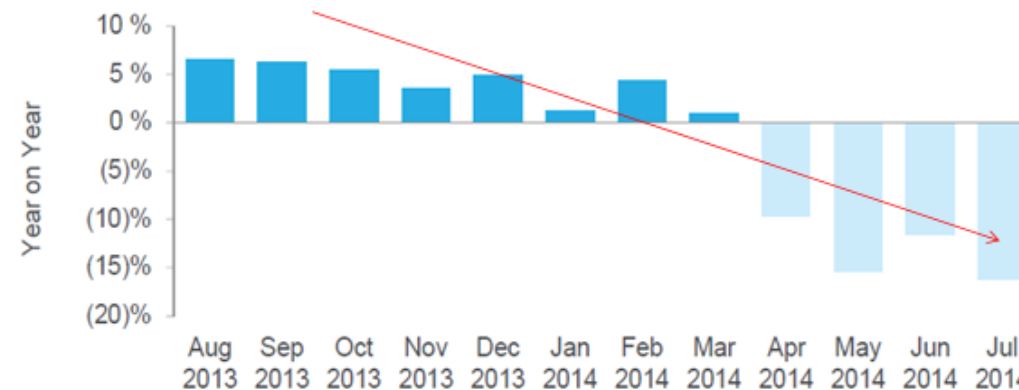
CHINA

Annual imports ~2.0 million tonnes of product



RUSSIA

Annual imports ~1.4 million tonnes of product



The Perfect Storm !!



- “Sharpest fall in Milk Price ever recorded in the EU”
- Combination of Factors



The Perfect Storm !!



- World milk production increase
- China – Not buying SMP – EU produce 800,000t
- Russian Trade embargo
- Exchange rate £/Euro – Harder to export
- Supermarket Price Wars

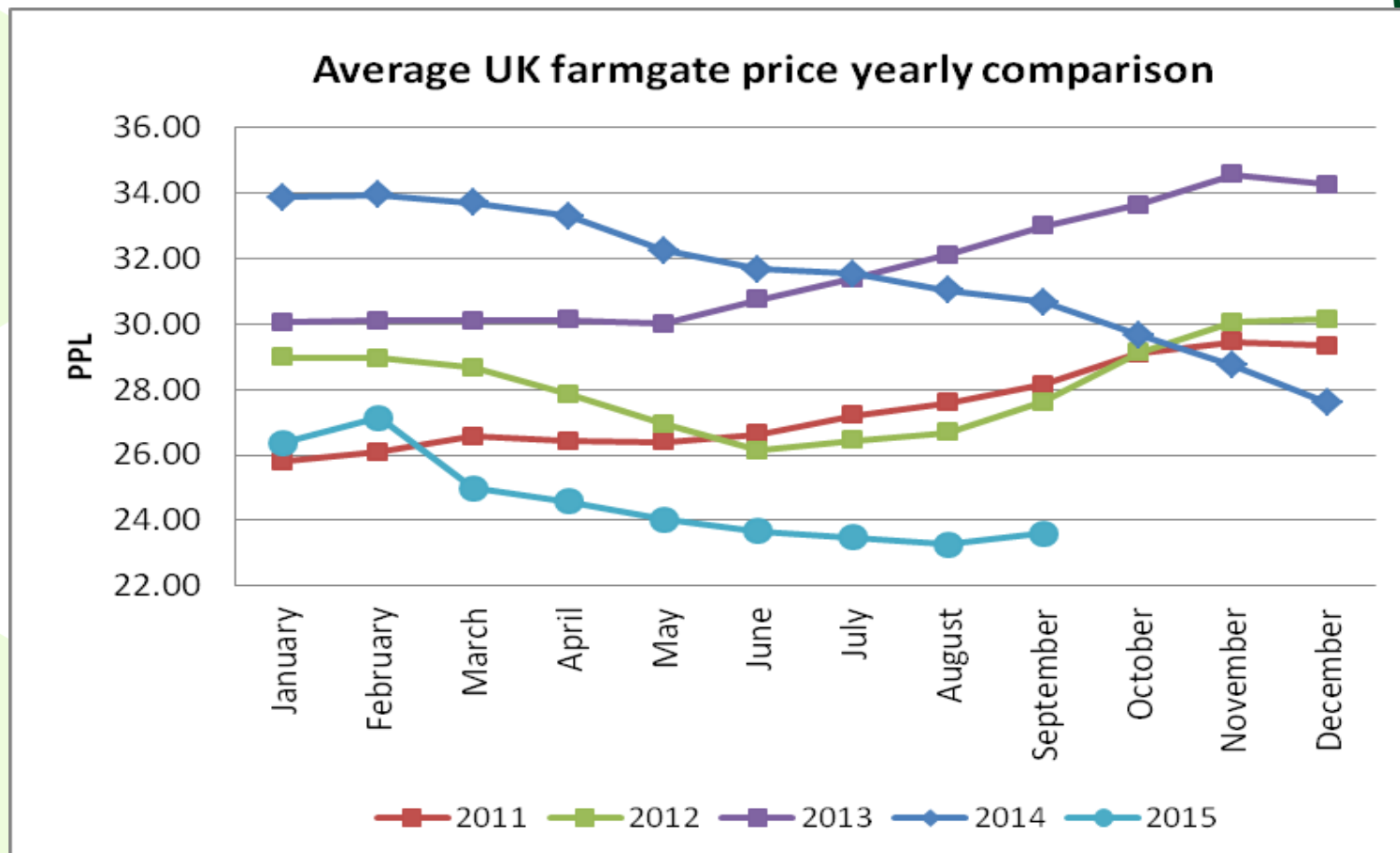
- Market Correction? – Milk Powder

Market Crash



- Commodity Driven downs
 - Poor EU Futures markets
 - Westbury – Exposure of First Milk
 - Devalued Cheese in Store – Knocks Milk Price
 - COP contracts reducing – Feed & Fert
-
- AMPE = 17.9 ppl
 - MCVE = 20.7 ppl

Milk Prices



Cost of Production & Milk Price



- COP Contracts Sainsbury's - 32.24ppl
- COP Contracts Tesco – 32.87 ppl
- System – Efficient Management & Welfare
- Economies of scales
- Value of Labour
- Drawings £30K pa

- Milk Price Range 33.54ppl-16.38ppl (Liquid)-Sept
- Spot prices lower than 16.00ppl

Market Stabilisation



- Private Storage Aid EU Cheese & SMP
- Increased funding from €30 Million to €60 Million
- Russian Effect – Major disadvantage
- Huge effect on UK
- PSA Product will be released back on to the market
- Longer period of market recovery

- US Farm Bill 2014 – Margin Protection Programme
- Farm Level Subsidy - WTO

Milk Quotas Ended



- Removed 2014 / 15
- Processors Introduce Dual Pricing 80:20 or 90:10
- Look at contract – Forecasting Models
- Penalties- Marginal Litres – 11ppl
- Litres Delivered 2014/2015 Very Important
- Futures Markets ???
- Forward Selling
- Hedging Milk Price



Fresh Water – Milk Production

Water & Welfare Factors



- China 19% World Population – 3% Fresh Water
- India 17.6% World Population – 2% Fresh Water
- Unsustainable water resources
- Urbanisation – Land demand

- Dirty Dairy – NZ -Nitrates & Phosphates
- Consumer Opinion

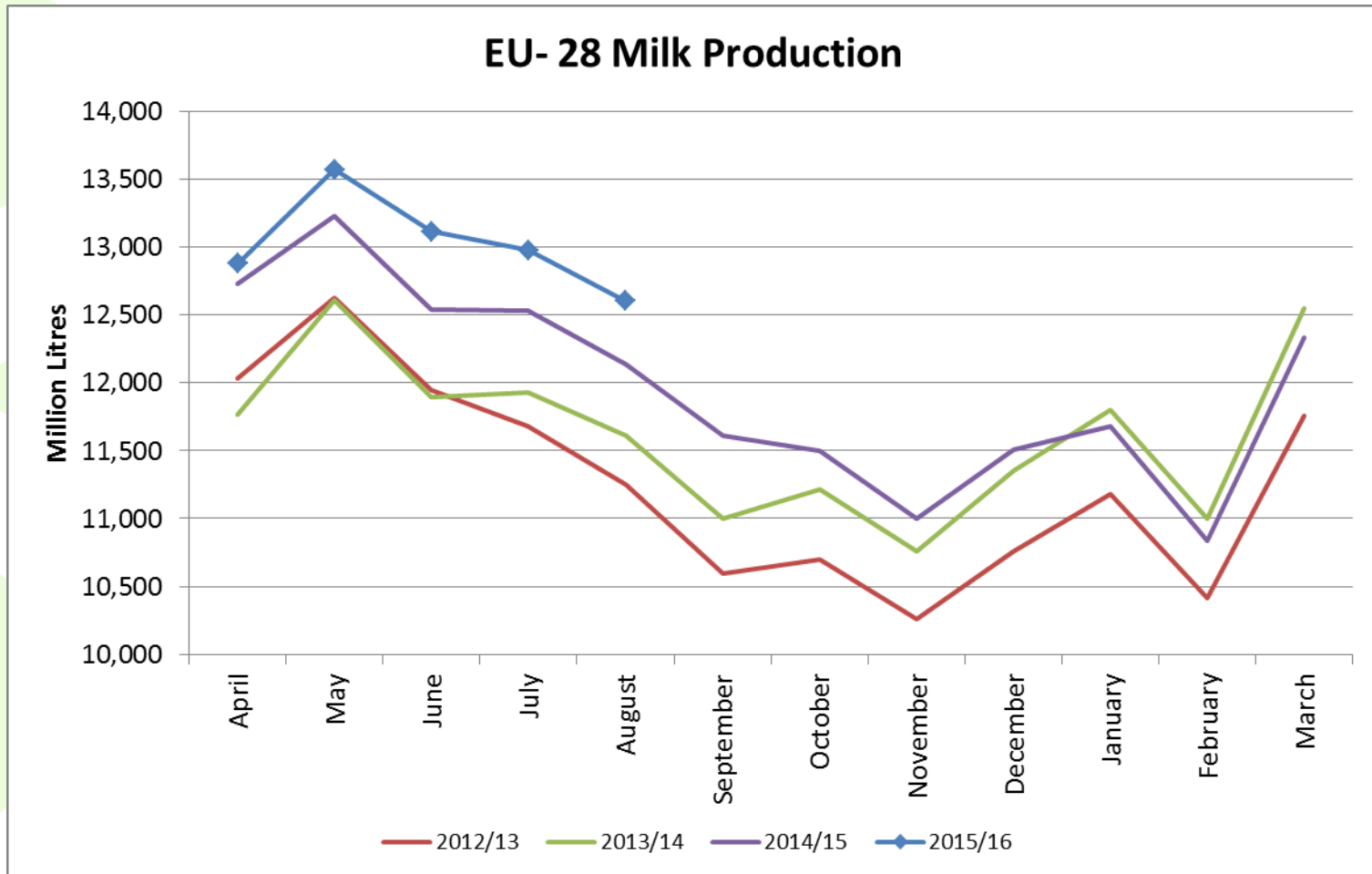
- Poorly Educated Consumers –
- Cheap Food generation in developed Countries

Solutions



- Ease East/West Tensions
- China starts to buy SMP
- Reduced Milk Production
- Weather the Storm
- Batten Down the Hatches
- Effect on Scotland

Increased Supply 2015



June Census



	<u>June Figures</u>			United Kingdom	Year on Year Chan
	England and Wales	Scotland	Northern Ireland		
1995	28,093	2,239	5,409	35,741	
1996	27,092	2,135	5,343	34,570	-3.28%
1997	26,110	2,009	5,233	33,352	-3.52%
1998	24,681	1,951	5,121	31,753	-4.79%
1999	23,286	1,896	5,039	30,221	-4.82%
2000	21,772	1,795	4,855	28,422	-5.95%
2001	20,191	1,624	4,741	26,556	-6.57%
2002	18,695	1,639	4,596	24,930	-6.12%
2003	16,977	1,590	4,425	22,992	-7.77%
2004	15,846	1,569	4,201	21,616	-5.98%
2005*	14,732	1,523	4,058	20,313	-6.03%
2006	13,778	1,472	3,376	18,626	-8.31%
2007	12,867	1,431	3,129	17,427	-6.44%
2008	12,252	1,351	2,989	16,592	-4.79%
2009	11,743	1,298	2,967	16,008	-3.52%
2010	11,256	1,263	2,781	15,300	-4.42%
2011	10,851	1,189	2,753	14,793	-3.31%
2012**	10,724	921	2,662	14,307	-3.29%
2013	10,581	894	2,684	14,159	-1.03%
2014	10,274	886	2,655	13,815	-2.43%

(Sources: DHI, SEERAD, DARD)

Campbeltown :Milk Quality Improvement Project

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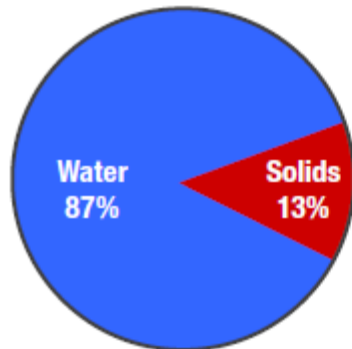
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Improving Factory Cheese Yields

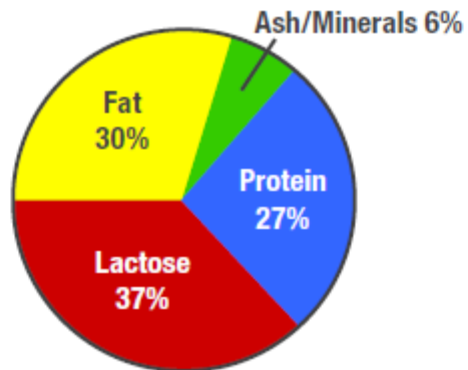


Milk Solids

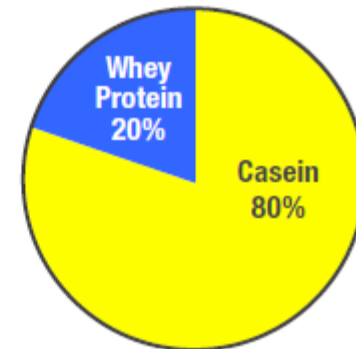
COMPOSITION OF WHOLE MILK



COMPOSITION OF MILK SOLIDS

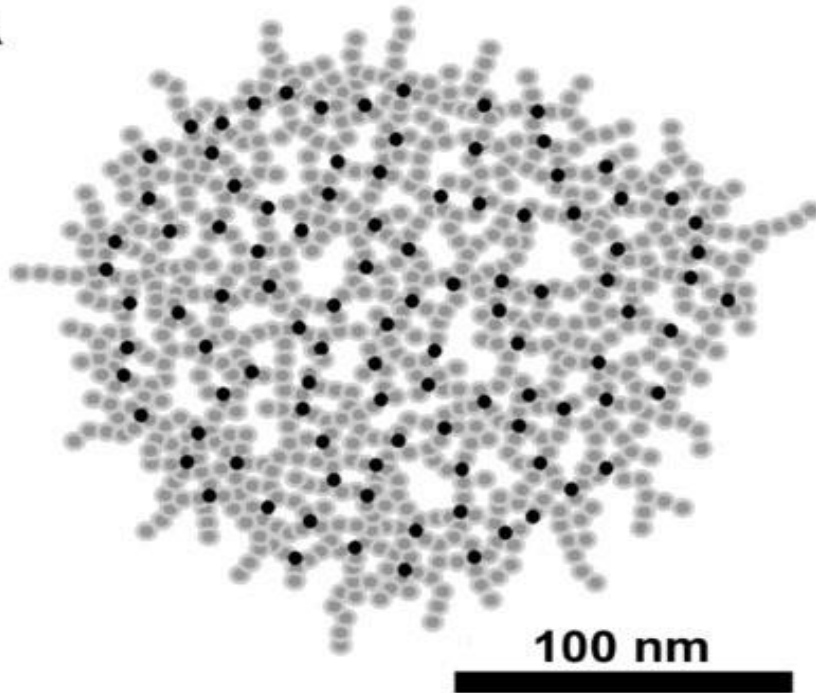


COMPOSITION OF MILK PROTEIN

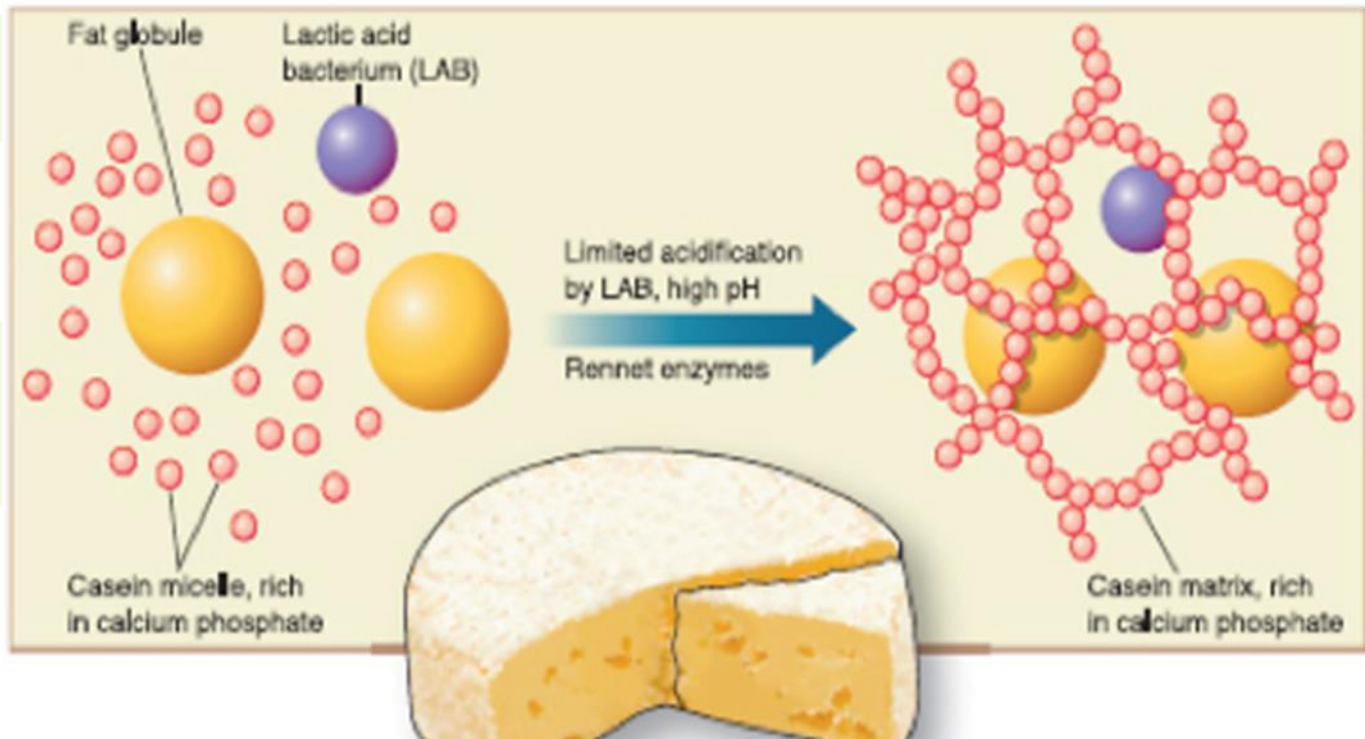
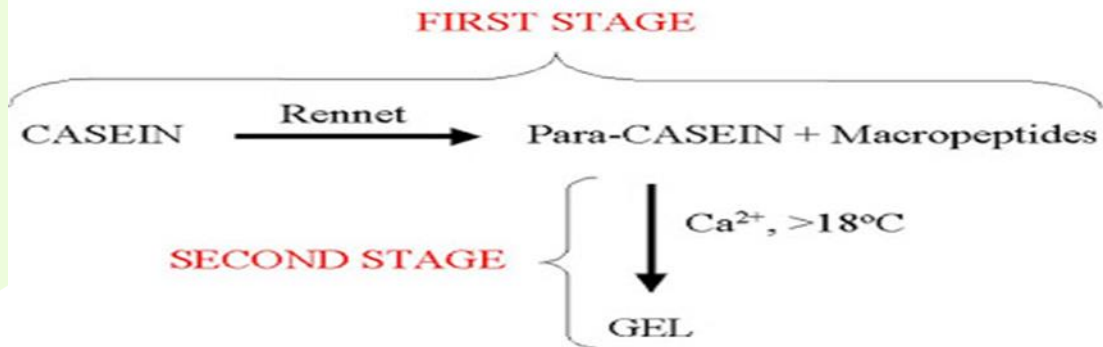


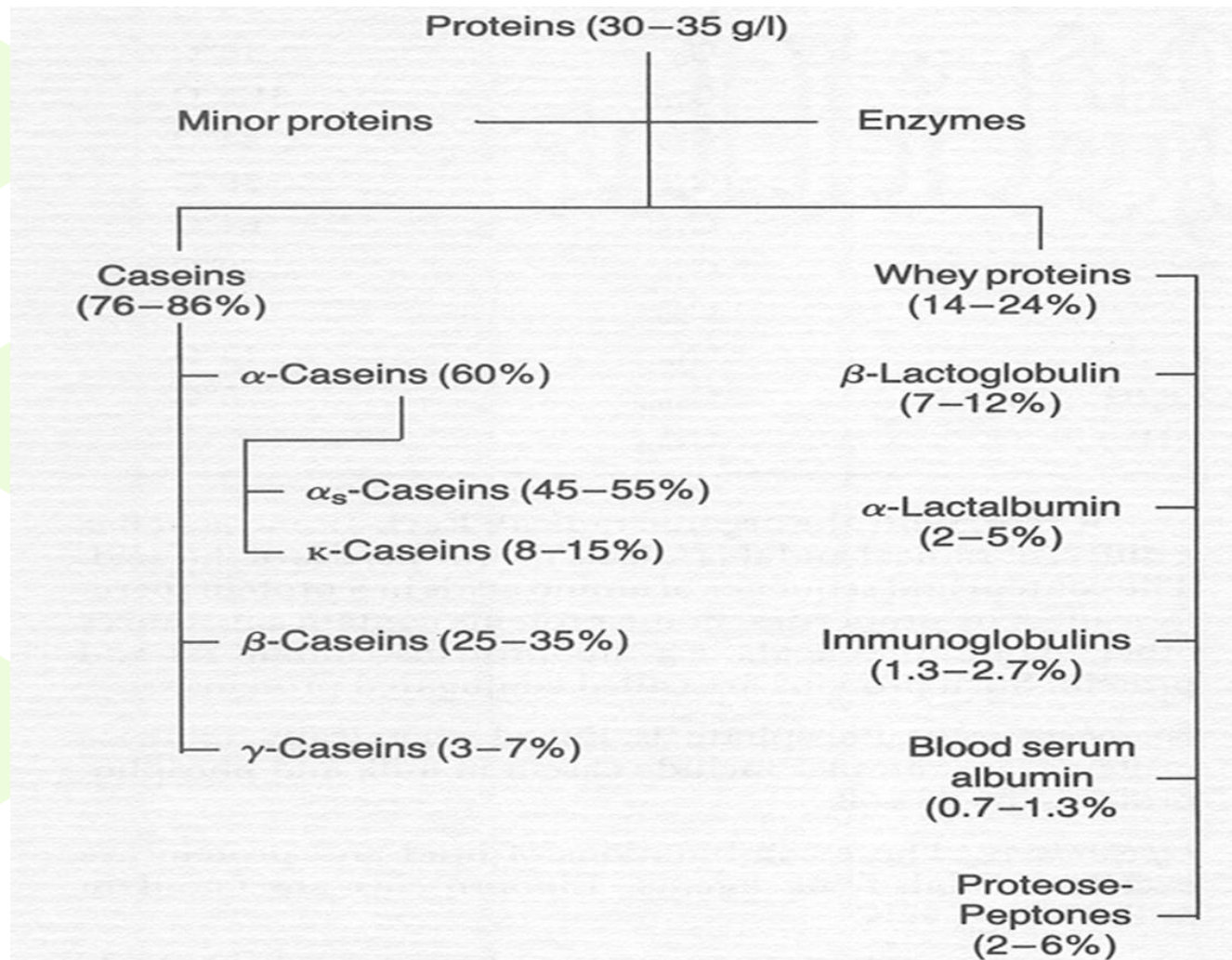
Casein = Cheese

A



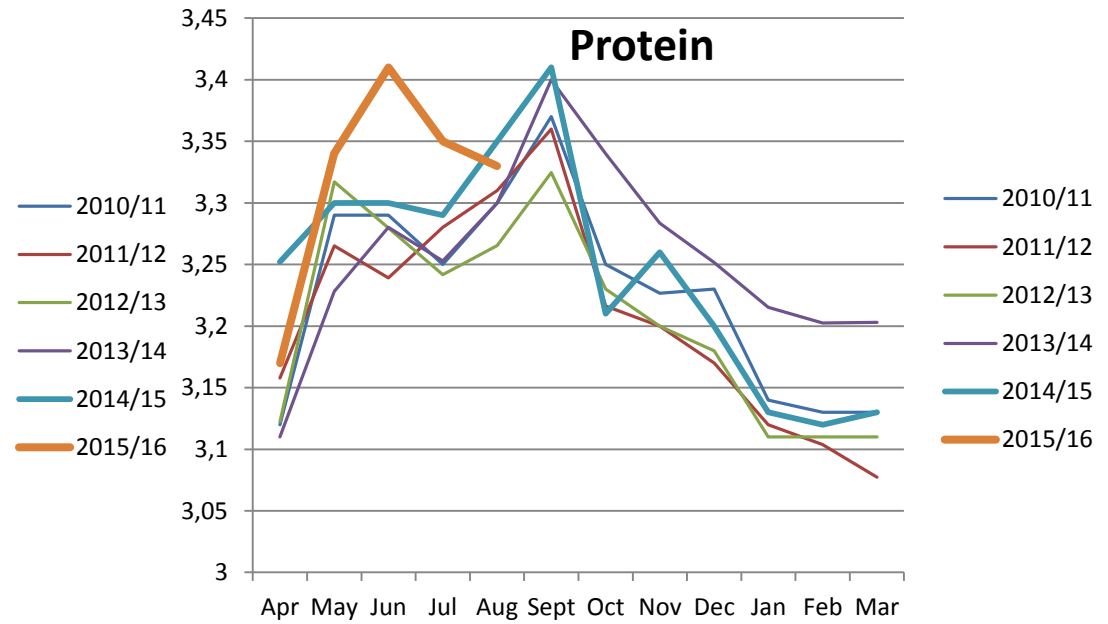
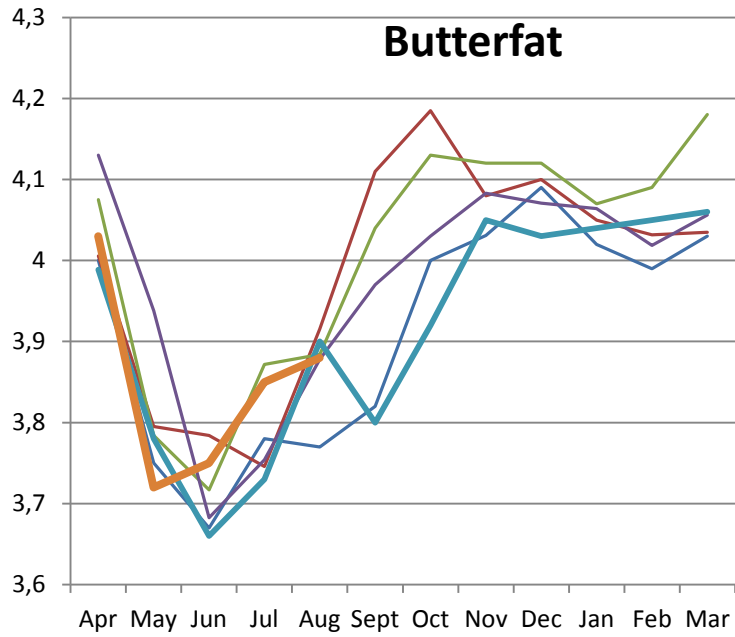
Model of casein
supramolecule







Milk Composition



Typical Milk Composition



Holstein US		Jersey US	
Butterfat	3.70%	Butterfat	4.90 %
Protein	3.10%	Protein	3.80 %

Factors Effecting

- **Genetics** -55% Heritability of Traits for Milk Composition
- **Environment** -45% - Feeding & Housing

Van Slyke Formula



- Calculation of cheese yield from Milk Fat & Milk Casein
- Standard Moisture
- % Milk Fat
- % Milk Casein

Questions?

- What's the difference between breeds?
- What's the difference within a breed?
- What are the cheese yields currently?
- Can we improve cheese yield?

Potential Cheese Yields – By Breed

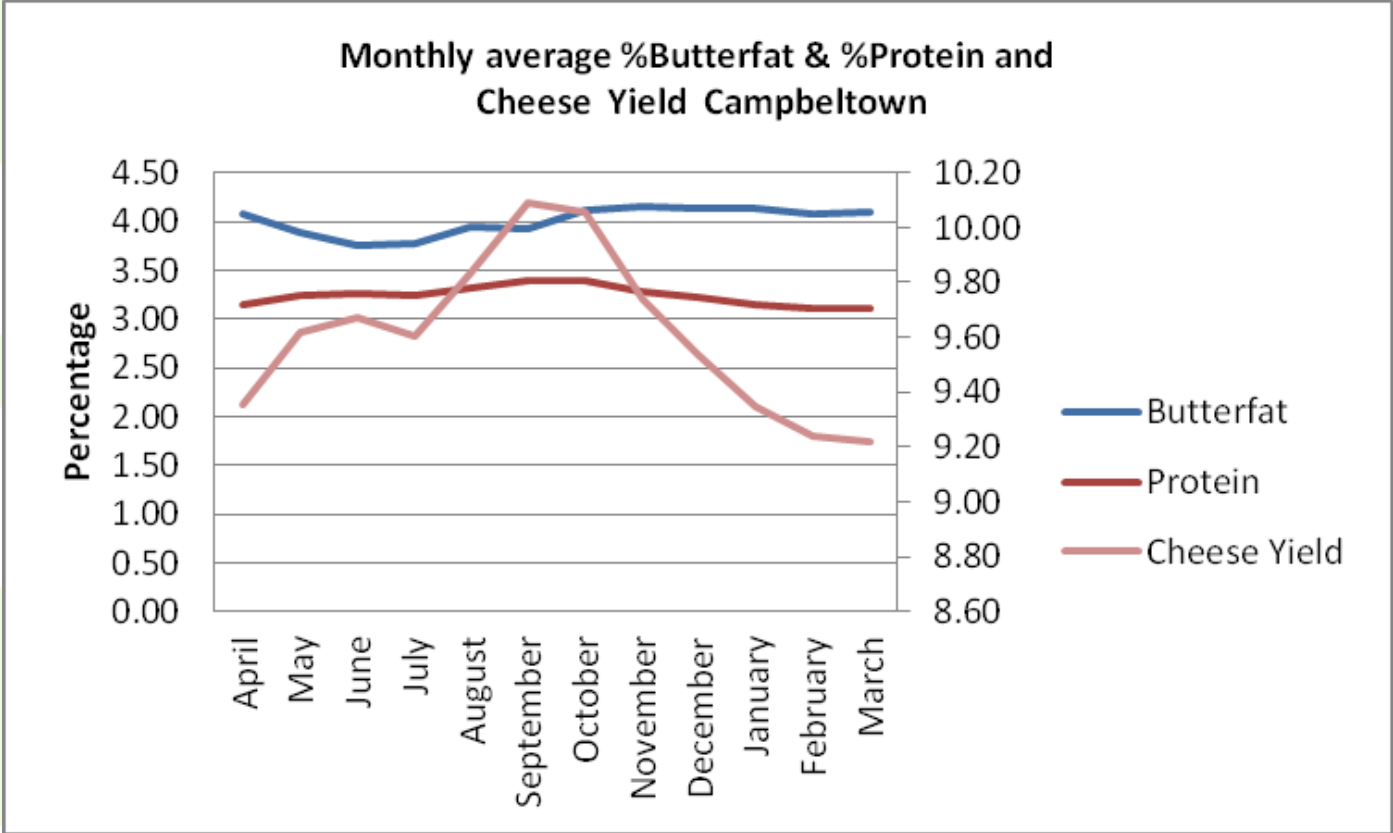


Breed	Butterfat	Protein	Cheese Yield	Average Annual Yield	Total Cheese yield per Lactation
Jersey	5.29	3.84	11.46	4500.00	515.72
Holstein	3.91	3.22	9.55	8600.00	821.10
Ayrshire	4.05	3.33	9.88	6500.00	642.48
Fleckvieh	4.3	3.6	10.71	8000.00	856.66
Swedish Red	4.31	3.5	10.41	8674.00	902.60
Montbeliarde	3.9	3.45	10.24	7486.00	766.85

Potential Cheese Yield within Breed

Breed	Butterfat	Protein	Cheese Yield	Litres	Total Cheese yield/lactation
Holstein	3.7	3.1	9.18	10000	917.89
Holstein	3.8	3.15	9.33	9500	886.62
Holstein	3.9	3.2	9.49	9000	853.82
Holstein	4	3.25	9.64	8500	819.47
Holstein	4.1	3.3	9.79	8000	783.58
Holstein	4.2	3.35	9.95	7500	746.16

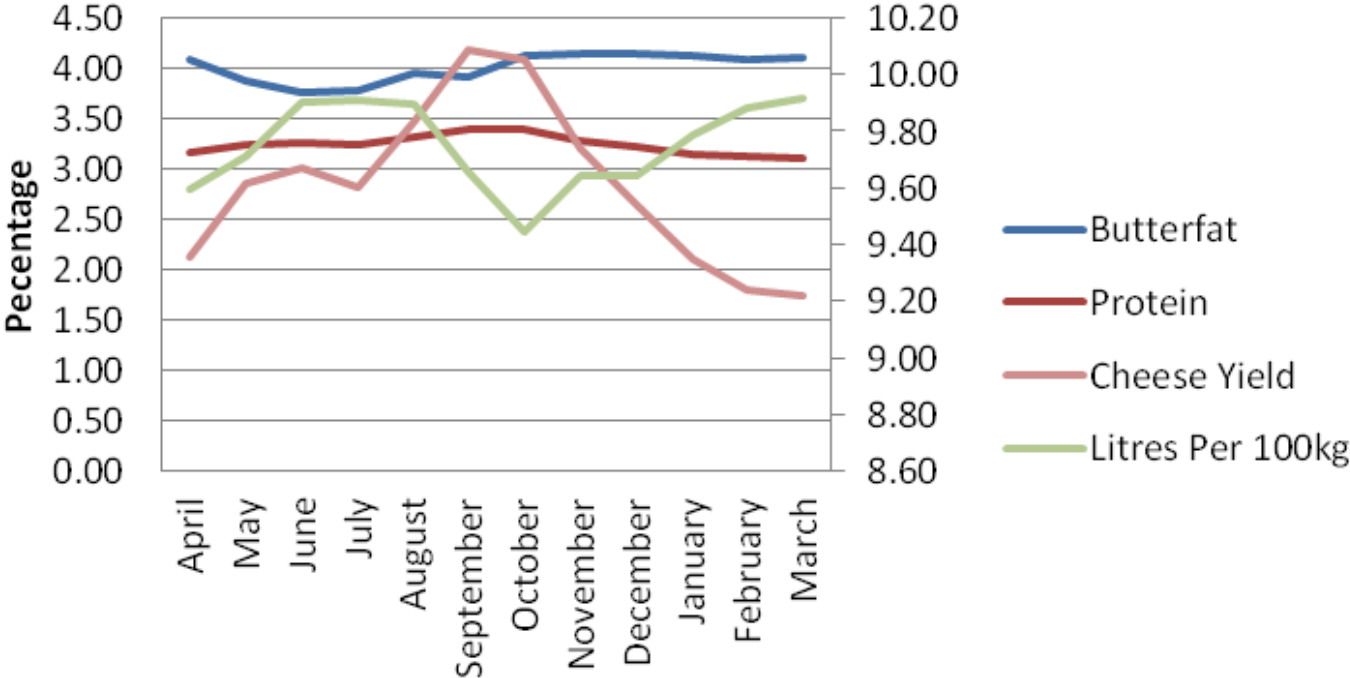
Campbeltown Data 2014/2015



Campbeltown 2014/2015 Data

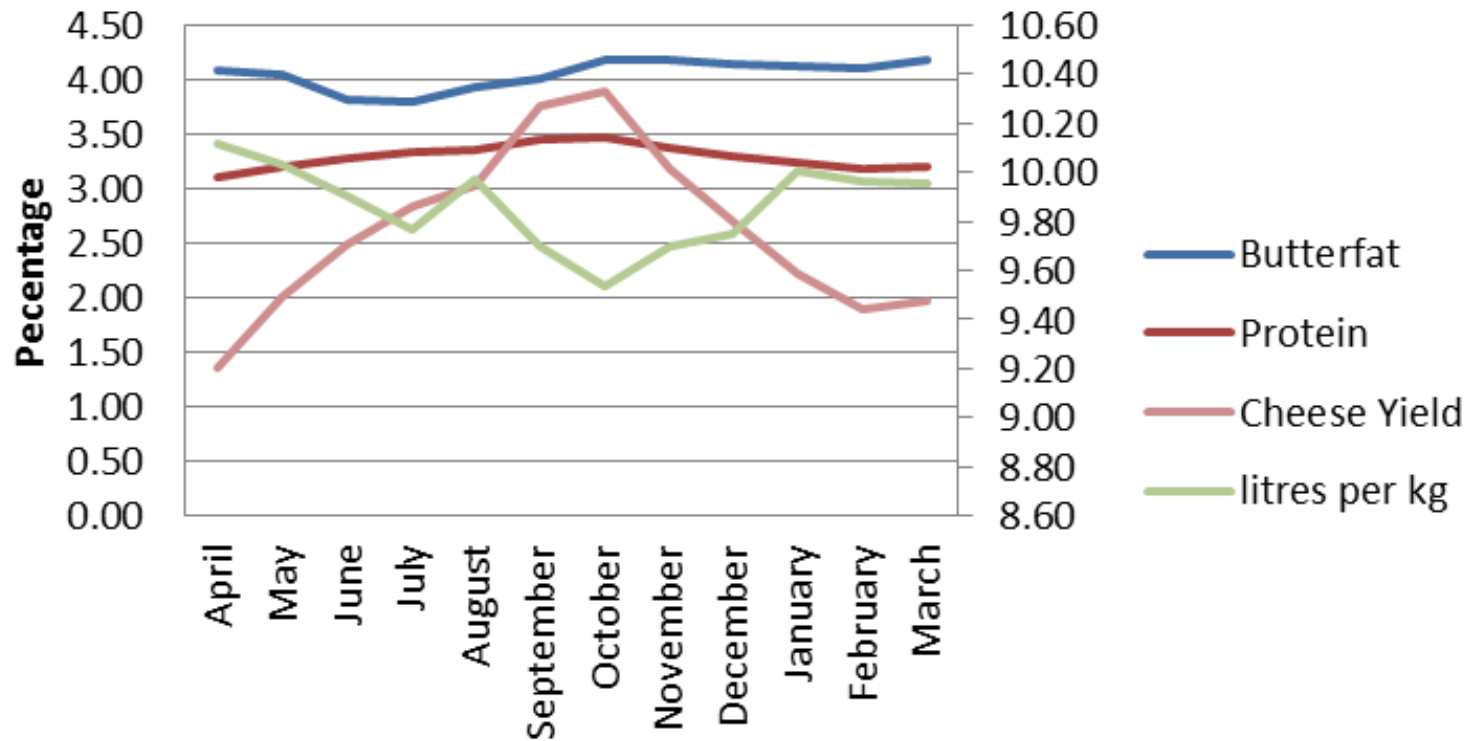


Monthly Average % Butterfat & %Protein, Cheese Yield and Kg Cheese per 100 litres milk - Campbeltown.

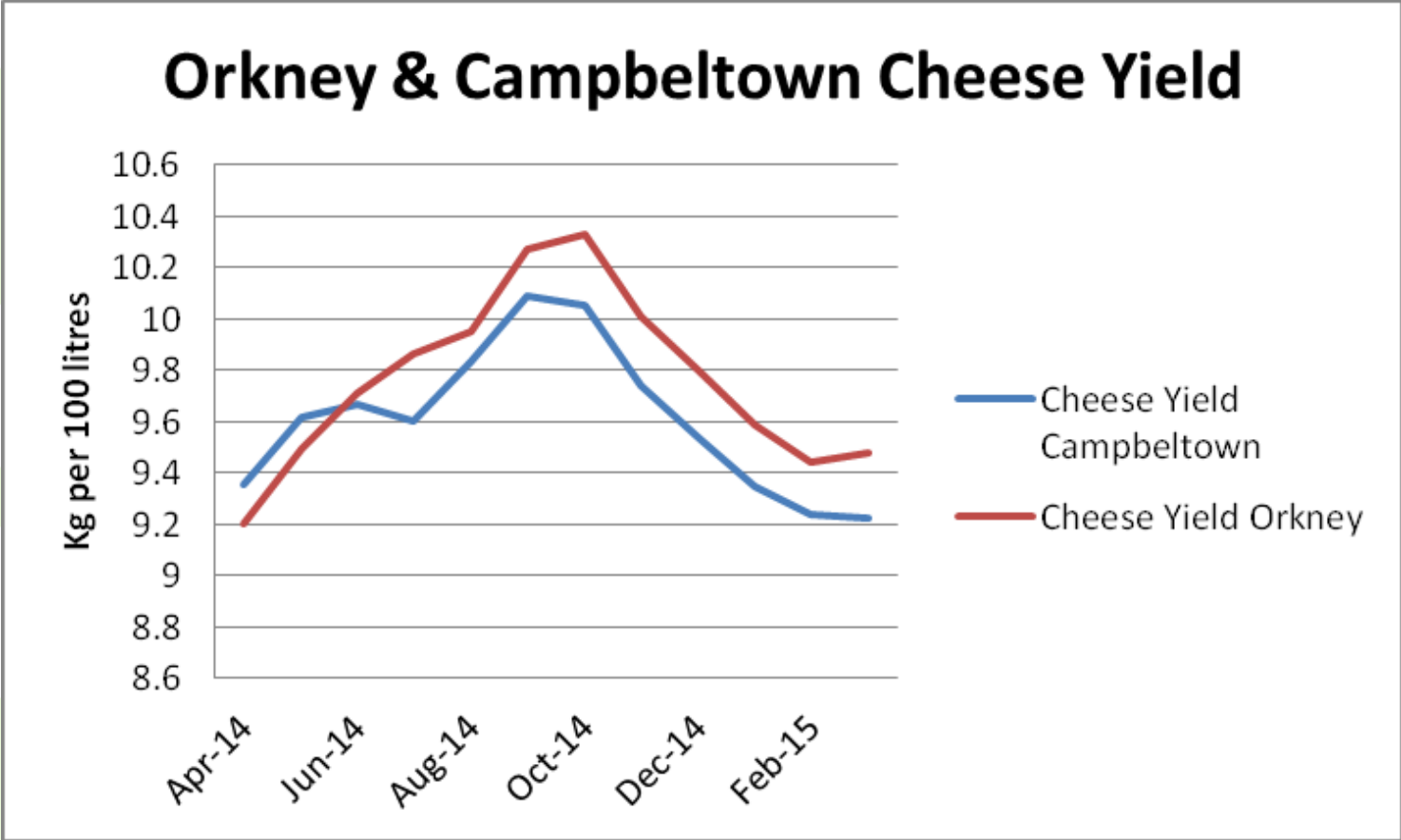


Orkney Results 2014-2015

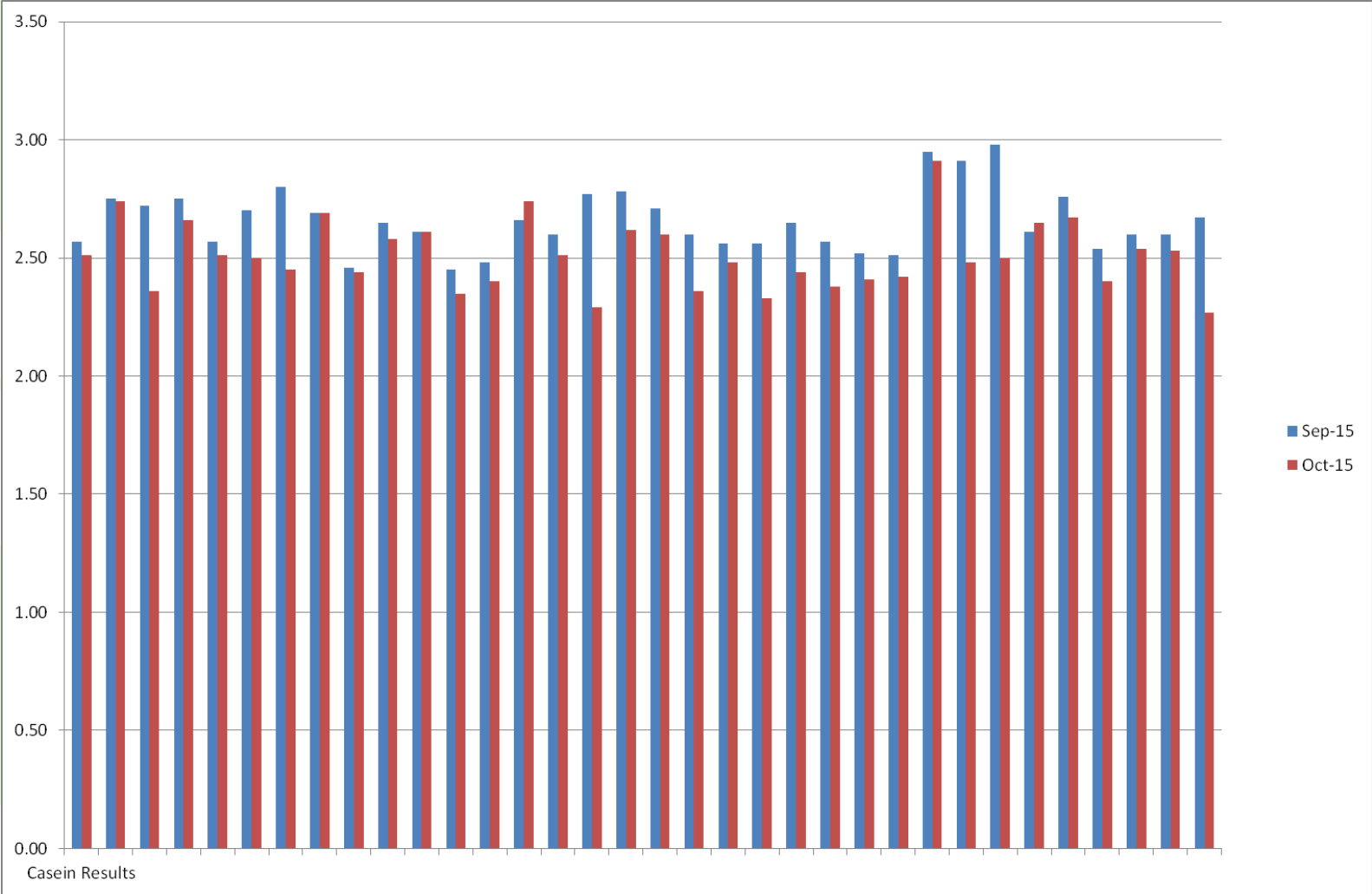
Monthly Average % Butterfat & %Protein, Cheese Yield and Kg Cheese per 100 litres milk.



Comparison Cheese Yield Data



Campbeltown Casein Results – Sept & Oct 2015



September Results - Campbelltown



	Casein as a % of Milk Protein	Van Slyke Litres per Ton Cheese	Van Slyke Cheese Yield	SCC	Bactoscan
Results for Farm	74.29	9692.66	10.32	108	34
High	87.65	8649	11.56	325	70.00
Median	77.60	9484	10.54	172.5	24
Low	74.24	10721.22	9.33	98	6

Summary



- Increase average Casein 80% from
- Increased Factory Output – Estimate 10% = 250 tonnes/year

- Better Quality Product
- More premium grade cheddar
- Long Keeping quality

- Focus on End Product
- Pricing of Casein in milk contract

- Best Practice
- Collective learning

Take Home Messages



- Increased Cheese yields help the productivity
- Breeding biggest influence on milk quality – LONGEST TIME TO CHANGE
- Nutrition and Environment are also key drivers – Quick to Change
- Breed Selection Vital – But selection within your breed also critical
- Litres with reasonable quality WINS – Think about yield
- Nutrition can influence cheese yield in the shoulders of the season
- Look at your blend ingredients and concentrate specification

Management Factors & Expected Effects



Factor	Butterfat	Crude Protein
Maximise DMI	Increase 0.30-0.20%	Increase 0.20-0.30%
Feeding Frequency	Increase 0.20-0.30%	No Change
Underfeeding Energy	Little effect	Decrease 0.10-0.20 %
Low NDF – $\geq 25\%$	Decrease 1.0%	Increase 0.10-0.40%
Particle Size – Small	Decrease 1.0%	Increase 0.10-0.30%
Added Fats (C16)	Variable	Decrease 0.10-0.20%

Environment

- Feed troughs – clean, shaded, space 700mm & dry
 - Frequency of Feeds x 2 per day & Representations x8 per day
 - DM of total ration MAX 50%
 - Social interaction - Heifers night feeders
 - Rations changes – Monitor accuracy
 - Lying times – Cubicle beds, cubicle size & dimensions
 - Flooring
 - Ventilation
 - Feeding surface
-
- Voluntary Feed intake key – DMI 3.6-4.0 % of Body Weight
 - Rejection 5%

Summary - Milk Fat (can be increased by)

- Increasing forage concentrate ratio
- High fibre forages
- Long fibre
- Digestion concentrate fibre – Soya hulls & Sugar Beet Pulp
- Concentrate feeding- Little & Often, stable rumen pH
- Distillery By-products – high oil content
- Avoid whole oil seeds – Cake
- Small amounts of protected fats.

Summary -Milk Protein

- Energy Density of Ration (TMR)
- High ME forages – good intake factors
- Protein Content 17-18%
- Mix Forages WC & Silages
- Digestible Starch – Rolled Wheat, Maize Germ & Fodder Beet
- By-pass Starch – Maize – slower fermentation & digestion
- By-pass protein – DUP Soya
- Whey Syrup
- Protected Fats
- Methionine
- Overfeeding Fats & Oils – distillery by-products Max 10kg FW
- Condition Score @ calving 3.0-2.75