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# Know Your Feed

## What to feed when and why

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# 3 Basic Truths

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- Truth 1: NZ nutrition is not that complicated
- Truth 2: Most NZ cows lack 1 thing.....
- Truth 3: Get the system right!



# Nutrition the Kiwi way

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- Nutrition in a grass based dairy system (i.e. NZ's) is not that complicated, unless you want it to be.
- 2 step process to solving 95% plus of all nutritional problems
  1. Define the problem you are trying to solve
    - More feed?
    - More protein?
    - Longer round?
    - Increase BCS etc. etc.
  2. Work out the best way of solving it



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What problem are  
we trying to solve?



# What problem are we trying to solve?

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- Need to define the problem before we look at solutions....
  1. More feed more evenly spread (most farms)
  2. What type of feed (some farms)
  3. Do I have the infrastructure to cope?



# Truth 1: NZ nutrition is not that complicated

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- Grass, Grass silage, Maize silage, Grain and PKE are the best feeds a farmer can use
- “Best” can be defined in a number of ways depending on what you are wanting to do
- Getting the system right will solve 95% of the farmer’s and his/her cows problems



# Pasture is a pretty fantastic feed!!!!

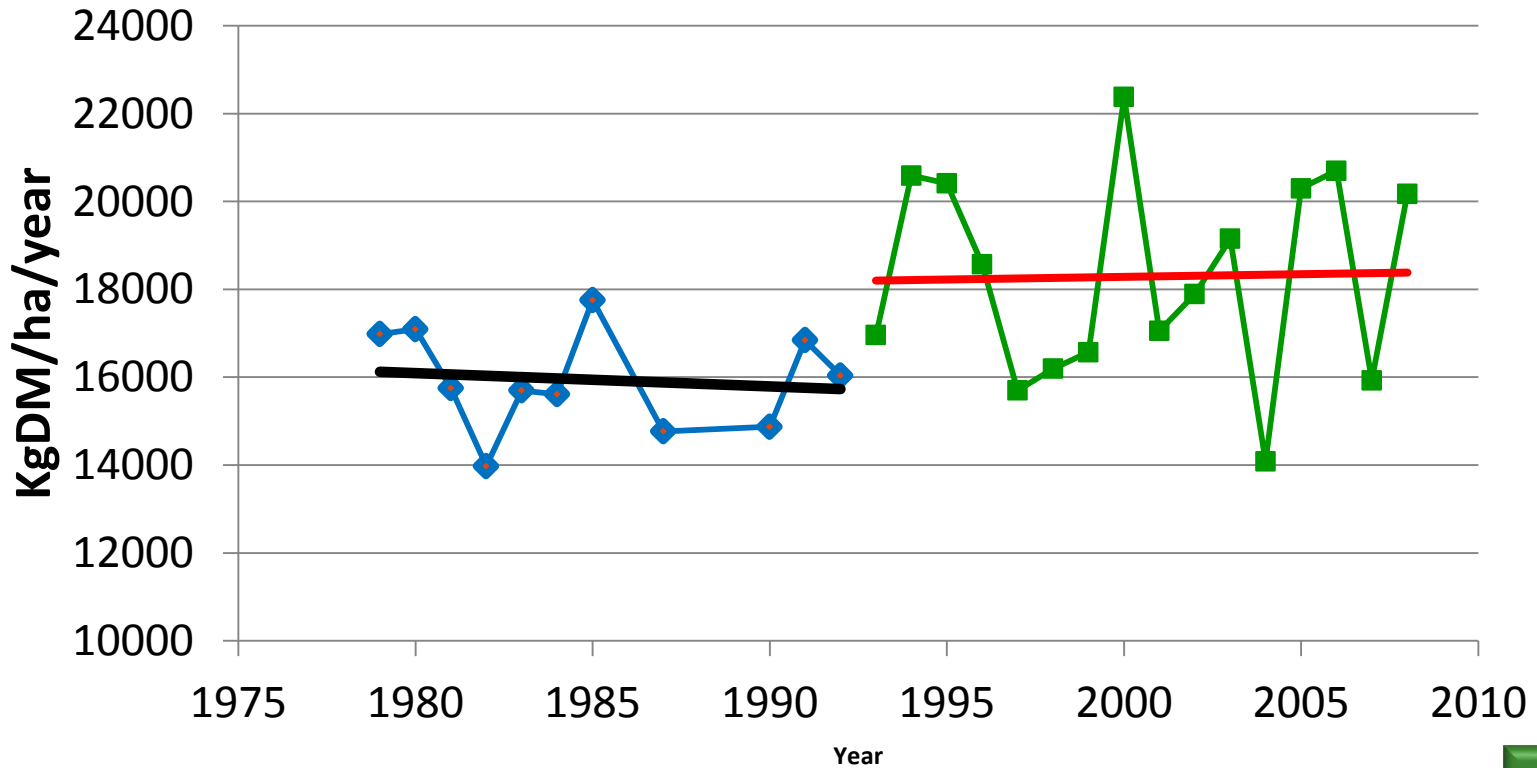
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- Pasture is enough
  - Good source of fibre
  - High in energy (usually)
  - More than enough protein
  
- The question is...Is there enough pasture?
  - Response to supplements is highest when cows are being underfed
  - Response should range from 60-160 gms depending on level of underfeeding



# Is there enough pasture?

## Ruakura No 2 dairy and Scott farm 1979-2009



◆ NoN    ■ Napplied    — Linear (NoN)    — Linear (Napplied)





# Truth 2: Most NZ cows lack 1 thing.....

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- Most New Zealand cows are short of only 1 thing.....

Energy



# NZ Dairying's number 1 missing ingredient

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# Energy



# Most herds need more energy!

## Nutrients first limiting milk production on high quality pasture diets

litres milk per cow per day	Nutrient first limiting production
20	Energy
25	Energy
30	Energy + protein
35	Protein

# Intake drives milk production

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- Intake determined by
  - Energy outflow (more energy out requires more feed in)
  - Size of the animal
    - Smaller animals eat higher% of BW than larger animals
    - 400 kg Jerseys (4%) vs 600 kg Holstein Friesian (3.5%)
  - Feed quality (digestibility of feed)



# Feed Quality is KEY

Cow requirement	MJ ME per day
Maintenance @ 450kg weight	54
Walking 3km (2MJ/km)	6
Milk solids (1.8 x 80MJ/kgMS)	144
LWT loss (05kg x -37MJ/kg LWT)	-19
<b>Total</b>	<b>185</b>

Feed quality	ME MJ/kgDM	ME kgDM/day	Intake kgDM/day
High	12	178	14.8
Medium	11	185	18.3
Low	10	192	20.9

1. Cows need to eat enough to get ME needed
2. Achieving intake is easy with high quality feeds



# Feed Quality

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- The higher the ME the higher the Intake

BUT

- High ME usually means low fibre (increased risk of acidosis)



# Different Foods Do Different Things

Starch/Sugar	Fibre	Protein
Provides energy for microbial production	Causes cow to chew cud, provides energy for microbial production	Provides base amino acids for microbial production
Causes production of Proprionate and Lactate	Causes the production of acetate and buterate	
Therefore drives milk volume and milk protein	Therefore drives milk fat	Therefore drives milk volume and milk protein
Sources		
Grain, molasses, cell contents, potatoes, maize silage, fodder beet	Grass, Hay, Silage, PKE, broll	Grass, Brassica tops, grass silage, soya, cotton seed, canola, DDGs

# Differences between feeds

	Pasture	Starch (maize grain)	Fibre (broll)	Sugar (molasses)
	<b>Intake</b>			
Drymatter intake, kg/day	14.9	17.6	18.1	16.1
Pasture, kgDM/day	14.9	13.7	13.5	14.9
Concentrate, kgDM/day	0	3.9	4.7	1.2
ME intake MJ/day	2119	2369	2516	2214
	<b>Milk Yield</b>			
Milk yield kg/day	23.14	27.70	26.21	23.56
Milk fat yield kg/day	1.03	1.07	1.16	1.06
Milk protein yield	0.8	1.01	0.94	0.79

- Starch drives milk protein
- Fibre drives milk fat



# Starch vs. fibre

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- Starch and sugar based supplements produce more milk protein
- Fibre based supplements produce more milk fat

Milk protein is worth more than milk fat, i.e. starch based supplements will deliver more milk revenue\*

	Percent of extra milksolids		Estimated milk revenue	
	Fat	Protein	\$5.50/kgMS	\$6.50/kgMS
PKE	75	25	\$370	\$440
Barley	25	75	\$570	\$675
Maize grain	20	80	\$675	\$800

\* Adapted from Roche and Hedley, 2011. Supplements – the facts to help improve your bottom line. DairyNZ Technical Series July, 2011 p 6-10. Assumes grazing residuals of 1,500-1,600 kgDM (7-8 clicks on RPM). Responses decline when residuals are higher than 1,600 kgDM (i.e. cows are better fed). In-shed feeding system . For a full list of assumptions see <http://www.dairynz.co.nz/file/fileid/37671>.



# What do we need? Forage or Concentrate

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## FORAGES

- Bulky (Fibrous)
- Low dry matter (except Hay)
- Low to med mjME/kgDM
- Usually cheaper/kgDM

### When should you feed forages?

- To extend round
- Build cover
- Fill a feed gap

## CONCENTRATES

- Highly digestible
- Usually processed
- Very little effective fibre
- High DM

### When should you feed concentrates?

- Increase energy intake with less substitution (e.g. spring)
- Correcting a major deficiency (e.g. protein in summer)



# Forages

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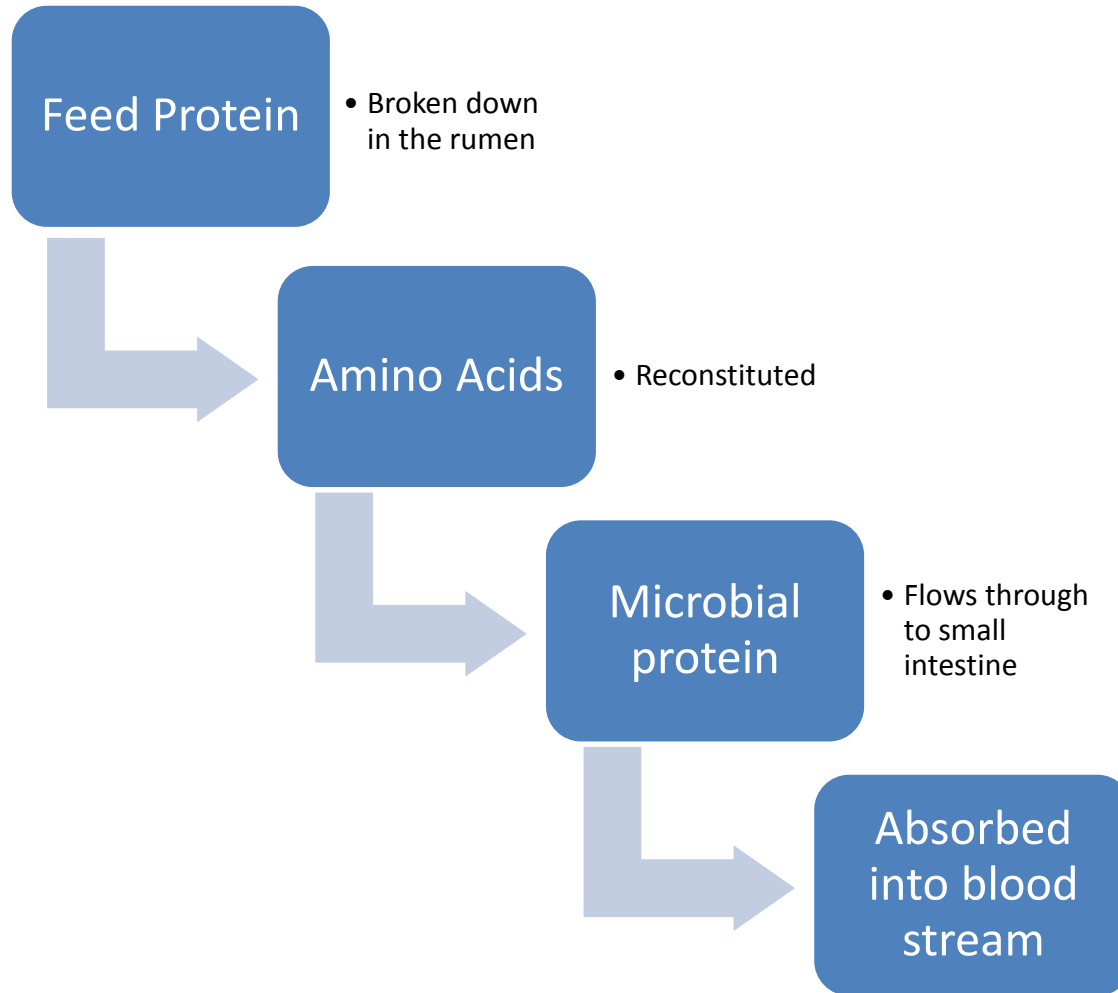
# Concentrates

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# What About Protein

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# How much protein is required?

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Stage of Lactation	Min Protein %
Early	18
Mid	16
Late	14

# However.....

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- A lot of protein feeds are sold to farmers when production is low (with the hope of lifting production)
- Protein feeds are usually high in energy
- Farmers often think they are getting a protein response vs an energy response!
- Protein is THE most expensive feed
- Pasture is a great source of protein



# Return to Protein Supplements

Milk price		\$5.00	\$6.50	\$8.00
Revenue from MS response		0.4	0.52	0.64
Savings from maize not fed (incl. 10% wastage)	0.28	0.392	0.392	0.392
Revenue + savings		0.792	0.912	1.032
Cost of soyabean meal	0.76	0.76	0.76	0.76
Cost of wastage at 10%		0.076	0.076	0.076
Total cost of soyabean meal		0.836	0.836	0.836
Revenue over feed costs		-0.04	0.08	0.20

Source: J Kay, DairyNZ 2015





# What About Fibre

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- Cows need to chew their cud....produce sodium bicarb
- Fibre is critical for cud chewing....
- Runny poo means nothing in most grass based cows
- BUT IF you are feeding large amounts of concentrates, fibre maybe beneficial



# Truth 3: Get the system right!

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- In order to find the right solution you need to accurately define the problem
- A number of top farmers are producing 2000-2200MS/ha very profitably on 3 feeds:
  1. Grass
  2. Maize silage
  3. Palm Kernel Expeller



# What are the core fundamentals?

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- Pasture harvest and the role of supplements
- 2 Non negotiables (BCS, Pasture cover)
- Cost control (esp. cost of feed)
- Optimising Intake
- Having the right cow (size, breed) and the right cow numbers (comparative stocking rate)



# Cost comparison of feeds

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1. Define the problem to work out what you need
2. If its more energy.....
  - a. Wet weight X DM% = kgs DM
  - b. Price per wet tonne ÷ kgs DM = c/kgDM
  - c. c/kgDM ÷ mjME/kgDM = c/mjME

e.g. PKE = 1T X 90%DM = 900kgsDM

\$350 ÷ 900 = 38.8c/kgDM

38.8c/kgDM ÷ 11mjME = 3.5c/mjME



# Cost comparison of feeds

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1. Define the problem to work out what you need
2. If its more protein.....

a.  $\text{Wet weight} \times \text{DM}\% = \text{kgs DM}$

b.  $\text{kgsDM} \times \text{CP}\% = \text{kgsCP}$

c.  $\$/\text{tDM} \div \text{kgsCP}/\text{tDM} = \text{c}/\text{gmCP}$

e.g.  $\text{PKE} = 1\text{T} \times 90\%\text{DM} = 900\text{kgsDM}$

$$900\text{kgsDM} \times 14\%\text{CP} = 126\text{kgsCP}$$

$$\$/\text{tDM} \div 126 \text{ kgsCP} = \$3.09/\text{kgCP}$$



Feed	\$/tDM	mjME/kgDM	CP%	c/mjME	\$/kg CP
Maize silage	270	10.8	8	2.50	\$3.38
Grass silage	400	9.5	16	4.21	\$2.50
Hay	700	8	8	8.75	\$8.75
Meal	500	11.5	16	4.35	\$3.13
Canola	600	11.5	38	5.22	\$1.58
PKE	290	11	14	2.64	\$2.64
Soya meal	780	12.5	48	6.24	\$1.62
Maize grain	550	13.5	10	4.07	\$5.50



# Supplementary Feed Price Calculator

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- Great tool.
- You put in your assumptions and feeds and it spits out a price
- <http://www.dairynz.co.nz/feed/feed-management-tools/supplement-price-calculator/>



# Summary

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- Truth 1: NZ nutrition is not that complicated
- Truth 2: Most NZ cows lack 1 Energy
- Truth 3: Get the system right, to make the most profit





A photograph of a lush green cornfield. The corn plants are in the foreground, with their long, pointed leaves reaching upwards. In the background, a line of trees is visible under a bright blue sky filled with large, white, fluffy clouds. The overall scene is bright and sunny.

Thank you