

Three challenges of really “magic grass”

Getting the best out our great
resource

The joys of “magic” grass are obvious

- High dry matter intakes- eat lots of bites
- High nutrient value – each bite is full of nutrients
- High daily nutrient take = lots of milk

- The alternative is not so good in a grazing world

- Too much fibre, low energy and protein
- Low Feed intakes each day
- Low milk yields commonly

Even “magic” grass needs managing and balancing

- Typically lacking in **effective** fibre as we are actively managing to keep NDF % low and intakes high.
- Often plenty of fermentible carbohydrates that are great energy, but breakdown and make mild acids in the rumen
- This doesn't change our well founded goals for pasture quality , just keeps us thinking about getting the best from grass

Feed type/rate of intake/salivation

Feed	Intake gms/min	Saliva mls/min	Saliva mls/g feed
Grain/pellets	357	243	0.68
Fresh grass	283	266	0.94
Silage***	248	280	1.13
Dry grass	83	270	3.25
hay	73	254	3.63

Impact on forage texture on saliva bicarb flows/day: Natural buffering

Hay coarseness	Fine	Medium	Coarse
Intake DM kg/day	22.6	22.8	22.6
Milk kg/day	24.4	26.4	24.7
Milk fat %	3.2	3.5	3.8
Ruminal pH	5.5	5.8	6.25
Eating min/24hrs	322	346	350
Ruminating min/24	381	484	496
Additional saliva Bicarb flow g/day	-	161	181

Part A: SARA - The Acidosis you have when you don't have acidosis

- **S**ub **A**cute **R**uminal **A**cidosis (SARA)
- IS NOT ABOUT LACTIC ACID AT ALL
- Is an accumulation of the good energy acids , propionate acetate and Butyrate

- Common when cud chewing is limited
- Common seasonally in Tassy
- Is not about grain feeding (though it can certainly increase it)
- Is a problem without being obvious = no scours !

Rumen pH Decline and Impacts

6.5 - 6.1 **Safe but Suboptimal** - Typical of excess fibre diets : favours cellulytic microbes and acetate at expense of propionate production.

DMI Limited
Total VFA yield low

6.1 - 5.9 **Optimal** - Rumen conditions ideal for both acetate and propionate producers.

Optimal DMI
Optimal VFA yield 7 ratio
Optimal energy yields

5.9 - 5.5 **SARA Range** - Reduced Fibre digestion to acetate by cellulytic microbes. Propionate digestion continues.

No lactic acid accumulation in this range.

DMI decreased
VFA balance and yield to energy impacted
Low level health impacts likely

5.5 - 4.5 **Clinical Acidosis Range** - Fibre digestion to acetate fully compromised. As lactic acid production comes to dominate with pH decline, propionate production is also compromised.

Big DMI decline
Clear health impacts
VFA yields to energy greatly reduced



90% of what we see
10% of what we see

FEEDWORKS.

Performance through Science

This is not about grain specifically ! Rumen pH on clover pasture, low grain intake (kyabram-various)

	Stockdale 1993	Stockdale 1993	Stockdale 1994	Wales 2005	Williams 2005	Williams 2005	Williams 2005	Williams 2005	Williams 2005	Williams 2005
Mean pH	6.3	5.8	6.0	6.1	5.9	5.7	6.0	5.9	5.8	5.8
Min Ph	5.8	5.6	5.6	5.8	5.5	5.5	5.8	5.6	5.6	5.6
Hours <pH6	4	>15	>16	7	21	24	11	16	19	20
Persian or Sub	p	p	p	s	p	p	p	p	p	P
Intake kg	8	15	17	13	12	19	6	10	16	20

SARA symptoms- not overt stuff

- Low dry matter intakes , poor foraging
- Loose , but not scouring
- Lower fat test , but protein maybe fine
- Poor feed conversion efficiency
- Lower milk yields (around 1-2 L/day)
- Cows just not firing !

Digestibility of Nutrients of Perennial Ryegrass in response to culture pH

Wales et al. (2004)

	Variable Ph 5.6	Variable pH 6.1	Difference, %
OM – true digestibility (%)	59.0c	69.1a	+ 15
NDF - fiber digestibility (%)	46.2c	65.6a	+ 30
ADF – fiber digestibility (%)	47.7c	74.7a	+ 36

P < 0.05

Fibre Digestability +/- SARA

Krajcarski-Hunt 2002 Uni Of Guelph Canada

Feed type	SARA pH 5.7	Control pH 6.4	P
Grass hay 24Hr	24.6	31.5	NS
Grass hay 48Hr	36.9	51.3	0.05
Legume hay 24hr	26.3	35.3	0.05
Legume Hay 48hr	35.8	49	0.05
Maize silage 24hr	37.2	44	0.05
Maize silage 48hr	44.8	56.1	0.5

Part B: The great mystery of seasonal depression of fat yield

- Yield depression is different to the stuff that just happens as volume goes up eg dilution
- Its also related to the wonders of modern pastures , but this time around the fat or lipid content of the grass
- Its the reason you get inverted protein/fat tests, or big crashes in fat with bugger all grain
- Relates around grass being 6% fat not 2-3% fat these days, and high intakes as well

Consider that fat depression has two broad causes

- **Lack of raw materials-** mostly the precursor Acetate, caused most commonly by killing the bugs that ferment fibre, rather than lack of fibre.... This is the traditional view ,but doesn't cover all bases
- **Impedements to production** of fat from the precursors within the mammary gland. This side of things was/is much less understood...and fills some big gaps.

Fat from pasture and feed in the rumen

- Conversion of veg oil into animal fat (poly unsaturated fats to saturated fats) by bugs
- Old times = 12kg pasture @ 3% = 360g/day
- Current = 15kg pasture @ 6% = 900g/day
- Lots more fat and less time to process it all
- Get partial processing to things called CLAs

CLAs

- Conjugated Linoleic acid....dont worry about the name , its sort of not veg oil and not animal fat, but in between
- Always some around in the rumen, but in our "modern" world we get different types to normal.
- The outcome is that the wrong ones get made, then absorbed into the blood , go to the mammary gland and tell the udder
"STOP MAKING MILK FAT"

Pathway of Fat processing in the rumen:

Normal

Abnormal

linoleic acid
(*cis*-9, *cis*-12 C_{18:2})



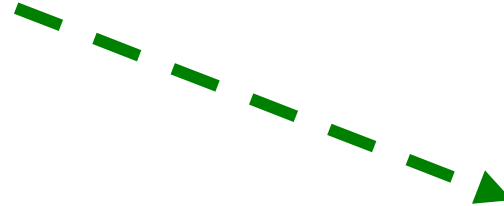
conjugated linoleic acid
(*cis*-9, *trans*-11 CLA)



trans-11 C_{18:1}



stearic acid (C_{18:0})



conjugated linoleic acid
trans-10, *cis*-12 CLA

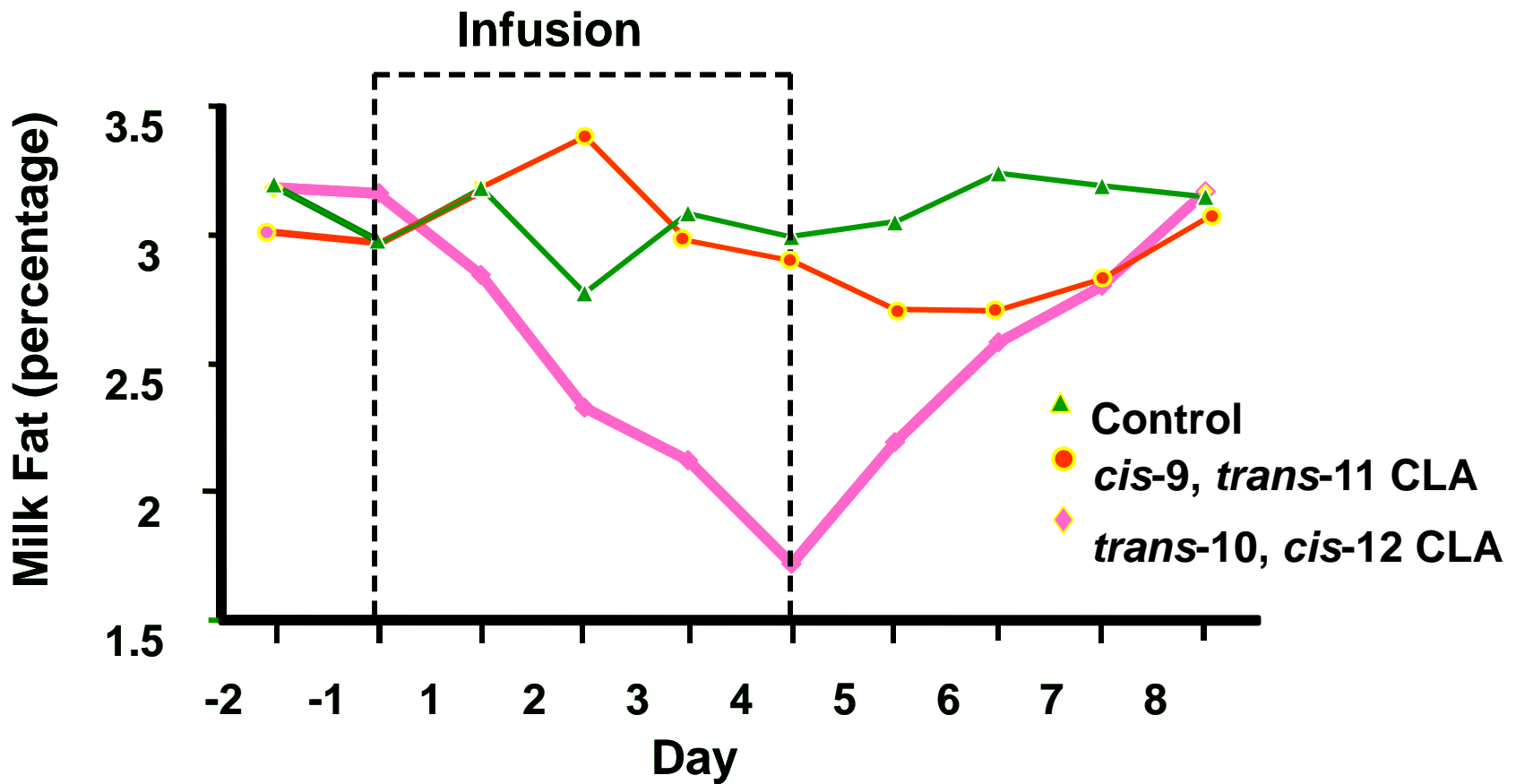


trans-10 C_{18:1}

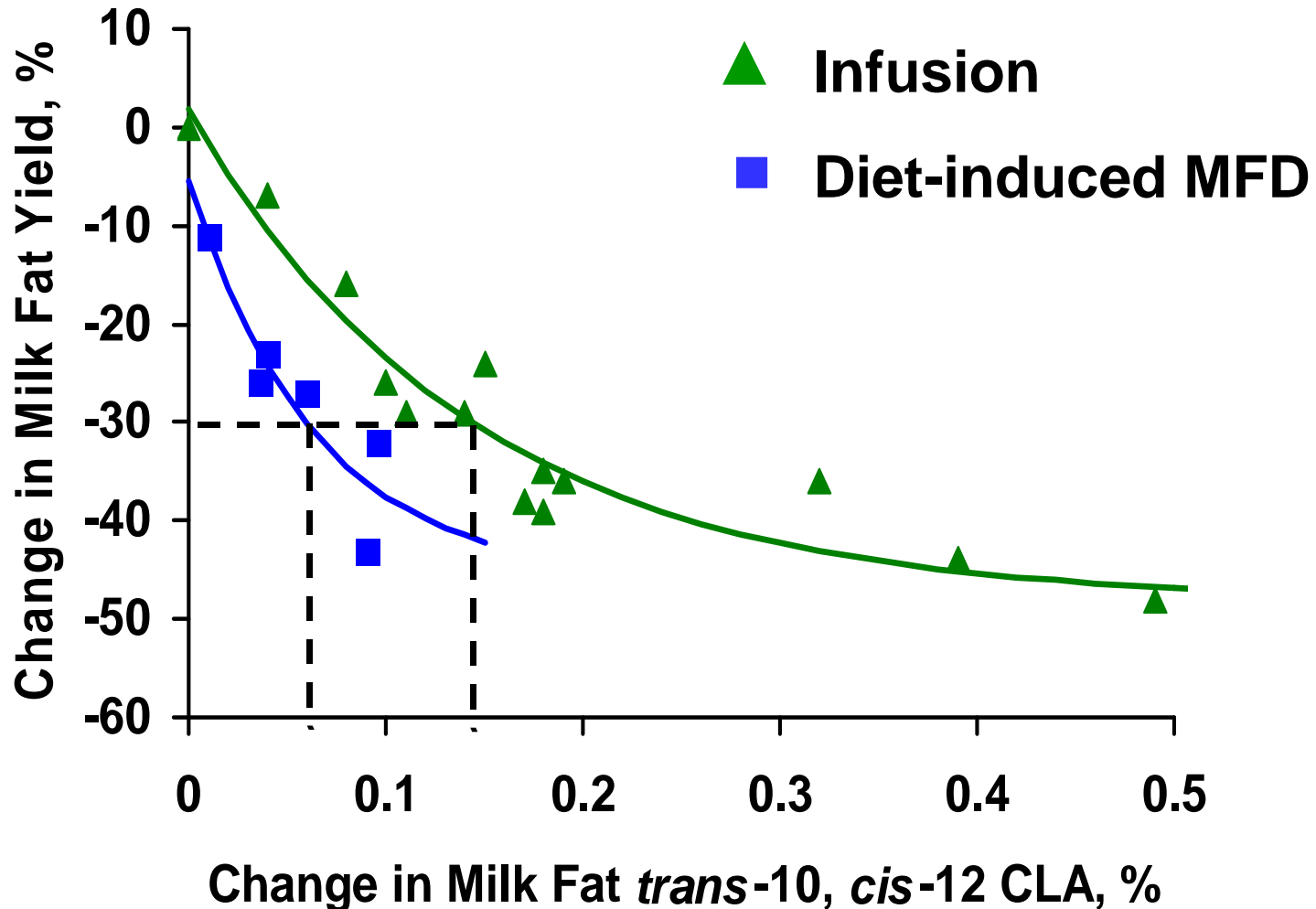


stearic acid (C_{18:0})

Effect of CLA type on Milk Fat



Post-Ruminal Infusion vs. Diet-Induced MFD



What triggers the change in pathway to the Trans-10 ones

- SARA is most common way it occurs, thus the clear link to the early bit of the talk
- Ionophores can change it too
- What can you do to set the pathway right ?
- Effective fibre , rumen raft , cud chewing .
So a wee bit of hay or straw CAN help,
but the rumen bugs don't always "reset" !

Potential benefits of CLAs in human health

- The C9 T11 ones are amazing in that they cure cancer...yes seriously, they have been shown to consistently and reliably reduce early malignancies
- The T10 ones that depress milk fat can stop weight gain in humans, and fat falls off you !
- Two MASSIVE potentials for dairy value adding !

Part C-Slow starch for magic grass! Integrating purchased feeds for best response

- Very recent completed major work from Ellinbank over 12 months.
- 1= 10kg grazing + winter cereal grain+hay
- 2= 10 kg grazing+ (grain+Hay in mixer)
- 3= 10 kg grazing +(grain+corn+Hay mixer)

- #3 group (combo corn+ wintergrains) had higher intakes and made more milk...why?

Slow starch benefits

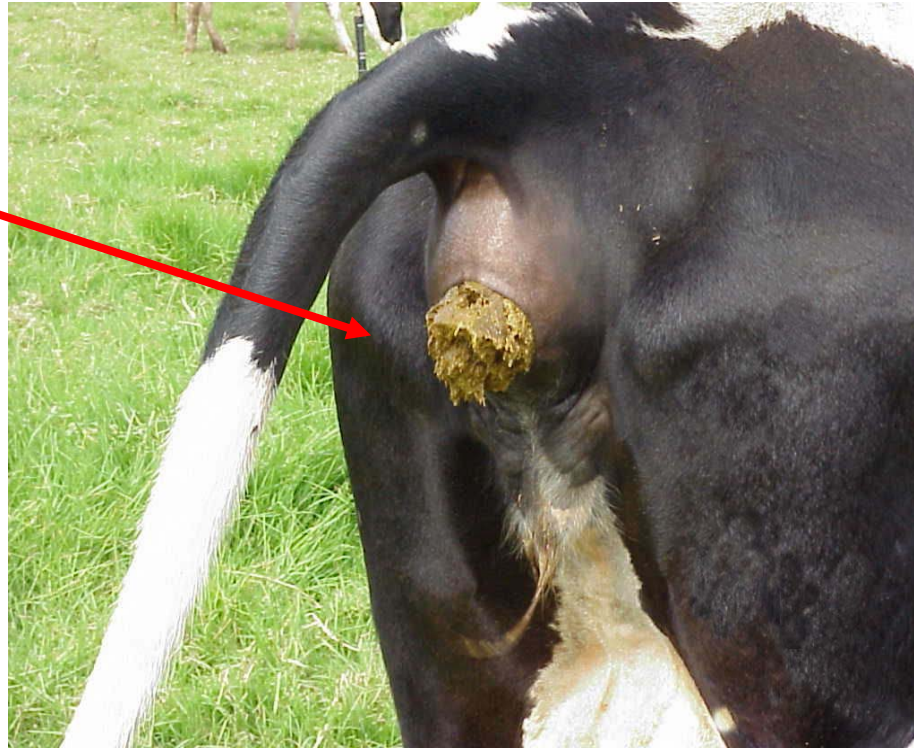
- 1- in wheat/barley all digestion is in the rumen ...and fast
- 2- In corn less ruminal digestion , more intestinal digestion, and rumen digestion is slower too
- 3-Intestinal digestion yields more glucose(energy) then digestion in the rumen

What we see in practice with combo of fast and slow starch

- Happier ruminants and less SARA
 - Better foraging and daily intakes
 - Better glucose and energy yields
 - Better protein tests
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- Great impacts are likely in calving and early lactation especially

**Thank you for your
attention!**

The end



Good food makes good faeces.....