

### Transition cows & ketosis James Manning James Husband



### Newcross Farm: Key points

- 355 cows
- 3 times a day milking
- Currently yielding 38L/cow with 305 day yield of 11,700 L
- All milkers fed as one group
- Calving interval 405 days

# Yields- before and after 3x day





### Dry cow management

Two groups

Aims

- FAR OFF- maximise rumen fill without overfeeding with starch and sugars
- TRANSITION- control the DCAB and keep intakes as high as possible

### Dry cow rations

Diet name:	Far off Transitions 8.3.14	
Animal details		
Milk Yield (kg)	0.0	0.0
Milk fat (g/100g):	0.0	4.0
Milk protein (g/100g):	0.0	3.2
Feeding plan (kg as fed/head/d)		
GS 2nd cut est	-	2.000
Maize Silage -30% Starch	-	10.000
2nd cut RG haylage	7.000	-
Straw -Wheat	7.000	4.000
Rapeseed -extracted	-	0.750
Soya-Hipro	-	0.750
Calcium Chloride	-	0.100
Dry Cow mineral	0.100	-
Dry Cow mineral with biotin	-	0.100
Limestone	-	0.050
Magnesium Chloride	-	0.125
Manning moist mix	-	4.000



### Main challenges: Metabolic health



Ketosis versus Acidosis in early lactation



### Dairy cattle: metabolic athletes



### How many 4-bar Kit-Kat's needed?

- 700kg cow
- Giving 50L of 3.8% BF, 3.1% protein

ebvc

• Not using any body-fat reserves

a) 20 b) 80 c) 120 d) 340

#### Predicted dry matter intake and ME requirements vs. predicted intake





# (Mal)adaptive responses

- In moderation, fat mobilisation & ketogenesis are beneficial.
- In extreme, they are detrimental to animal health, productivity & fertility.



# **Clinical ketosis**



- Uncommon
  - 0.5-1 cases per 100 lactations
- Clinical signs
  - Sudden milk drop –
  - Selective anorexia
  - Breath smells of pear drops
  - Neurological signs
- >3.0mmol/L BHB
  arbitrarily defined as CK

#### **Reduced production**



393kg milk per lactation

Blood BHB >0.96 mmol/L

#### Increased metabolic disease



Risk ratio: **4.4** LDA, RFM, ketosis, metritis

#### **Reduced fertility**



Decrease preg risk 13%

Ospina et al., 2010

#### Conditions contributing to displaced of the abomasum



# Subclinical ketosis

- 'Type I' ketosis
  - Energy output exceeds supply
    - Over a long time period
    - Or greater than adaptive responses can operate
  - Typically week 3-6
    - Greatest mismatch between DMI & output



### Subclinical ketosis

- 'Type 2' ketosis
  - Excessive fat mobilisation & insulin resistance
    - A sign of transition 'mismanagement'
    - Fatty liver usually also present
  - Typically week 1-3





# Cost to industry

### Subclinical ketosis: \$78 USD, Clinical \$145 USD

(Geishauser et al., 2001)

	Nature of cost	Impact	Unit cost (£)	Cost per case
Direct cost	Reduced milk yield @ MOPF <sup>1.</sup> of 17ppL	353 Litres <sup>2</sup>	0.17	£60.01
Indirect costs	Extension of Ca-Co interval	16 days <sup>3</sup>	3.00	£48.00
	Incr. risk of LDA <sup>4</sup>	2.60 x incr. <sup>6</sup>	398.00	£10.82
	Increased risk of culling <sup>6</sup>	1.40 x incr. <sup>5</sup>	1050.00	£84.00
	War Purchasad Food	Total:	£202.83	

eb

<sup>2</sup>·Rajala-Schultz P, 1998

<sup>3.</sup> Walsh. 2007a

<sup>4</sup> Based on an estimated UK incidence of 1.7 cases /100 cows /yr (Vecqueray & Husband, 2010)

<sup>5.</sup> Based on an estimated UK incidence of 21 culls/ 100 cows /yr (Vecqueray & Husband, 2010)

6. Duffield et al., 2009

<sup>7.</sup> Duffield et al., 2002

On average, what percentage of cows get subclinical ketosis at least once in a lactation?

a) ~2%

b) ~10%

c) ~30%







### Monitoring at Newcross

- Urine pH precalving: aim for 7.75
- Fresh cow yields
- Metabolic disease incidence
  - LDAs
  - Milk fever
  - Retained placenta
- Cow measurements
  - Blood ketones and occasionally precalving NEFAs

ec

- BCS at calving
- Temperature
- Appetite / rumen fill & dung

# Monitoring : Yields in 1<sup>st</sup> month

	<u>.</u>				19/03/201	Cell	16/04/201	Cell	21/05/201	Cell	cf.	cf.	Davs	Peak	Yield to
	Category	INO.			4	count	4	count	4	count	self	herd	ΡP	yield	3rd date
	All.cows	182			43 45 km	197	44.76 km	171	43 04 km	107	2%	21%	175	55.5	7 822
	May 14	10			0.00 kg	101	0.00 kg		42.83 kg	49	0%	3%	14	42.8	541
	Apr14	19			0.00 kg		41.41 kg	42	53.24 ka	34	3%	19%	36	53.6	1.716
	Mar14	19			40.65 kg	71	52.74 kg	63	53.63 kg	53	4%	21%	66	56.2	3,304
	Feb 14	26			50.95 kg	48	53.55 kg	83	53.32 kg	48	6%	26%	96	57.4	4,879
	Jan 14	18			51.37 kg	62	50.57 kg	44	45.81 kg	44	-4%	13%	124	54.4	6,118
	Dec13	15			48.21 kg	223	48.64 kg	141	45.97 kg	151	-1%	20%	159	57.4	7,969
	Nov 13	9			47.28 kg	127	47.08 kg	220	44.51 kg	171	3%	21%	182	54.6	8,714
	Oct13	13			45.12 kg	179	44.11 kg	416	40.23 kg	88	0%	22%	214	57.2	10,247
	Sep 13	9			38.36 kg	662	36.54 kg	198	30.90 kg	192	-9%	10%	251	58.2	11,289
	Aug 13	6			42.07 kg	143	40.42 kg	93	30.18 kg	76	-8%	20%	278	60.5	13,618
	Jul 13	13			37.69 kg	662	37.27 kg	478	31.01 kg	430	1%	16%	307	54.2	12,937
iroup	Animal ID	P	Calving date	Present status	19/03/201 4	Cell count	16/04/201 4	Cell count	21/05/201 4	Cell count	cf. self	cf. herd	Days PP	Peak yield (kg)	Yield to 3rd date
	47	2	14/05/2014	NH/Mi					47.10 kg	43	0%	18%	7	47.1	306
	48	2	06/05/2014	NH/Mi					46.00 kg	65	0%	- 7%	15	46.0	637
	1410	3	13/05/2014	NH/Mi					44.20 kg	59	0%	3%	8	44.2	328
	1436	2	05/05/2014	NH/Mi					49.30 kg	44	0%	15%	16	49.3	729
	1459	2	03/05/2014	NH/Mi					34.10 kg	61	0%	-21%	18	34.1	567
	1467	2	13/05/2014	NH/Mi					38.90 kg	34	0%	-4%	8	38.9	288
	1492	2	01/05/2014	NH/Mi					30.10 kg	162	0%	-31%	20	30.1	557
	1532	2	02/05/2014	He/Mi					51.80 kg	19	0%	19%	19	51.8	910
	1547	2	04/05/2014	NH/Mi					44.40 kg	14	0%	3%	17	44.4	698
	1552	2	11/05/2014	NH/Mi					42.40 ka	27	0%	2%	10	42.4	392

ebvc

# Diagnosis of SCK

- 'Gold standard' remains laboratory blood BHB
  - BHB: good stability in blood
  - Research credentials
    - (most common outcome measure)
- Cow-side testing using diabetic testing kits
  - Relatively accurate
    - Se=91%, Sp=94%
  - Cheap & fast



# Milk ketone testing

- Ketotest milk strips
  - Not bad `ready reckoner', but not perfect

Ketotest cut-off	Sensitivity	Specificity
≥50 µmol	89%	77%
≥100 µmol	83%	82%
≥200 µmol	54%	94%

Oetzel, 2007

- Herd Navigator by DeLaval
  - Similar test used `in-line' + biomodel
  - Accuracy reportedly much better

### Pre-calving NEFAs

Sample	NEFA µmol/l
47	446
48	255
1410	323
1467	416
1552	364
1665	386
1698	474



### Fat:protein ratios (and friends)



Duffield (1997)

"...the protein-to-fat ratio, as a test, is not useful for discriminating among cows affected and unaffected with subclinical ketosis."  $\sim ebv$ 

### Conclusion

- Subclinical ketosis is an important disease of cattle
- Monitoring herd transition performance is central to prevention
- Prevention begins well before calving
- A coordinated farm approach between farmer and advisors is required.