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Updated Abstract

The present worldwide trend is for the number of smaller, mostly family farms, to decrease as larger more profit-oriented units, incorporating many modern.technologies, become more commonplace. The divergence between grass-based systems and housed herds will increase and may lead to branding issues. Despite all this change, the basic principles of profitable production systems and the major health and welfare issues faced by the dairy cow remain largely the same as 40 years ago. However there have been considerable improvements in our knowledge base, particularly in nutritional and reproductive management. The young calf typically spends only a few hours with its mother but is generally spared the worst excesses of white veal production. Despite research into optimum rearing regimes for dairy heifers, there is still substantial variability in what happens on the farm. Knowledge on the best way of feeding, training and introducing down-calving heifers into the dairy herd has developed considerably, but is not always applied. Similarly, for adult cattle, housing aspects, such as cubicle design, are being constantly refined and optimized for cow well being but are limited in application on the farm by economic considerations and in most cases they still do not match grazing in temperate climates for comfort. Most herds manage to achieve good average body condition at calving, but often with considerable within herd variation and, while the incidence of overt metabolic disease in early lactation is probably less than it was, the incidence of subclinical disease, in particular, mastitis and lameness and also poor fertility are still not well controlled. The advent of genomic technologies potentially offers increased opportunities to breed for "robustness" but this is still to be fully exploited. Increased mechanisation alongside Precision Animal Management Systems based on individual diet formulation on a daily or weekly basis offer exciting prospects for improving productivity, health and welfare of individual cows especially in large herds. Farm intensification coupled with increasing intercommunity trade in breeding livestock and climate change is slowly bringing a more diverse range of pathogens, parasites and pests into Northern Europe and this trend is likely to continue. In addition, legislative control over these and other welfare and environmental impact issues resulting from these pressures will increase due to public (and policy maker) disquiet about so-called "factory farming" and the concomitant increase in "hobby farmers". The latter present considerable difficulties to authorities in the face of notifiable disease outbreaks such as FMD. (402)

(Key words -, dairy cow, welfare, nutrition, quality-of-life.)

session 39

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HERAKLION, CRETE ISLAND, GREECE

HEALTH AND WELFARE POSITIVE NUTRITION FOR THE DAIRY HERD

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cost

FEED for HEALTH

HEALTH AND WELFARE POSITIVE NUTRITION FOR THE DAIRY HERD

Format of talk

Background

- *Changes in milk production/Quality of life*

The calf

- *Colostrum/Water/Automated feeding & more rapid growth*

Youngstock & heifer

- *More rapid growth/ Management/Diseases/Biosecurity*

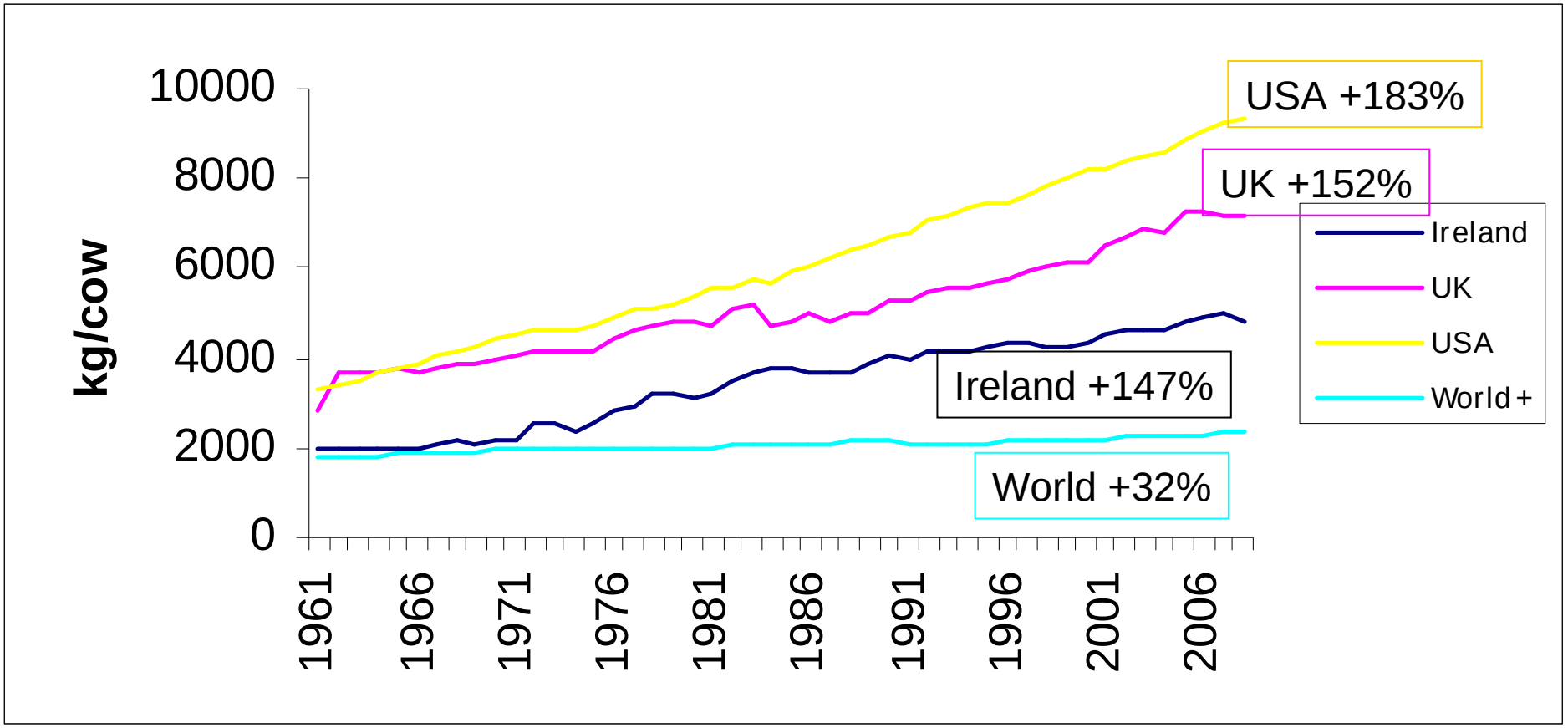
The cow

- *Nutrition analysis/Calving & transition/Early lactation,NEB & fertility/Genetics*

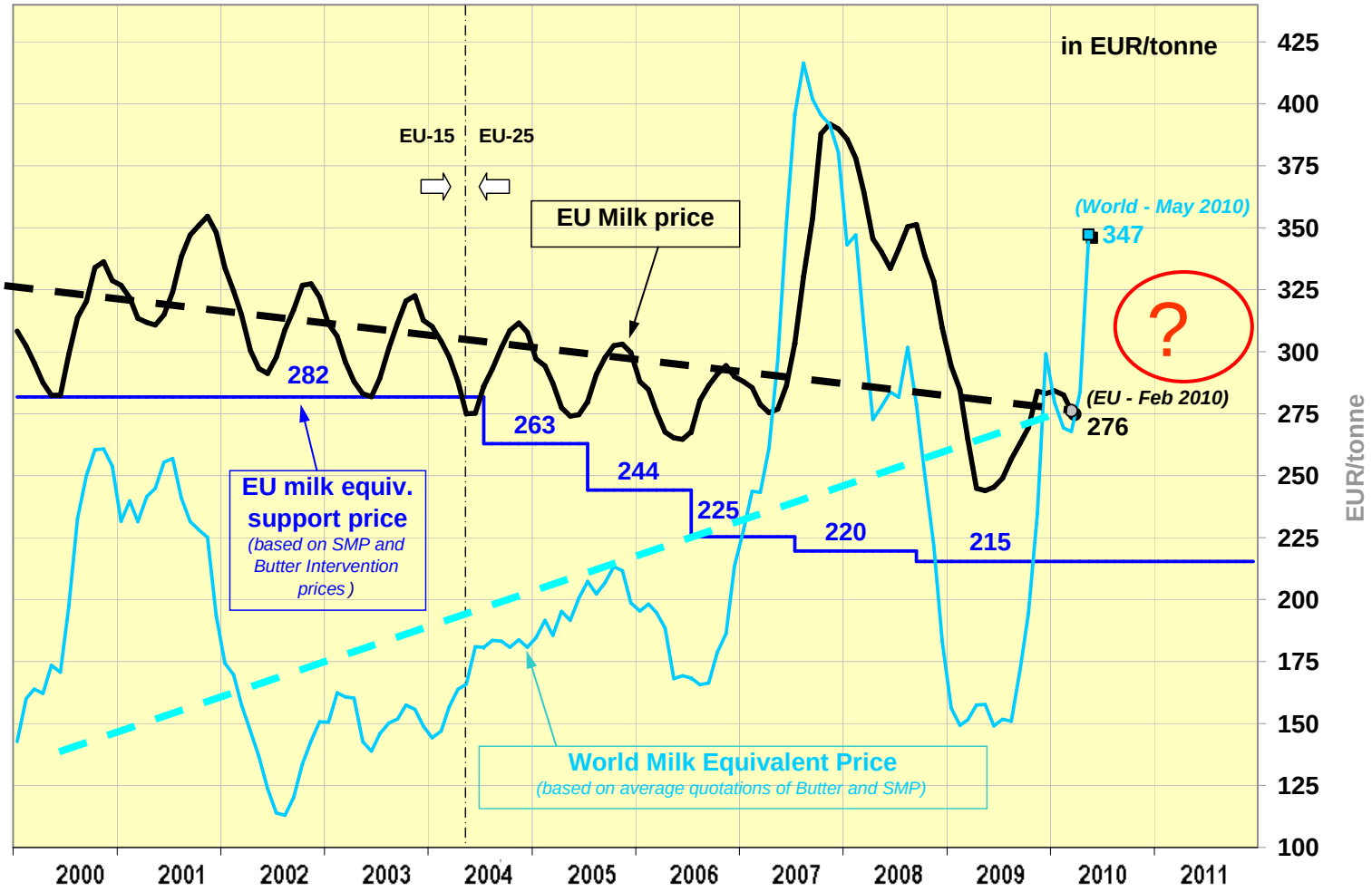
Technology

- *Automation & information overload*

Growth in milk yield/cow (1961-2008)

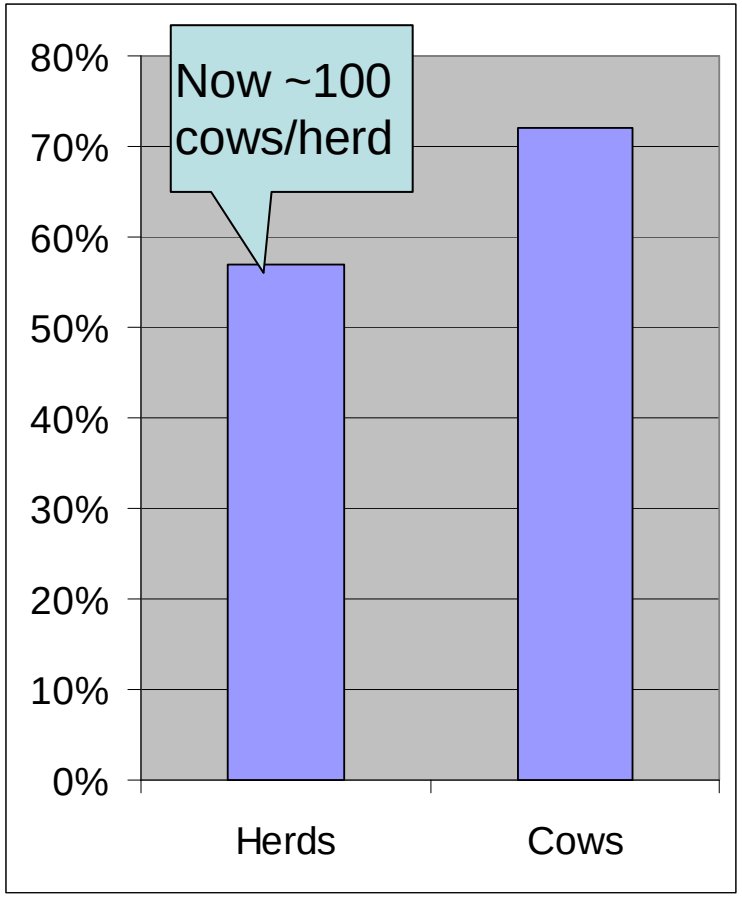


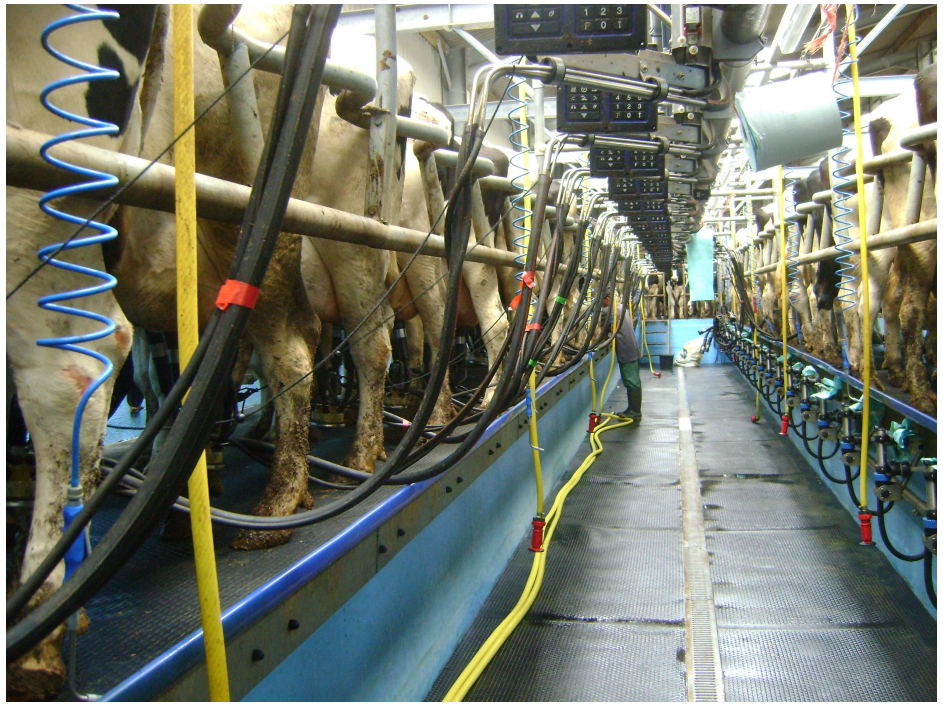
Changes in EU AND world milk price 2000 - 2010



Changes in dairying -1998-2008

UK Herds and cows in 2008 recorded as a percentage of number in 1998





Similarly number EU dairy herds has approx., halved in last 10 years

–NB quite area dependent.

UK has ~10% EU cows

Reasons for larger herds

- Milk price & economy of scale
- Increased individual performance
- Milking organisation & labour
- Grazing difficulties
- ?peer pressure?

NB Public reaction to 8,000 cow herd proposal in Lincolnshire England

- QOL issues

Quality of life issues

Human

- **Farmer:-** Profit, Way of life
- **Milk Buyer/processor:-** Profit, management of milk flow & quality for products
- **Retailer:-** Profit, "customer satisfaction"
- **Customer:-** safe, unadulterated, high quality, *cheap?* from "happy cows"
- **Government:-** environmental enhancement (at least neutral)

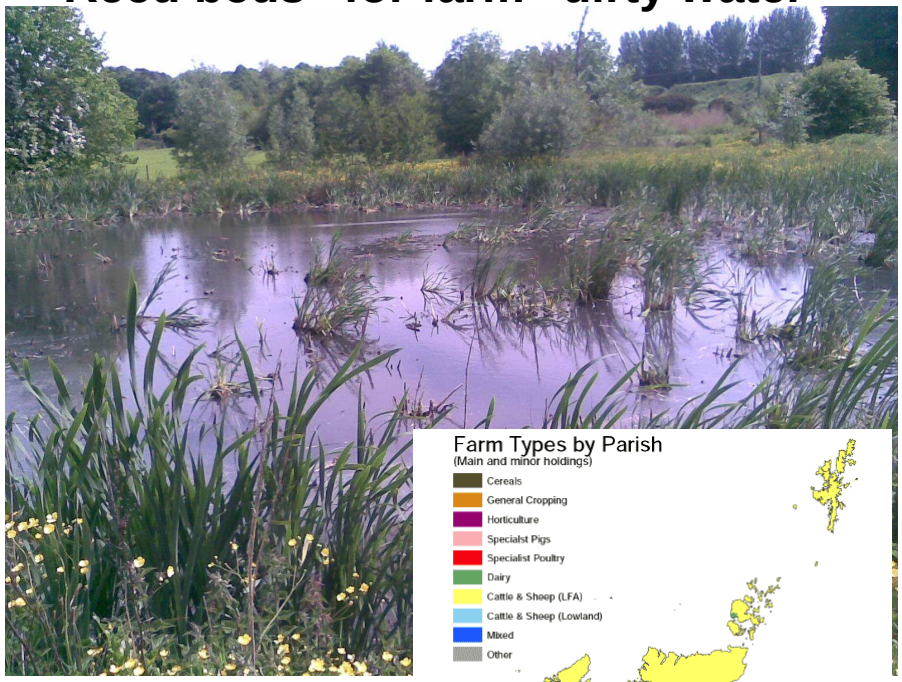
Cow

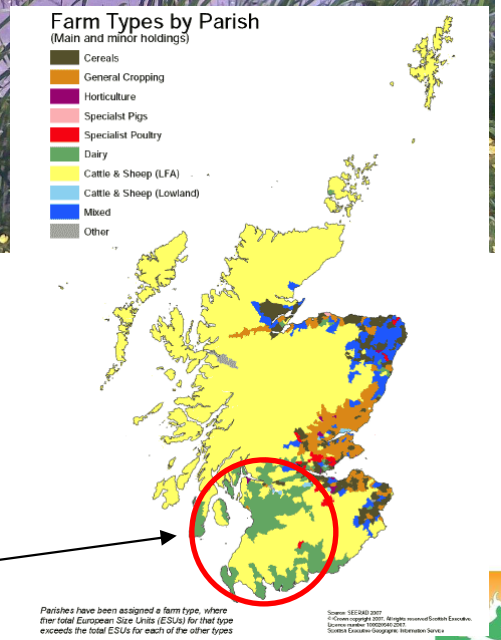
- What does she want?
- What can we give her?

Quality of life issues

Slurry spreading

“Reed beds” for farm “dirty water”



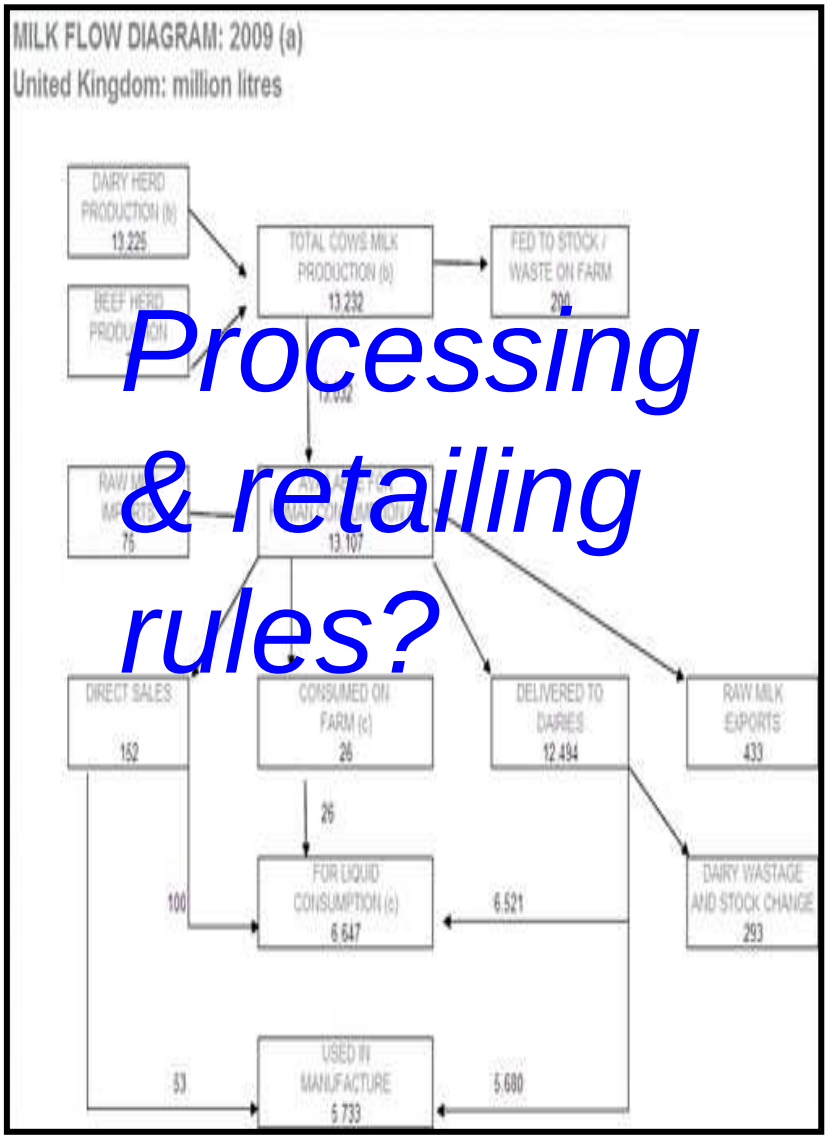


Government

- Enough food
- Sustainable food production
- Limited environmental effect
    1. *Nitrates in drinking water*
    2. *Phosphates in water*
    3. *Greenhouse gases*
    4. *“Nimby” – “not in my back yard”*

Dairying becoming concentrated regionally

Quality of life issues



Processing & retailing rules?

What about the farmer?

Farmers Guardian

Farmers quit in droves as milk price dives

11 August 2010 | By William Surman

SCOTTISH dairy farmers are quitting the industry in their droves as supermarket price wars continue to eat into farmers' returns, new data has revealed.

What about the cow?

- What does she want?
- What can we give her?

What about the cow?

Table 16 Welfare principles and criteria proposed for animal-based assessment by the FP6 Welfare Quality programme.

Welfare principles	Welfare criteria
Good feeding	Absence of prolonged hunger
	Absence of prolonged thirst
Good housing	Comfort around resting
	Thermal comfort
	Ease of movement
Good health	Absence of injuries
	Absence of disease
	Absence of pain induced by management procedures
Appropriate behaviour	Expression of social behaviours
	Expression of other behaviours
	Good human-animal relationship
	Absence of general fear

Note health is part of welfare!

Note "Distress" should be included

From Annex to the EFSA Journal (2009) 1143, 197-284

Ideal food?

FEED INTO MILK

A new applied feeding system for dairy cows

Edited by C Thomas

NOTTINGHAM University Press

1. Given her yield does the diet supply the cow's needs?
2. Are the constituents of the "assumed" quality.
3. How are they fed?- is there sufficient & is it accessible & suitable for:-
   - ***The cow to eat?***
   - ***The rumen etc., once eaten?***
4. Are there any other reasons the cow will not eat e.g. disease

Food supply dictates environment

Not a new issue!

"Considerable doubts have often been expressed as to whether we are not pressing high production in our farm animals too far, thereby undermining their constitution and so shortening their life"

Sir John Hammond, 1952
Special Report to British Assoc. Adv. Science

Interesting dilemma

" If improved (non- human) animal welfare is the aim, there is unlikely to be a case for improving one animal's lot if the price involves a greater harm (in terms of severity, duration and numbers affected) to the welfare of others."

James Kirkwood, UFAW 2007.

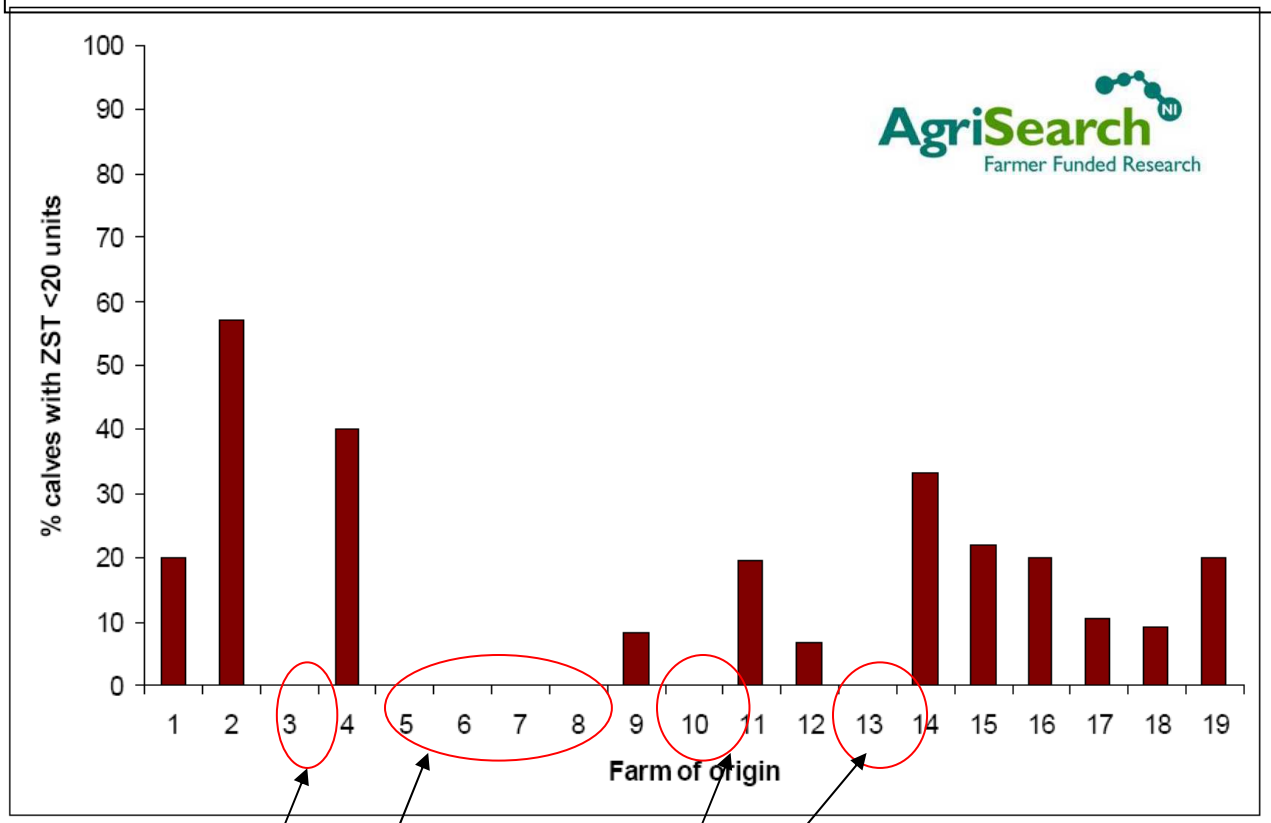
The dairy calf

- Colostrum
- Dam & calf
- Management of the calf
  - *a) automated feed*
  - *b) treatments*

The dairy calf – Colostrum

Good immunity can be achieved!

Figure 1. Effect of farm of origin on percentage of calves with immune status less than 20 ZST units

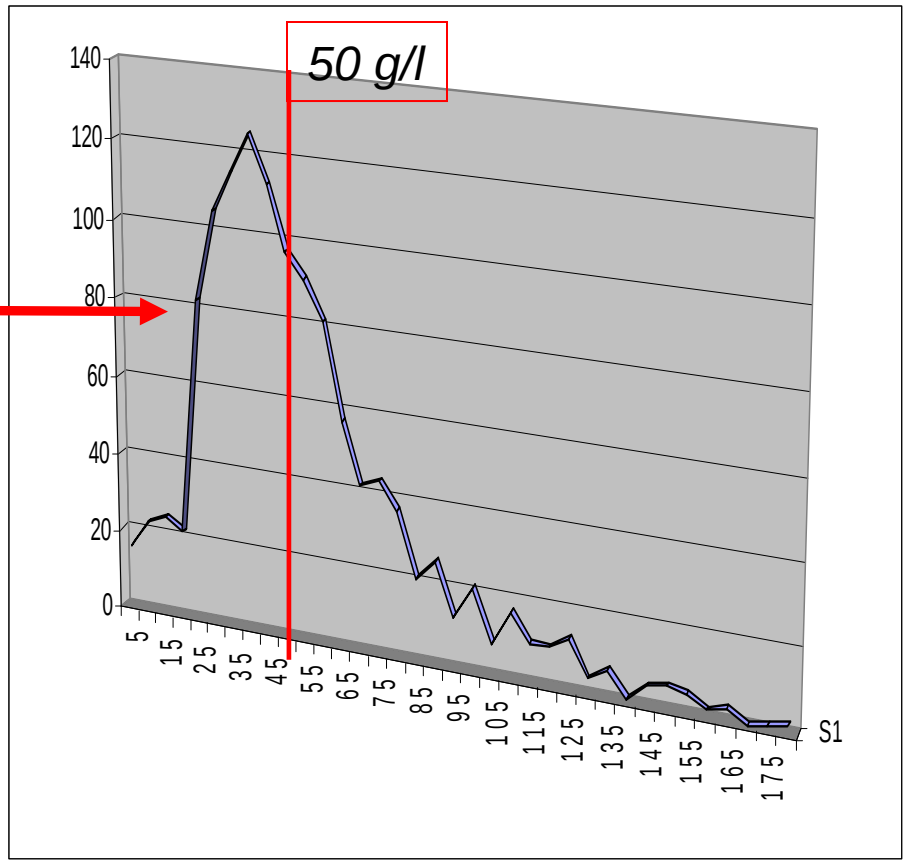


Dawson & Moss, 2009

- **~1/3 had no calves with low colostrum.**
- **Most farms with calves had some "low" calves (14% overall).**
- **Calves with <20 iu had significantly poorer growth.**

Colostrum Quality & the dairy cow

- Some evidence to suggest high yielding, HF cows, housed in winter may have low colostral IgG levels (<50 g/litre).
- Highest risk - 2nd lactation with high SCC.
- Some units in SW Scotland routinely administering "commercial colostrum" as well as from dam.



Adapted from Gulliksen et al, 2008

The dairy calf – Colostrum
Good immunity can be achieved!
Best practice

1. Calves born with assistance, should be given extra aid including, where appropriate, heat.
2. Encourage the calf to suckle at least 4 litres of colostrum from its own dam from a teat within 4 to 6 hours of birth. (may need more if dam IgG insufficient)
3. Monitor cow colostrum especially in late winter in older cows and supplement if necessary.
4. Approximately 1/3rd of calves (the smaller or less vigorous) will need supplementation by stomach tube.
5. Individual pen for first 3 to 7 days
6. Always supply water…

Calf nutrition

- Increasingly realised that calves are best fed >2/day
- Old aim ~ 0.5kg/d growth (to weaning)

  Based on a simple system but now automated feeders so:-
  - *Now >0.75 kg/d*
  - *Some aiming for 0.9 to 1.0kg/d?*

  NB caution high rates & weaning check
- Most farms in SW Scotland with automated feeders now feeding between 6 & 8 litres per day with a max of ~1.5 litres at one feed.
- Most calves drink this on each occasion (i.e. x4/d)
- They want to suck more than this!

(Organic)

Calves want water

- Young calves - ~0.5 l/d

(Macleod* 2009)

- Older calves ~1.5 l/d* (Gillespie*, 2008; Macleod*. 2009)

***When automated machine broke down for 12 hrs intake went up to 2.5 l/d**

**Final year student projects at SAC Dairy Cattle Research Centre, Dumfries*

Calf health & “milk” intakes

more intake/more feeds = better health?

Calf losses are too high ~5% or more (depends on BVD?)

Main treatments are for calf diarrhoea & pneumonia

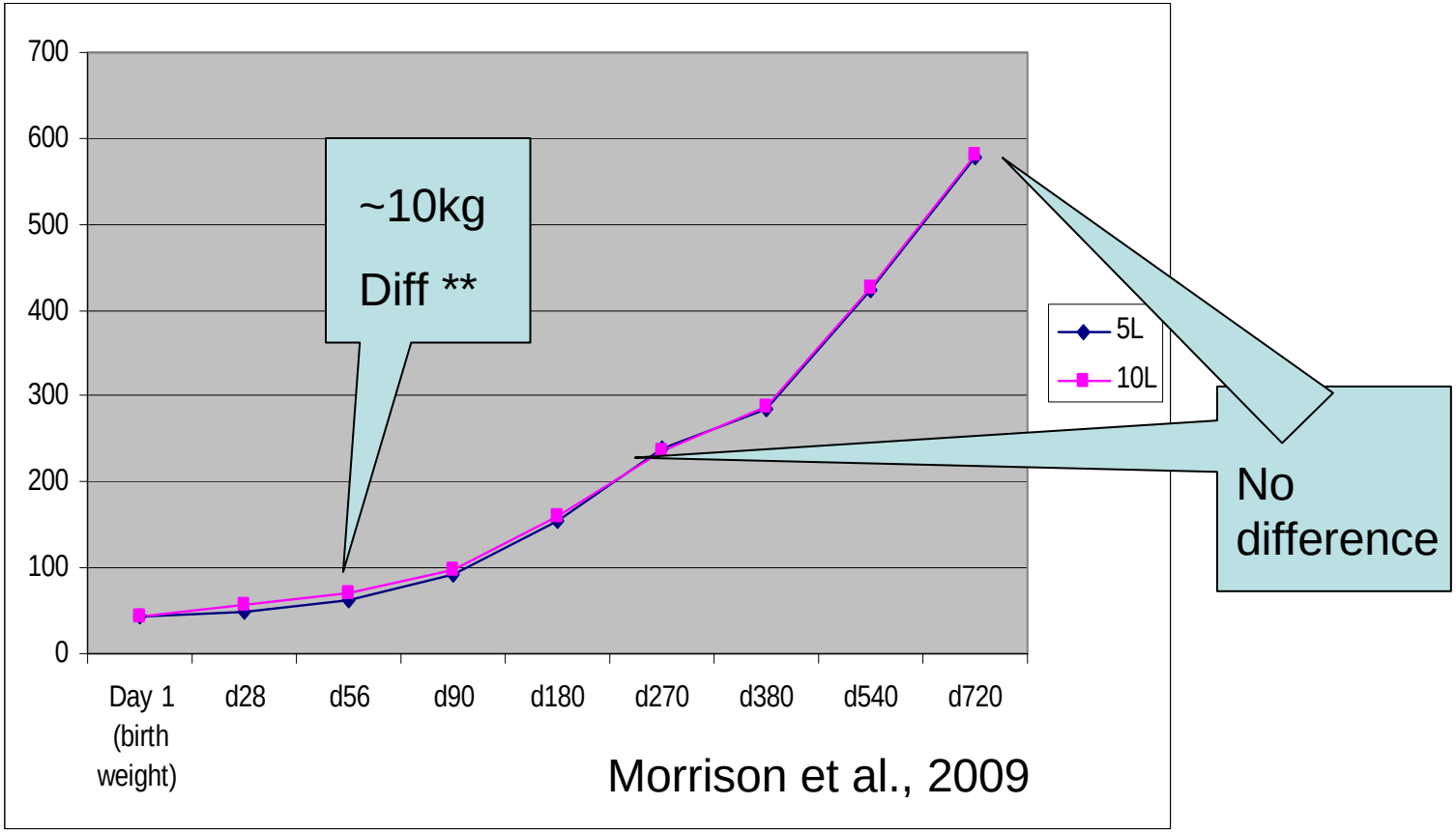
Some anecdotal evidence latter more of a problem in larger automated milk feeder groups

BUT…….

Relatively few reliable data…

Calf performance to adulthood

calves fed 5 or 10 litres milk/milk substitute

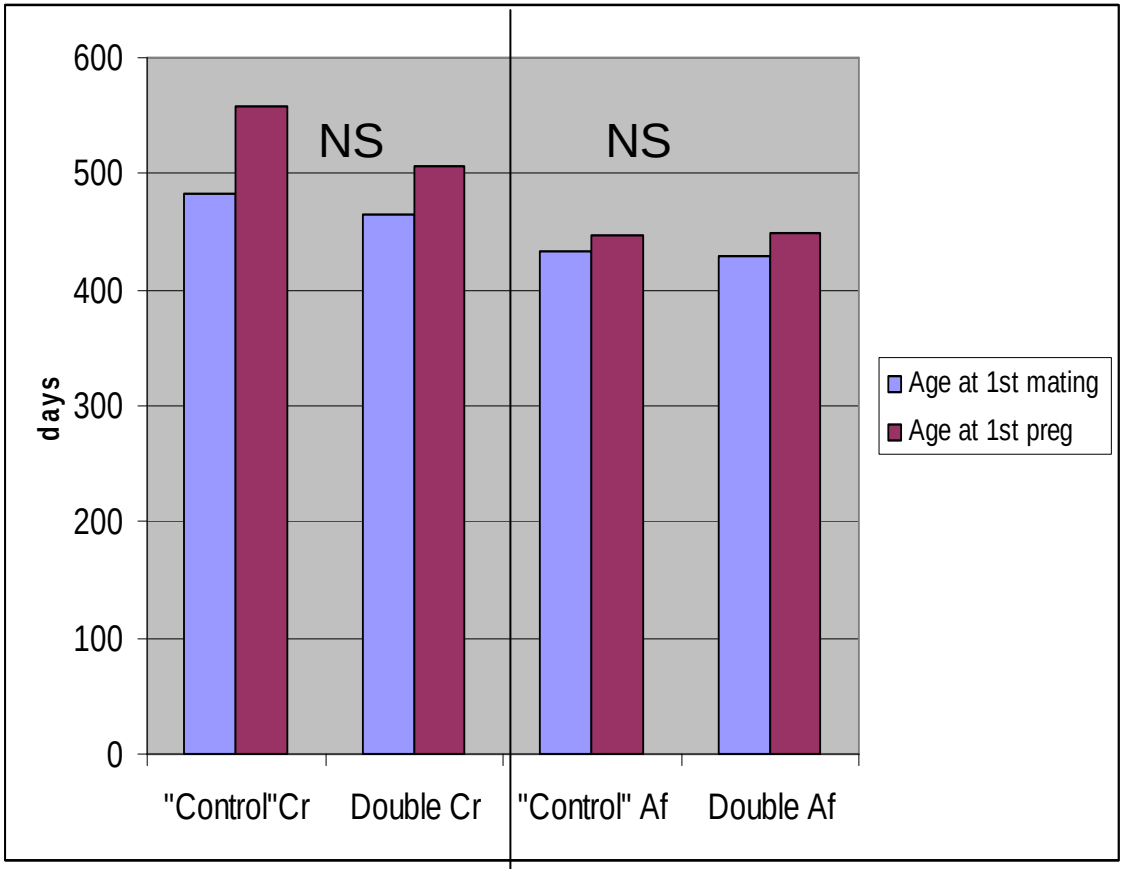


At least under UK conditions value of rapid growth pre-weaning & increasing CP content of milk substitute still uncertain.

Carson et al., 2002

More intake (as calf) = better heifer prod/ fert ?

- **Conflicting reports**
  - *~500 litres more milk? sig?*
  - *Fert NS?*
- **Needs a series of well-controlled expts. and then meta-analysis.**



Gillespie et al., 2008 | Morrison et al., 2009

Youngstock – *a variety of methods of feeding can be used equally successfully in terms of growth including grazing*

Table 1 *Details of rearing treatments imposed from 7 weeks to 23 months of age*

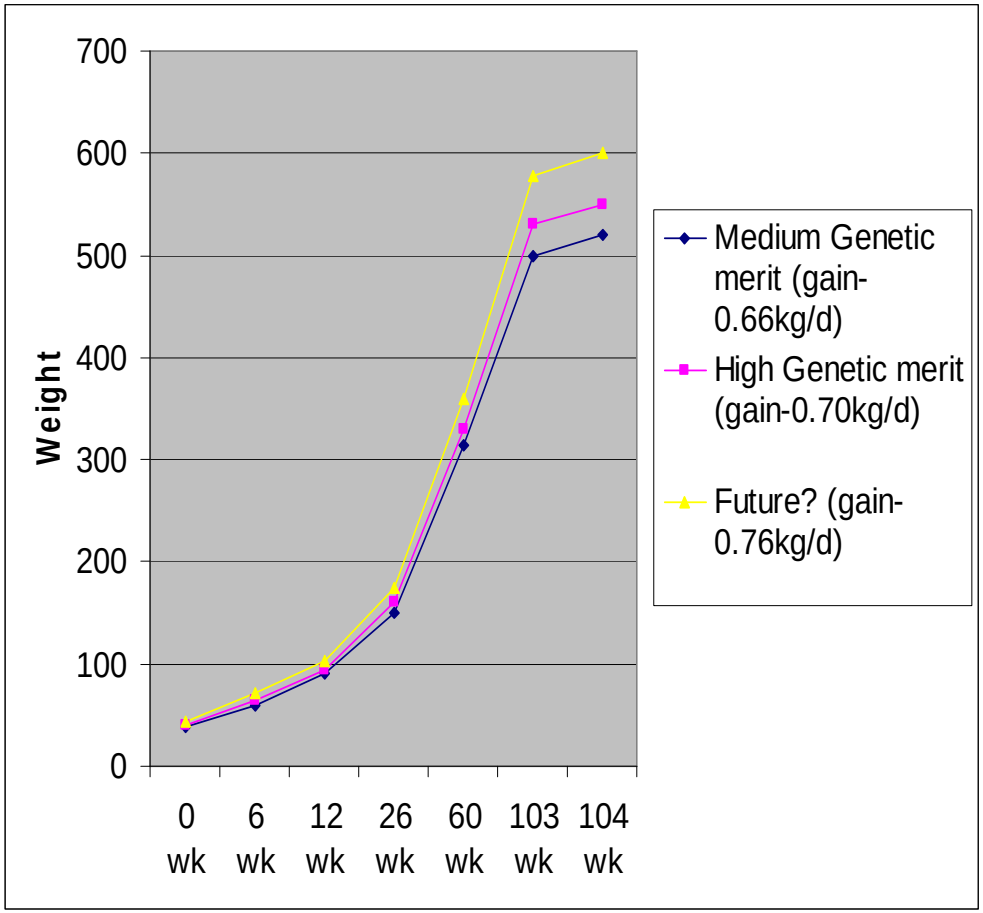
	Target weight (kg)				Diet type			
Treatment	3 months	10 months	14·5 months (mating)	23 months	First winter	First summer	Second winter	Second summer
1	90	220	320	525	Grass silage + concentrate	Grazed grass	Grass silage + concentrate	Grazed grass
2	100	250	365	595	Grass silage + concentrate	Grazed grass + concentrate	Grass silage + concentrate	Grazed grass + concentrate
3	100	250	365	595	Barley straw + concentrate	Grazed grass + concentrate	Barley straw + concentrate	Grazed grass + concentrate
4	100	250	365	595	Barley straw + concentrate	Barley straw + concentrate	Barley straw + concentrate	Grazed grass + concentrate

From Carson et al., 2002

Young stock growth targets

– *High Genetic merit heifers best with more growth?*

Note "competition" feed face space & barrier type is important!!!!!!!



After Carson et al., 2002 & 2003

Heifer management

Ist 100 days performance of heifers following pre-conditioning to the milking parlour or (control)

	Control	Pre-conditioned
Milk Yield (kg/d)	25.4	26.7 ***
Somatic cell count ('000)	156	95 ***
1st service (d)	76	81.5
Conception (d)	83	102.2
Services/Conception	1.29	1.89
	(n=23)	*(n=26)*

(Wicks et al., 2004).

Limiting lameness

- Heifer management is crucial
- In our opinion nutrition is usually NOT the DIRECT cause

  A) Claw horn lesions

  –"Nutritional" laminitis is rare and the term has been used loosely.

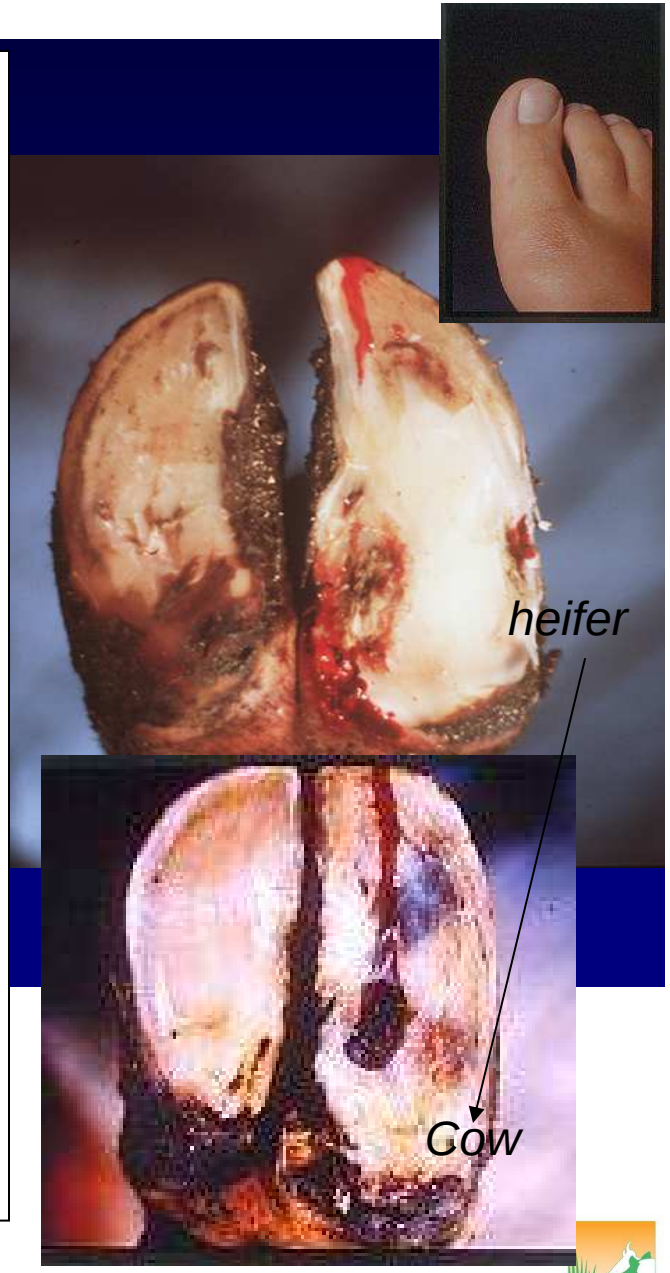
  –Sole & white line haemorrhage is a better description - rises to peaks @ ~100d (varies a bit.)

  –Main problem biomechanical = interaction between claw, corium, bone & environment.

  B) Infections of skin e.g. Digital dermatitis

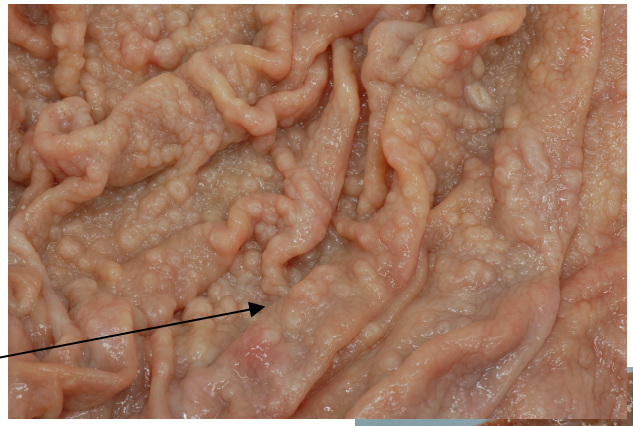
  –Main problem dirty, wet underfoot conditions

- How food is fed affects interaction of environment with claw/skin
- Other interactions e.g.training, introduction to herd etc.,



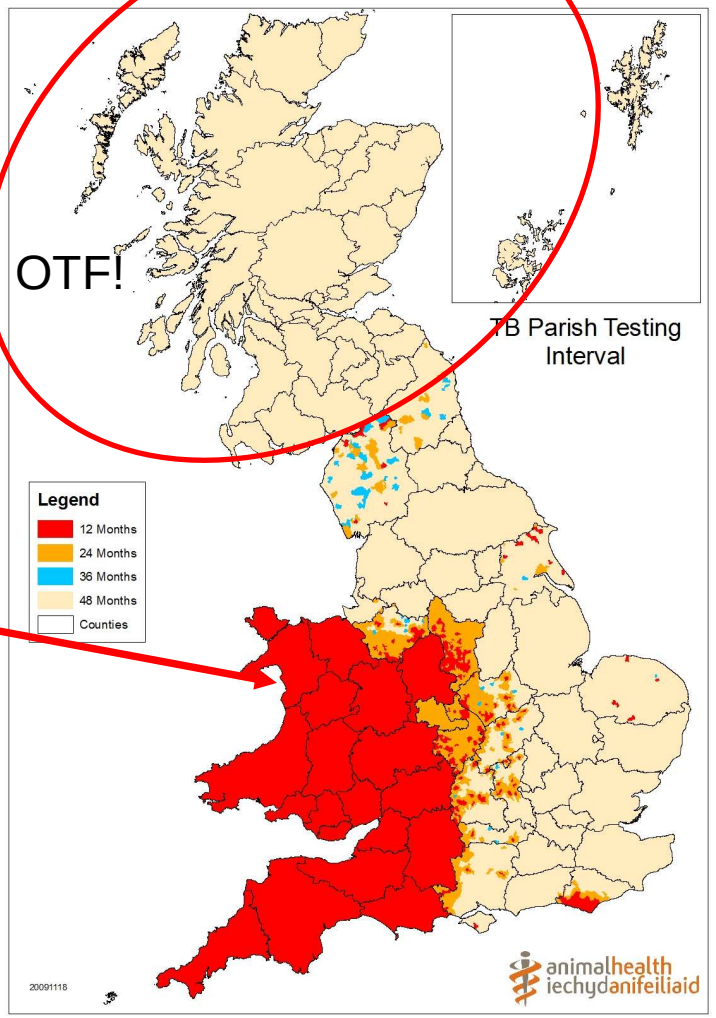
Youngstock & disease

- Pneumonia
- Parasites
  - Ostertagiosis & other PGE
  - Fascioliosis
  - Paraphistomosis
  - Besnotia
  - +…..



Youngstock, disease & *biosecurity*

- Others
  - "Weak calf syndrome"
    (Rice et al.,1986;Berglund et al., 2003)
  - BTV,
  - ***bTB,*** Johne's,
  - IBR, BVD etc.,



BUT….CLOSED HERDS PRESENT ADDED MANAGEMENT PROBLEMS

SUMMARY OF YOUNGSTOCK

Follow dietary plan (does not need to be complex) & monitor pregnancy, growth rates & health strategically to:-

- *ensure calve down at >540kg*
- *…… 22 to 25 months of age.*

- Particular care in last month of pregnancy
  - *Ensure "trained" to adult system both milking & housing and feeding*
  - *If no heifer group introduce in them in groups in evening after milking.*
- Closed, "protected" herd or from known source
  - *Ensure BVD free etc.,*

The adult cow

- Major breed within EU is Holstein Friesian
- Most research on this breed
- There are a variety of types but North American strain predominates
- These have specific nutritional requirements
- Selection needs to be more focussed on “horses for courses”
- The recent unravelling of the Genetic map of the cow may help us.

BUT……

that will take time the cows are here NOW……..

Feeding the cow

- Essentially we are feeding the rumen & then the cow
- Requires roughage, starch/sugars, fat, protein & minerals and vits
- Much is known at rumen level
  - Balance of energy & protein is critical
    - *Type of energy*
    - *Rate of fermentation*
    - *Degradability of protein etc., etc.,*
- It is the interaction with the cow that is more problematic esp., as there is individual farm/man/building/cow variation!
- Cows need water – a lot & GOOD access!

Cows will eat almost anything!

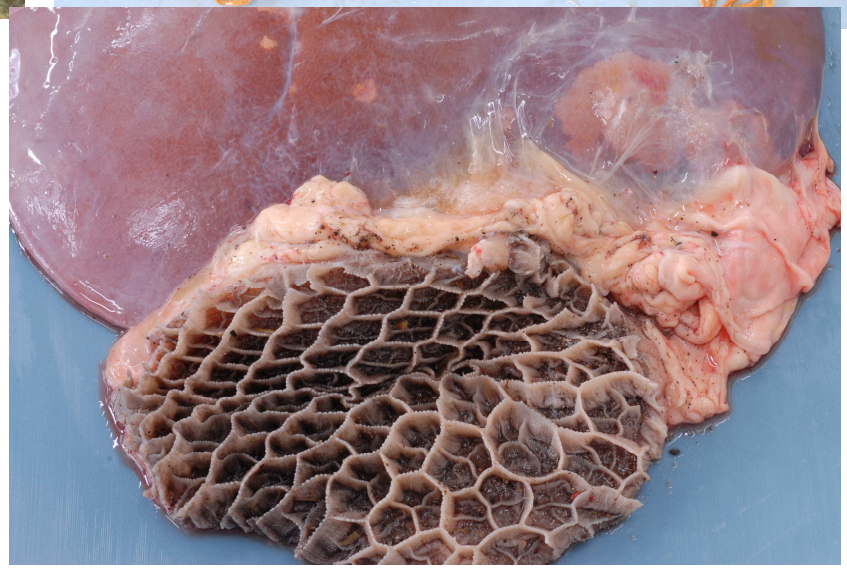
Feeding the cow – more difficult to control with grazing.

Leading to divergence in management systems

– Grazing/forage based vs housed TMR (BOTH)

Former mainly in wetter milder west of Europe & other parts of world

Cows will eat almost anything!



Nutrition and health

"Winter"–get the diet formulated

afbi Agri-Food and Biosciences Institute

Hillsborough Feeding Information System

A Member of the Forage Analysis Assurance Group in association with AFBI Hillsborough

Maize Silage Analysis Report

Adviser's name & address	Farmer's name & address
Ryan Law AFBI Hillsborough Large Park Hillsborough Co. Tel:- 554 e-mail:- FAX:-	SILO 26 Co. FAX:- Mob:- Tel:-

Sample & analysis details

Sample no.	09-09-0802	Sample type	Maize Silage	**Comments**
Date received	8/9/09	Additive	Unknown	
Date reported	10/9/09	Cut date		
HFIS no.	28,343	Cut system	Unknown	O/No.
Farmer acc.	D90			

Practical Feeding Information		Comments	Typical averages 2008	9 year
Dry matter (%) *	26.9	Good	26.8	30.9
Protein (% DM) *	10.4	Good	9.3	8.3
NDF (% DM) *	47	Average	48	47
NCGD (% DM) *	66	Satisfactory	69	71
ME (MJ/kg DM) *	10.2	Poor	10.9	11.0
Starch (% DM) *	21.0	Satisfactory	21.7	27.2
Ash (% DM) *	5.2	Normal ash	4.6	4.5

Approved by:- Michael G Porter - Analytical Services Manager

* Values validated by FAA Group

Contact the Hillsborough Feeding Information System at +44 (0)28 92681580 - Mike Porter or +44 (0)28 92681589 - Kyla Whiteside

09-09-0802 PTO

afbi Agri-Food and Biosciences Institute

Hillsborough Feeding Information System

A Member of the Forage Analysis Assurance Group in association with AFBI Hillsborough

UKAS TESTING 2746

Grass Silage Analysis Report for Dairy Cattle

Adviser's name & address	Farmer's name & address
Ryan Law AFBI Hillsborough Large Park Hillsborough Co. Tel:- 554 e-mail:- ryan.law@afbini.gov.uk FAX:-	SILO 30 Co. FAX:- Mob:- Tel:-

Sample & analysis details

					Feeding reports requested	
Sample no.	10-01-0574	Sample type	Grass Silage		Dairy cows	Yes
Date received	8/1/10	Additive	Unknown		Suckler cows	
Date reported	8/1/10	Cut date			Breeding ewes	
HFIS no.	34,774	Cut no.	Unknown		Growing lambs	
Farmer acc.	D90	Cut system	Unknown		Growing cattle	
Farmer silo id.		Comments				

Practical Feeding Information		Comments	First cut av.	Range
Dry matter (%) *	26.0	Good	27.7	15 to 55
pH *	3.8	Good	4.1	3.5 to 5.0
Ammonia (% total N)	8.0	Good	8.1	7 to 15
Protein (% DM) *	13.3	Average	12.7	7 to 16
ME (MJ/kg DM) *	10.9	Average	10.8	9 to 12
D-value (% DM) *	68	Average	67	55 to 77
FIM intake (g/kgW0.75)*	94	Average	93	70 to 115

The comments above are for general guidance on silage quality only and are not covered by any accreditation system

Additional Feeding Information

Lactic acid (% DM) *	10.8
Lactic acid (% total acids) *	84
Volatile fatty acids (% DM) *	2.1
PAL (meq/kg DM) *	716
Neutral detergent fibre (% DM)	46
Soluble sugars (% DM)	1.3
FME (MJ/kg DM)	8.2
FME/ME ratio	0.75
Oil (% DM)	3.4

Degradability coefficients & constants

	Solubility *	a *	b *	c *
Dry matter	31	38	43	0.05
Protein	60	69	23	0.07

FAA

Approved by:- Kyla Whiteside - HFIS Services Manager

* Values validated by FAA Group

FEED INTO MILK

10-01-0574 Page 1 of 2

start with the forage

cost

FEED for HEALTH

Nutrition and health–get the diet formulated

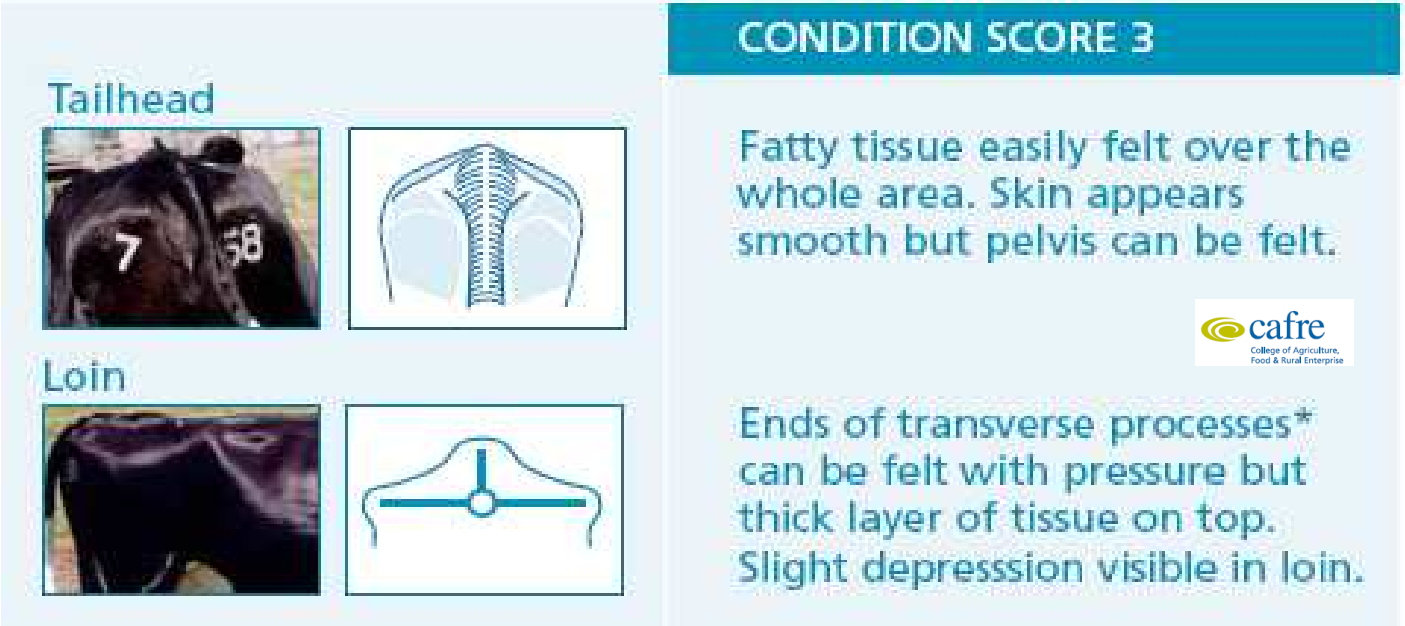
- **Dry Matter Intake & limitation of NEB in early lactation is primary concern**
  - *But within this require adequate energy and protein.*
  - *Grazing is a difficult area as cheapest feed but the cow has to work harder and there is a limit to intake.*
  - *Supplementation at grass appears to offer no easy solutions due to substitution tho' yield improves BUT fertility NS affected (Walsh et al., 2008)*

Some Dairy nutrition models:

- ***Feed Ration Balancer***
- ***CamDairy***
- ***The Consulting Nutritionist***
- ***CPM-Dairy (Unis. Cornell& Pennsylvania)***
- ***CNPS***
- ***Dairy Ration System***
- ***Formulate2***
- ***INRAtion - PrevAlim INRA***
- ***Mixit-Win***
- ***Molly, Shield & PCDairy-2 Uni California, Davis***
- ***PCDairy-2 U. California, Davis***
- ***RationPro***
- ***RumNut***
- ***SigaDairy***
- ***Spartan Michigan State Uni.***
- ***Trilogic***
- ***Feedbyta***
- ***Feed into milk***

Adapted from Chalupa et al., 2004.

Fat mobilisation in the dairy cow



- Simplest criteria for on-farm management is body condition score. *NB the most important stores are omental fat*
- Various methods but all have same end point of identifying potentially problem cows (esp over-fat)-automation? (Bewley et al., 2010)
- Now also automatic weighing & recording – use both?
- Aim for BCS of 2.5 to 2.75 at calving (higher end for grazing animals).
- The “transition diet” – targeted energy intake precalving

Transition diet

- Aims
  - *ensuring adeqate DMI around calving*
  - *conditioning the rumen for lactation diet*
  - *at its simplest it is based on restricted intake of ~1/3 milking cow diet*
- Problem is absence of large scale studies - we rely on relatively small study results and “best practice “
  - Usually involves
    - *Good fibre*
    - *Restricted energy*
    - *Good quality protein*
    - *Restricted calcium (or DCAB - acidogenic salts) (NB calcined magnesite dusting of pasture ~20kg/ha)*

Ease of calving

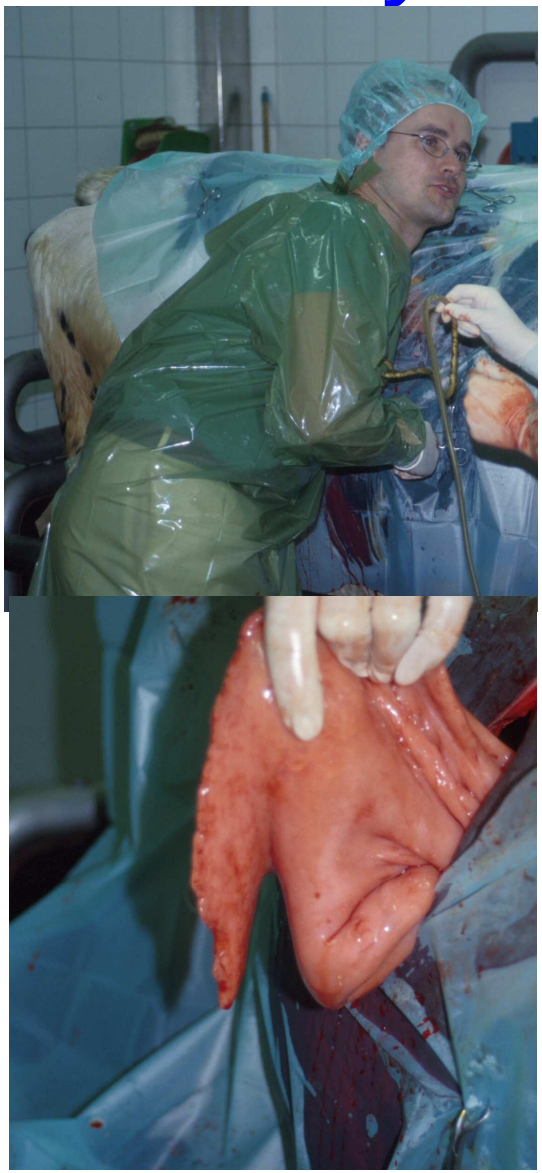
- Assistance due to malpresentation – *NS milk reduction*
- Assistance essentially due to relative foetal oversize – *Significant reduction in milk production ~10%*
- Thus nutritional management of the cow (BCS) & selection of dam and sire for calving ease is important.

(Barrier et al., 2010)

BCS = 4 too fat!!!!

Digestive disorders in the dairy cow

- **Displaced abomasum**
  - Increasingly common (>2%) - mainly LDA
    - *inadequate care to maintain dry matter intakes of cow just prior to calving (HF reduces intake by ~ 30%).*
    - *Genetic predisposition of modern cow with elliptical peritoneal cavity? Twins?*
    - *Hypocalcaemia a major risk factor (X5) (also for RFM;MET;Mast)*
- **Sub acute ruminal acidosis (SARA).**
  - *Overdiagnosed? pH<5.8 or 5.5*
  - *Difficult to confirm*



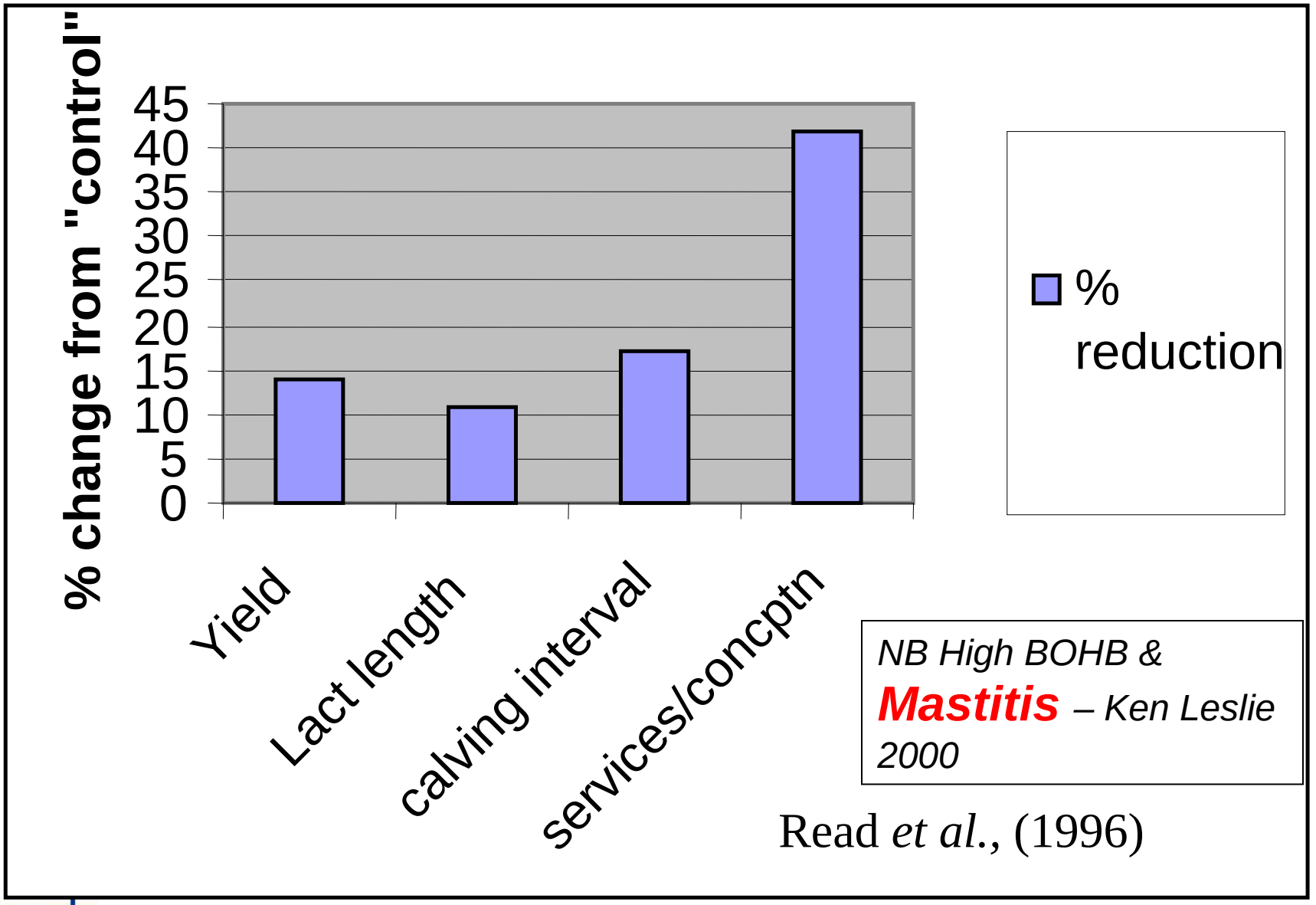
Calving is a risk for disease!

- **Many of the major conditions affecting the dairy cow are related to the pericalving & early lactation periods**.
  - *Dystocia, metritis, abomasal displacements*
  - *Metabolic diseases e.g. hypocalcaemia*
  - *Infertility or poor fertility*
  - *Mastitis*
  - *Lameness*

  Roughly 1 in 10 cows is treated during the periparturient (never mind subsequently)

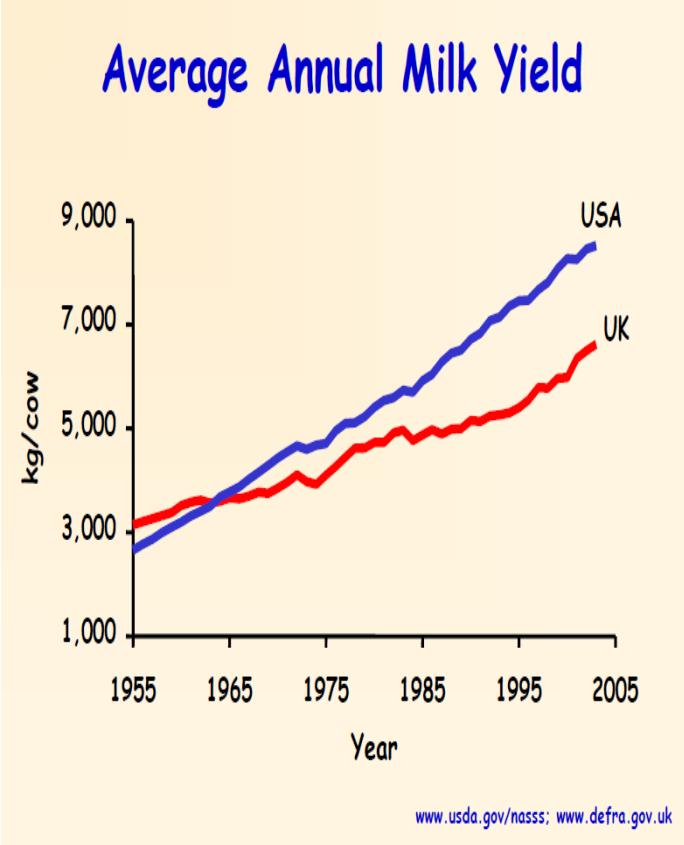
BCS = 2.5 correct

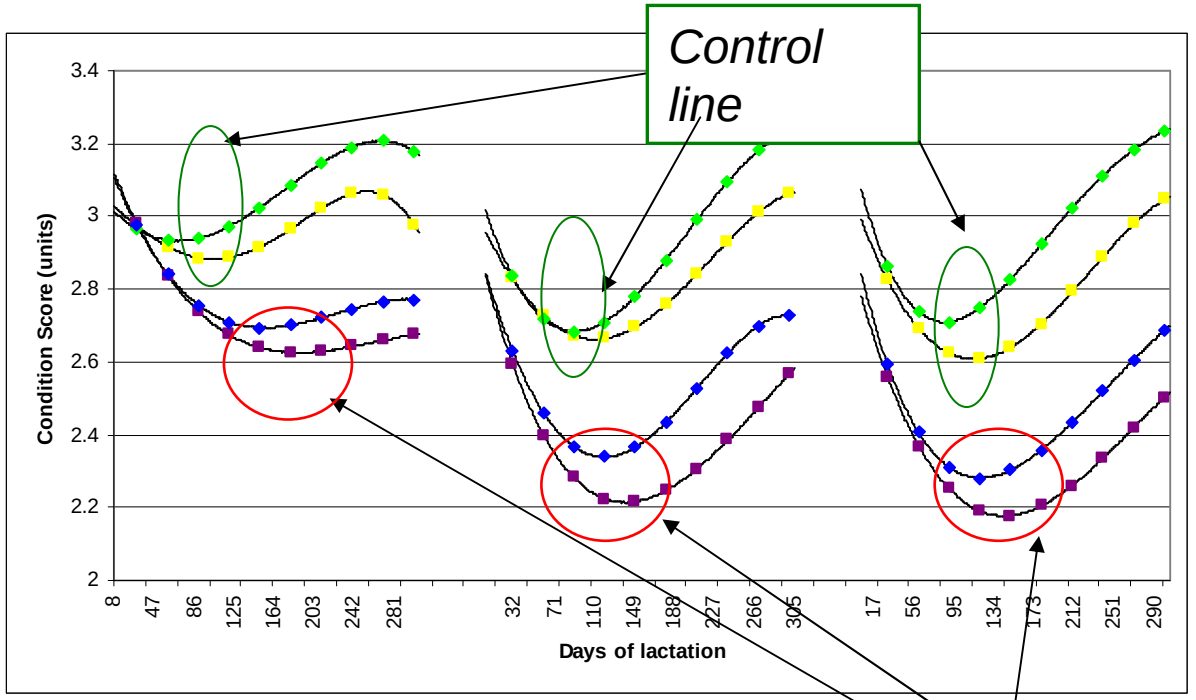
% reduction in parameter with "fatty liver" (>30% "fat")



Yield/cow is rising BUT…

… there are differences derived largely from genotype x environmental interactions - all related appear to increased NEB?





Select line shows greatest nadir over all lactations – Mike Coffey, SAC

Day of 1st ovulation & plasma concentrations of metabolic factors in high and low genetic merit cows

Genetic Merit	Days of 1st ovulation postpartum	Growth hormone	Ketones
Low	20.1 ±1.6	12.8 ± 0.41	0.70 ± 0.05
High	28.2 ±1.9	16.7 ± 0.53	1.00 ± 0.03

Data from Roslin Select and Control lines

Gong & Webb (1997)

Rapid BCS loss in early lactation = poor fertility

- High starch content (greater than 160g/kg DM) & low fat (below 50g/kg DM)

  = high insulin: glucagon ratio

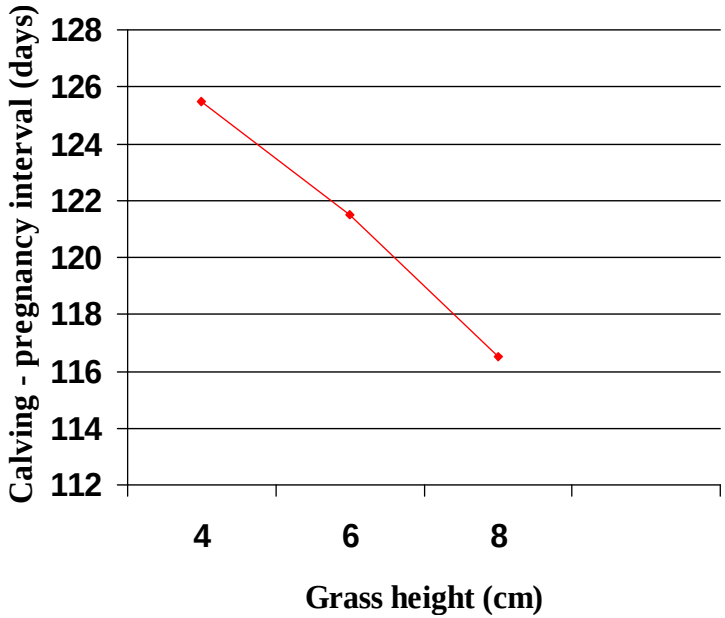
  Means an earlier resumption of cyclicity but then…see Garnsworthy this conference.

  – Reduce hypocalcaemia – reduces all uterine problems (& mastitis)
    - DCAB can be modified easiest with a Total Mixed Ration but needs constant monitoring can go wrong!

Garnsworthy et al., 2007 & 2008

It is not so easy at grass!

Effect of grass height on the calving to pregnancy interval.



from Ryan & Mee 1994 BUT NOW OK *if maintain leaf in sward!*

PTO O'Donavan 2010 pers comm

Improving herbage quality by tight grazing

Improved herbage quality

	2002/03 Lax grazing	2005/06 Tight grazing
Average ME (MJ/kg DM)	11.4	12.5

O'Donavan 2010 pers comm

Tight grazing "NZ style"

Summary grazing the cow

- Grass is the cheapest feed (by >2 at least)
- Best for margin in terms of ppl
- Yield per Ha means penalising the cow

- Overall better welfare? Needs – shelter, shade, water!
- It requires expertise to manage well - weather effects.

Genetic selection goals differ from TMR system

•(McCarthy et al., 2007)

Evidence for advantages of breed, crossbreeding & HF “types” esp., under different nutritional conditions

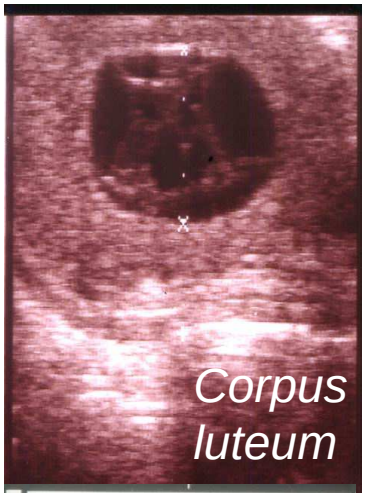
- **Type variation within HF** *(McCarthy et al., 2007)*
- **Breed differences** *e.g. Norwegian Red (Wicks et al., 2004)*
- **Heterosis** (Bluhm, 2009**)**
  2nd cross??

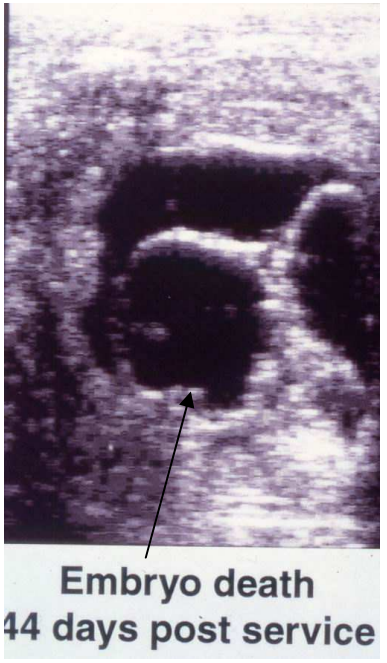
Generally improved fertility (less delayed first ovulation postpartum and higher conception and pregnancy rates) over N American HF esp., at grass. BUT…often reduced performance (esp., if DMI is maximised).

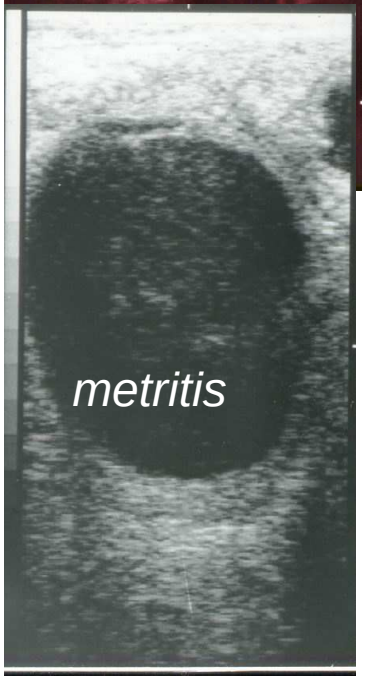
Bench marking fertility

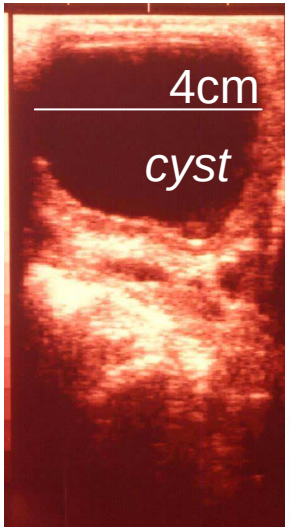
- Many parameters - all have a place.
- Good records would help geneticists.
- The main presentation for veterinarians are:
  - ***Oestrus not observed (but cycling)=ONO***
  - ***Anovulatory=ANO***
  - ***Metritis/endometritis=MET***
  - ***Cystic ovarian disease=COD***
  - ***Twining- TW***

Ultrasound has revolutionised our approach

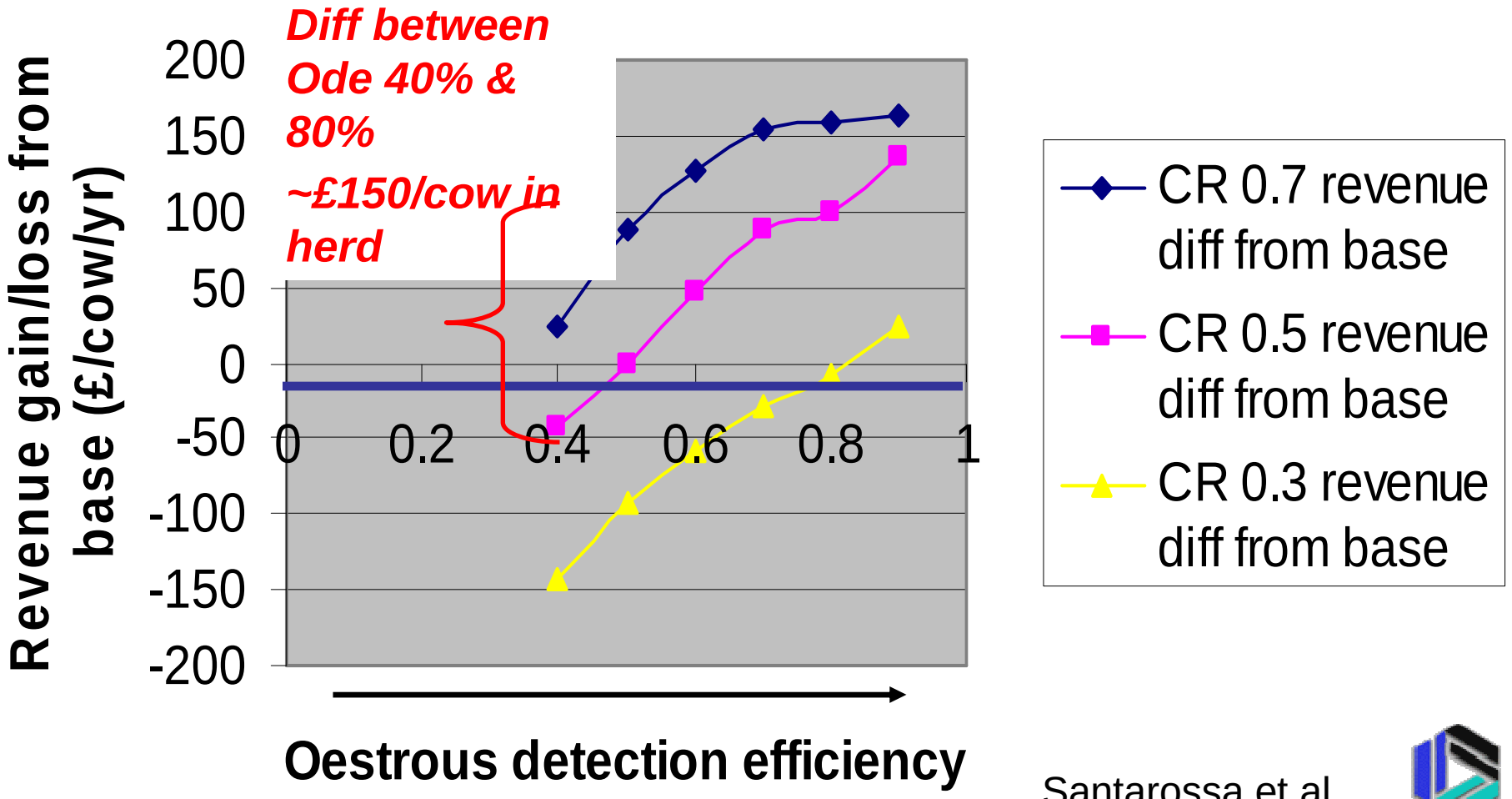








Poor ODe & Calving Rate (CR) costs money (>3Eur per % per cow in herd)



Santarossa et al.,

Improving submission rate & fertility management

- **Feed must allow time for behaviour**
- **Environment must allow expression**
  - ***Activity monitors –useful esp., in housed cattle***
  - ***In line P4 could be esp., with above.***
  - **Oestrous synchronisation useful for targeted groups**
    - ***heifers***
    - ***problems***

All are best value in well managed herds

Diet affects rumen, faeces & behaviour and so Mastitis & Lameness

Improve consistency of faeces and slurry:-

- *Use of larger particle size in diet*
- *Increasing neutral detergent fibre (NDF) in diet*

Create a cleaner environment!

Automation

- Innovation in design of feeding and milking equipment has significantly improved the efficiency of labour and feed use.
- It also provides a wide array of accurate data on animal performance and feeding behaviour.
- It is a continuous process……..BUT

•We need to prioritise what we can utilise as there is a limit!

More technology –robotic milking

- **Better for housed cattle?**
- **Needs careful monitoring**
- **Av ~2.5 milk/d (variation)**
- **Av ~5% more milk than std 2X/d**

But ……..

- **Problem of irregular intervals and stoppage**
  - ***Bactoscan more variable***
  - ***SCC more variable***
  - ***FFA increased***
- **Cow traffic needs thought esp., food if cows are to be attracted thro'.**
- **On free entry systems cows eat more!**
- **Masses of data**

Svennersten-Sjaunja and Pettersson, 2007

Precision Dairy Management

- **Increased automation is now providing a vast array of production, health and fertility data for individual cow. (*Weight/BCS/Od/AMS/ Milk tests/Boumatic stepmetrix etc.)***
- **Some still need better validation (and algorithms?) - development of integrated biological models is required to maximise use of data –otherwise overload!**
- **Model development will facilitate management of nutrition, health and fertility at an individual cow level within large herds.**

Summary:- Plan, Monitor & Adapt!

- *Cows/calves are not clockwork!!*
- **Think about ALL aspects of nutrition especially:-**
  - *Ensure correct condition, weight etc. at all times*
    - *Good calving management*
    - *Limit weight and condition loss post-calving*
  - *Diet type is important - high starch, low oil diet in early post calving period can help resumption of cycling but….*
  - *The more complicated the more difficult to manage.*

- *Concentrate upon OD efficiency BUT…..*
  - *Reduce Lameness & Mastitis*
  - *Target veterinary interference & keep good herd biosecurity*
- **MONITOR, MAINTAIN and USE RECORDS - benchmarking means consistency!**
  - *Last is essential for good genetic selection*

University of Glasgow

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Thanks to all who have sponsored this meeting

cost

FEED HEALTH