Indicators of early lactation disease in the dairy cow from data recorded in the preceding lactation and dry period

G. L. Smith, M.G.G. Chagunda, C. J. Ashworth & N. C. Friggens

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

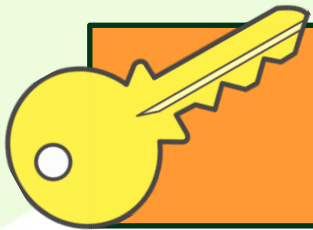# Research Drivers

Setting the scene

Physiological stress in early lactation
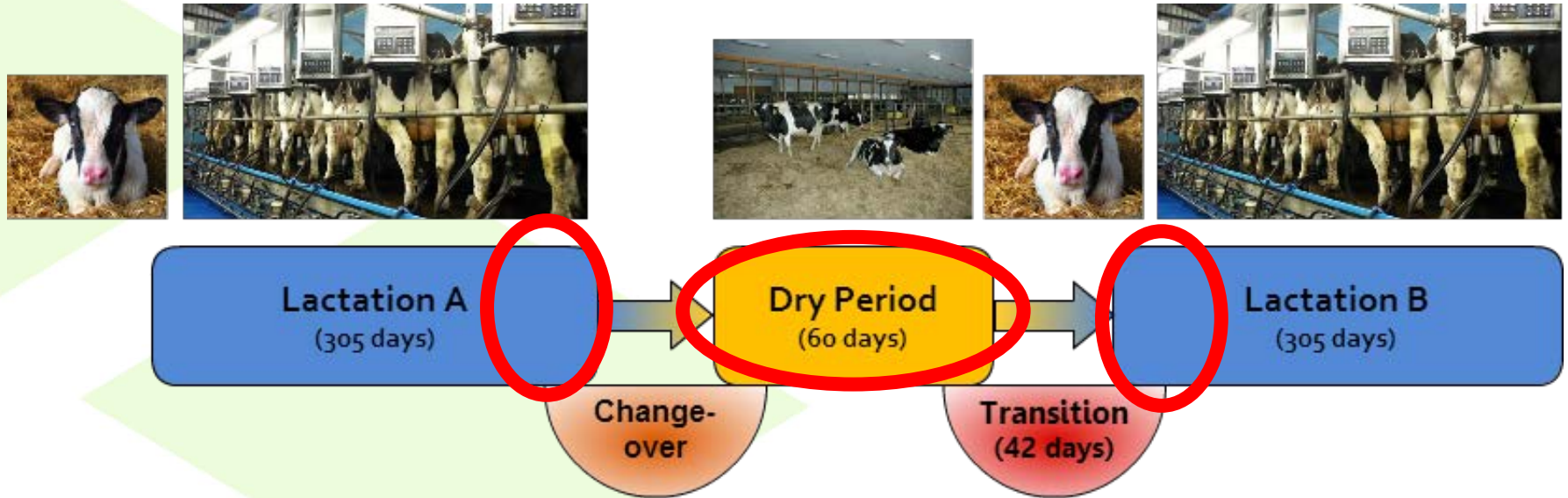
High disease incidence

Increasing average herd size

On-farm technology

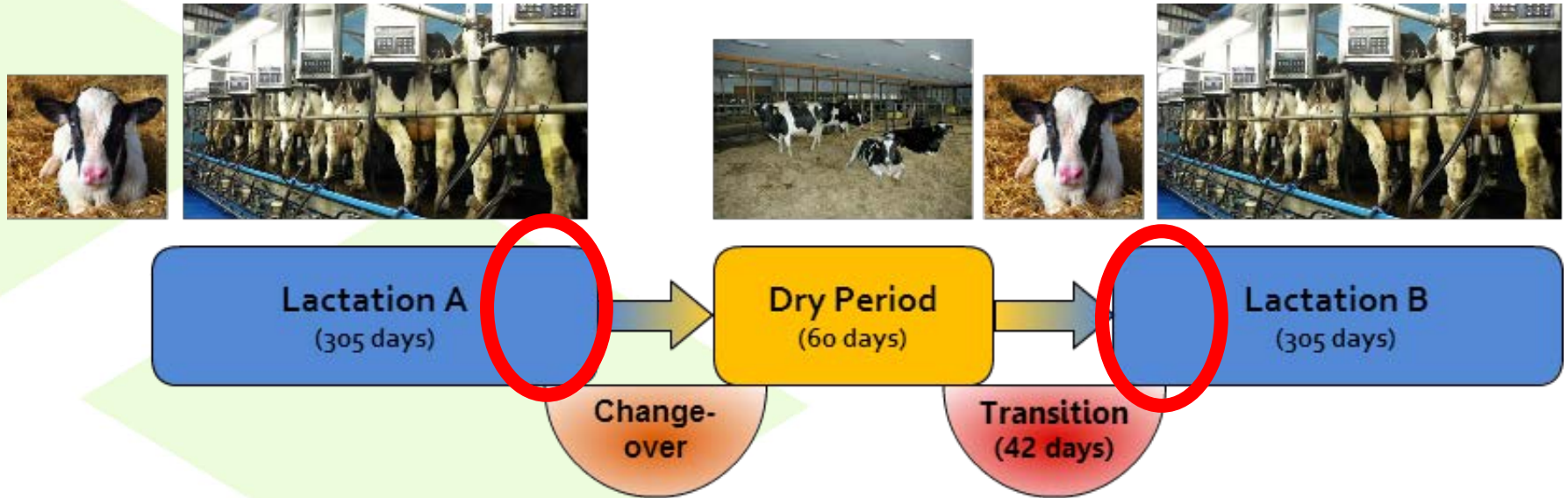**Biologically meaningful and practically available indicators of disease**

Study Objective

Identify and extract candidate indicators of production disease in early lactation from data recorded in the preceding lactation and dry period

Materials & Methods

Lactation A → Change-over → Dry Period (60 days) → Transition (42 days) → Lactation B
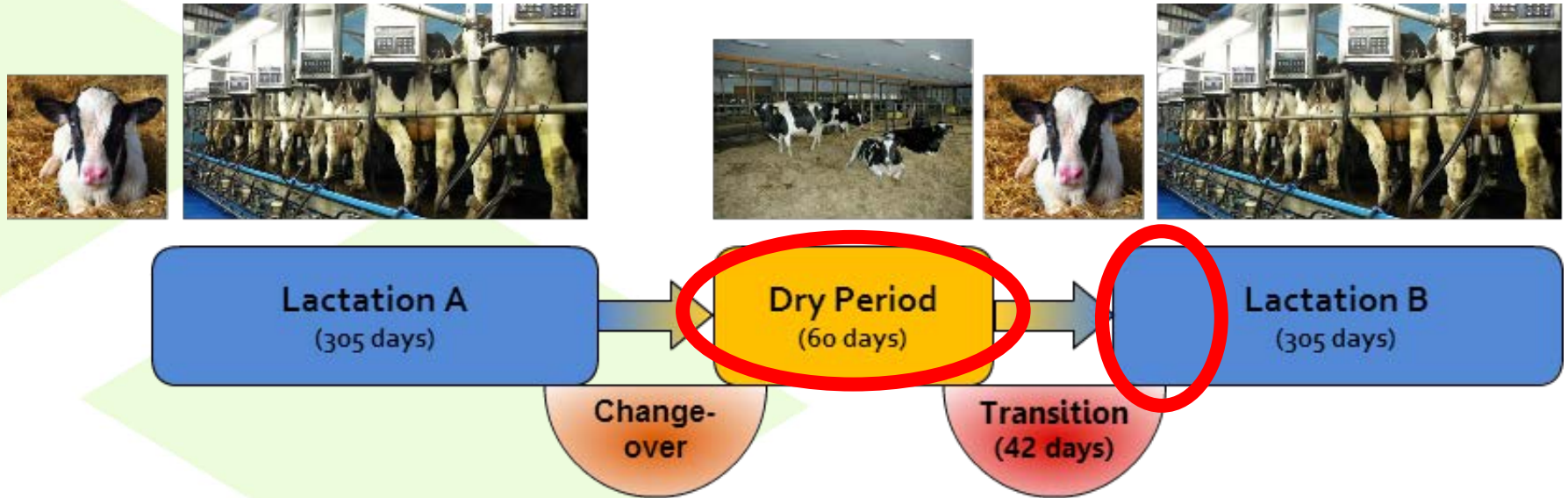
Lactation A

- Dry off milk yield
- Dry off body weight
- Dry off body condition score
- Dry off ECM milk yield : dry off body energy content

Body energy content (MJ/day)
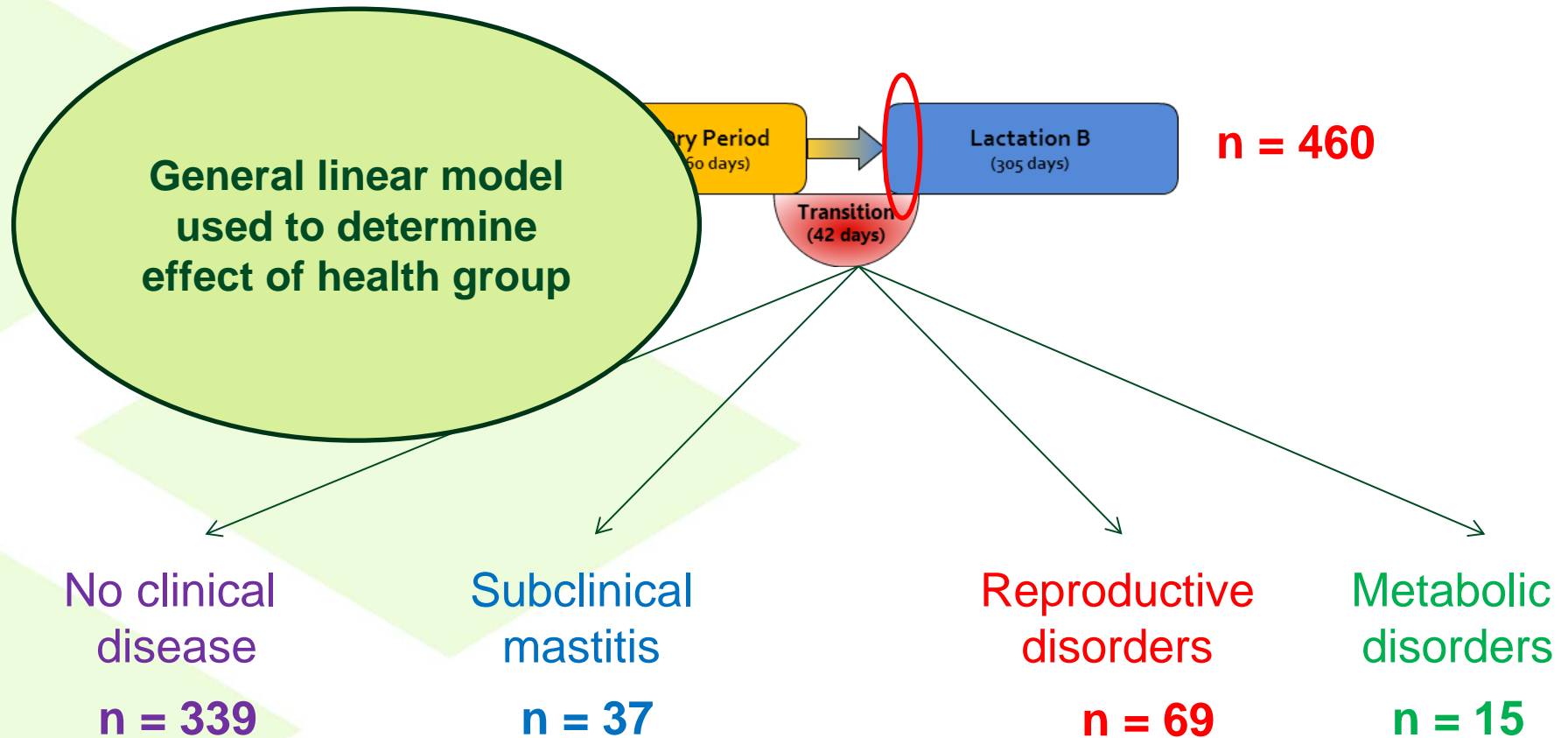
Materials & Methods

Dry Period

- Weekly body weight
- Weekly body condition score

Body energy content (MJ/day)

- Change in body weight, body condition and energy content
- Rate of change in body weight, body condition and energy content

Materials & Methods

Classification of cow-lactations

General linear model used to determine effect of health group

Dry Period (60 days) → Transition (42 days) → Lactation B (305 days)

n = 460

No clinical disease

n = 339

Subclinical mastitis

n = 37

Reproductive disorders

n = 69

Metabolic disorders

n = 15

Results
End of lactation

Dry off milk yield and MBER by health group
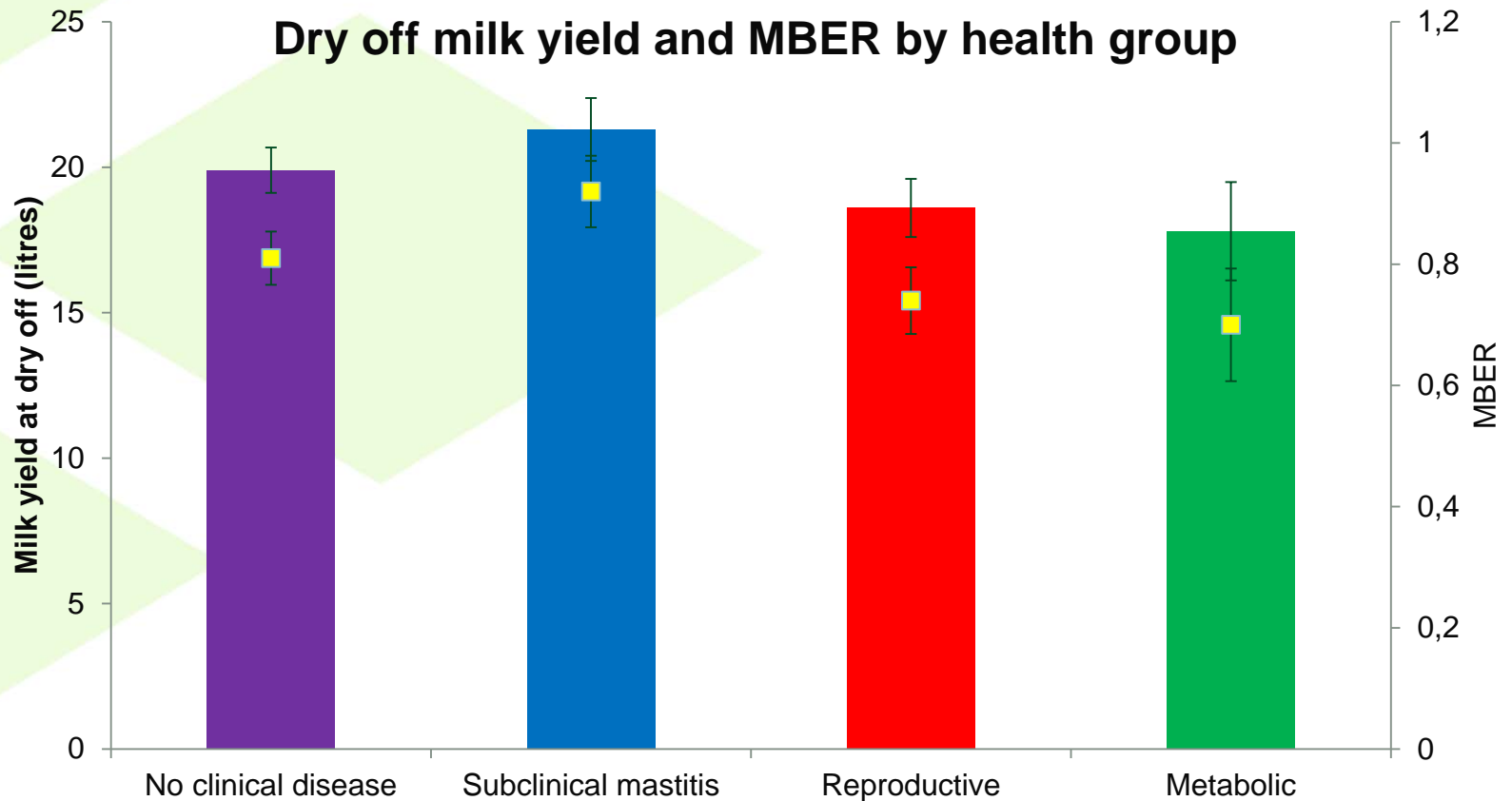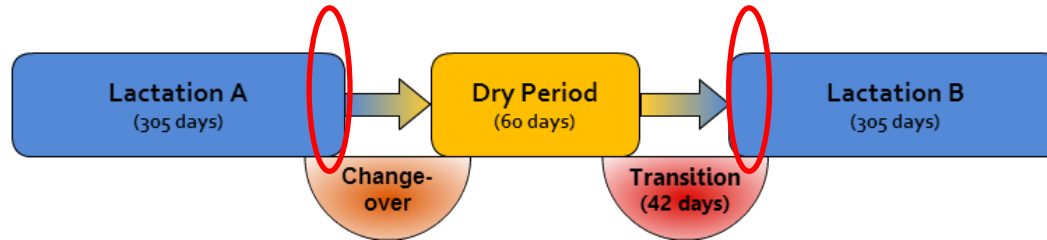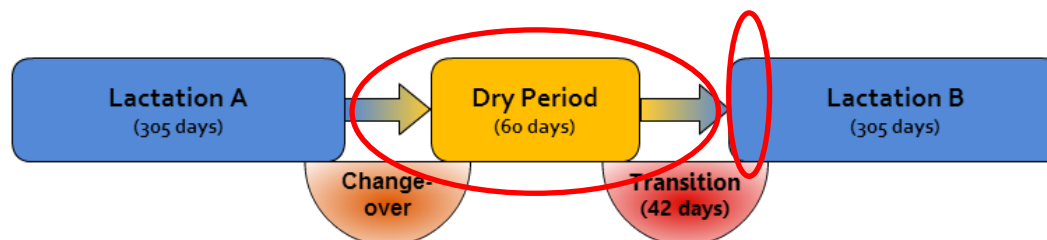
Results

Dry period

Health group	DryBEC	CalvBEC	DiffBEC
No clinical disease	3059±103	2817±79	-235±74[a]
Subclinical mastitis	3058±156	2821±125	-222±106[a]
Reproductive	3278±133	2735±105	-596±101[b]
Metabolic	3144±220	2573±179	-422±171[ab]

Results
Dry period

Body energy content change in the first 2 weeks of the dry period

Y-axis: Body energy content (MJ)

X-axis: Days from dry off

Legend:
- No clinical disease
- Subclinical mastitis
- Reproductive
- Metabolic
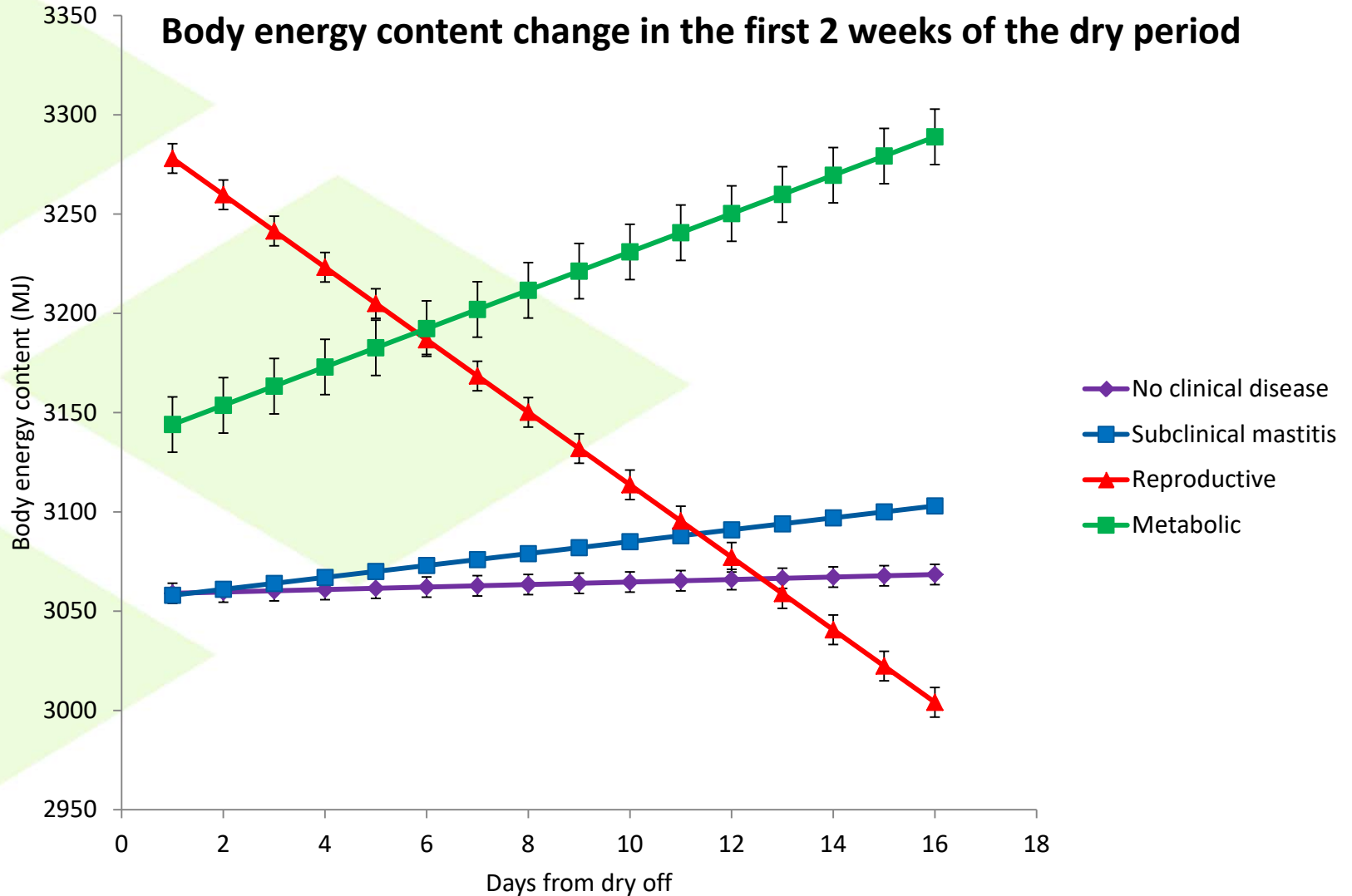
Predictive ability of candidate indicators
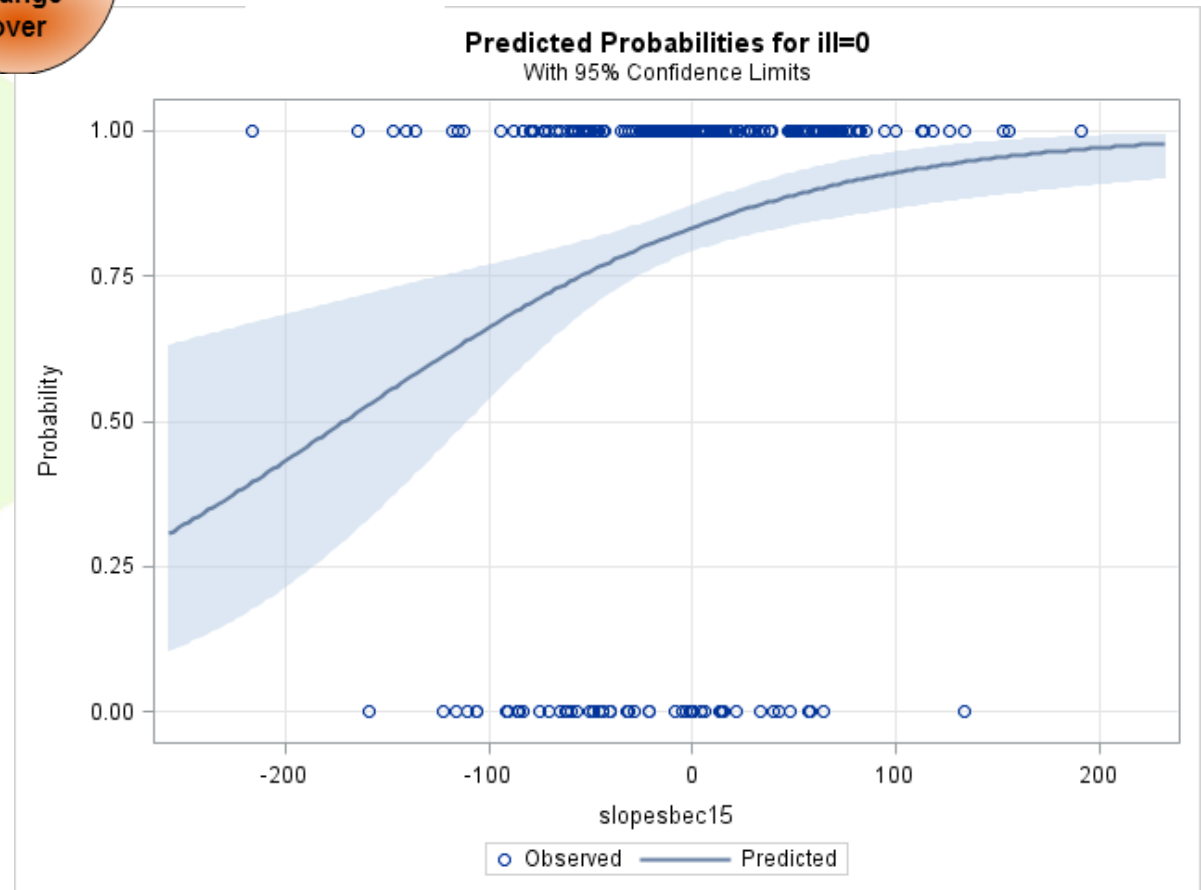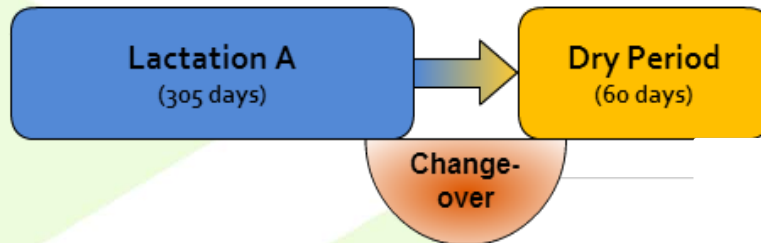## Can we use indicators to predict risk of disease?

Implications

Physiological stress in early lactation

High disease incidence

Increasing average herd size

On-farm technology

Biologically meaningful and practically available indicators of disease

MBER ?

BEC 15 ?

grace.smith@sruc.ac.uk

	System							
	LFC		**LFS**		**HFC**		**HFS**	
	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
Energy corrected milk yield (kg/day)	28.0	7.70	34.0	8.17	23.0	6.74	27.0	7.38
Milk yield (kg/day)	30.5	8.93	35.5	9.36	23.9	7.43	27.1	7.88
Milk fat (g/kg)	1.1	0.33	1.3	0.35	0.9	0.28	1.1	0.32
Milk protein (g/kg)	0.9	0.25	1.2	0.27	0.7	0.22	0.8	0.23
Body weight (kg)	623.8	75.12	636.5	76.48	598.8	77.19	626.7	79.84
Metabolic body weight (kg)	124.6	11.28	126.5	11.45	120.8	11.72	125.1	12.04
Condition score	2.3	0.40	2.2	0.41	2.2	0.36	1.9	0.37

Where: LFC = Low Forage Control, LFS = Low Forage Select, HFC = High Forage Control, HFS = High Forage Select;

Metabolic body weight = Body weight $^{0.75}$

Health category	Definition
No clinical disease (NCD)	No clinical disease diagnosis or somatic cell count greater than 250,000 cells/millilitre in the first 30 days of lactation
Sub-clinical mastitis	At least one recorded somatic cell count greater than 250,000 cells/millilitre in the first 30 days of lactation
Reproductive	Clinical cases of retained placenta (failure to expel foetal membranes within 24 hours of calving) - diagnosed by farm staff in the first 30 days of lactation. Clinical cases of metritis (abnormally enlarged uterus, vaginal discharge and systemic illness/fever with a temperature >102.5°F) – diagnosed by veterinarian in the first 30 days of lactation.
Metabolic	Clinical cases of hypocalcaemia (low blood calcium levels, lack of rumen activity and recumbency), hypomagnesaemia (low blood magnesium levels, excitability/hypomagnesaemic tetany), left displaced abomasum (sudden decrease in milk yield, reduced feed intake secondary ketosis) and ketosis (decreased concentrate intake, lethargy and abnormal behaviour) – all diagnoses confirmed by veterinarian in the first 30 days of lactation.

Disease Classification	Production System				Parity		Total group size
	Low Forage Control	Low Forage Select	High Forage Control	High Forage Select	2	3	
No clinical disease	93	63	106	73	203	132	335
Subclinical mastitis	14	16	13	10	25	28	53
Reproductive	20	19	19	19	42	35	77
Metabolic*	4	3	3	7	5	12	17
Total disease cases (n)	38	38	35	36	72	75	147
Total disease cases (%)	29	37	24	33	26	36	43
Total cow lactations	131	101	141	109	275	207	482

*Includes cases of left displaced abomasum, hypocalcaemia, hypomagnesaemia and ketosis.