66th EAAP ANNUAL MEETING

INNOVATION IN LIVESTOCK PRODUCTION: FROM IDEAS TO PRACTICE

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WARSAW, POLAND

DairyCare: Monitoring of the Welfare and Health of Dairy Cows

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Introduction

- Good husbandry ensures welfare and health
- Is good husbandry more than absence of disease?

How important is the individual?

Do we care about individuals?

Do we always have that opportunity?

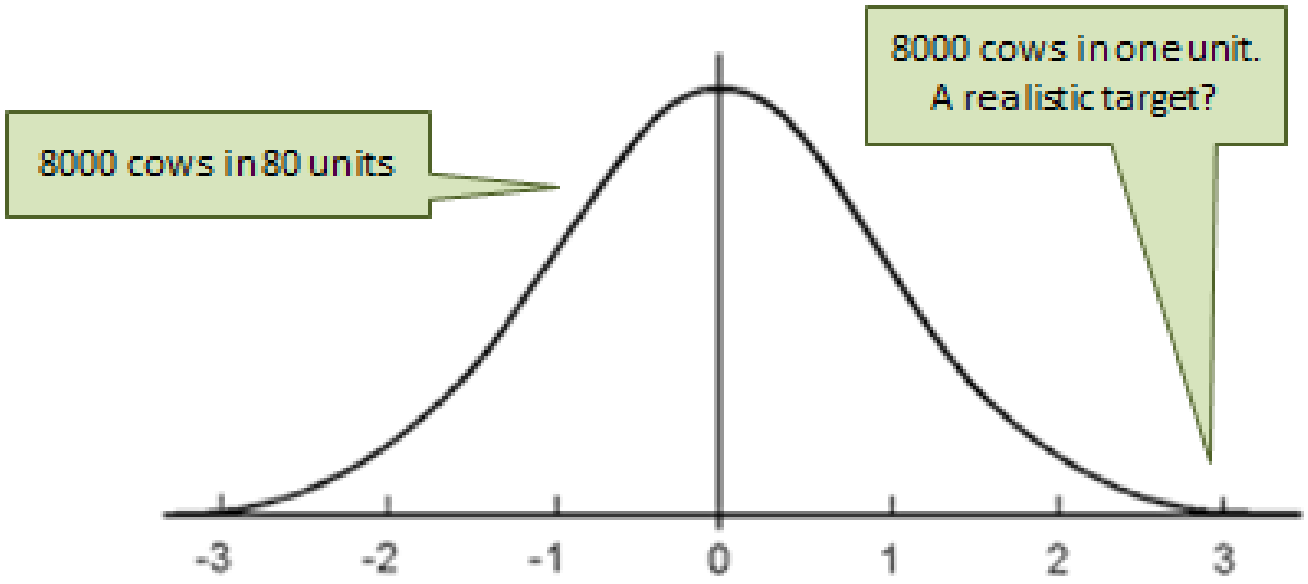
Dairy Animal Welfare


From The Sunday Times
February 26, 2012
'Battery' dairy of 8,000 cows sparks protests

- EU dairying: the "bigger is better" problem

- How do we achieve good management in large units?
- How do we spot problems?
- Can the cow remain an individual?

Before you criticise big…



Worst welfare

Best welfare

www.dairycareaction.org

No magic answer yet!

What is DairyCare?

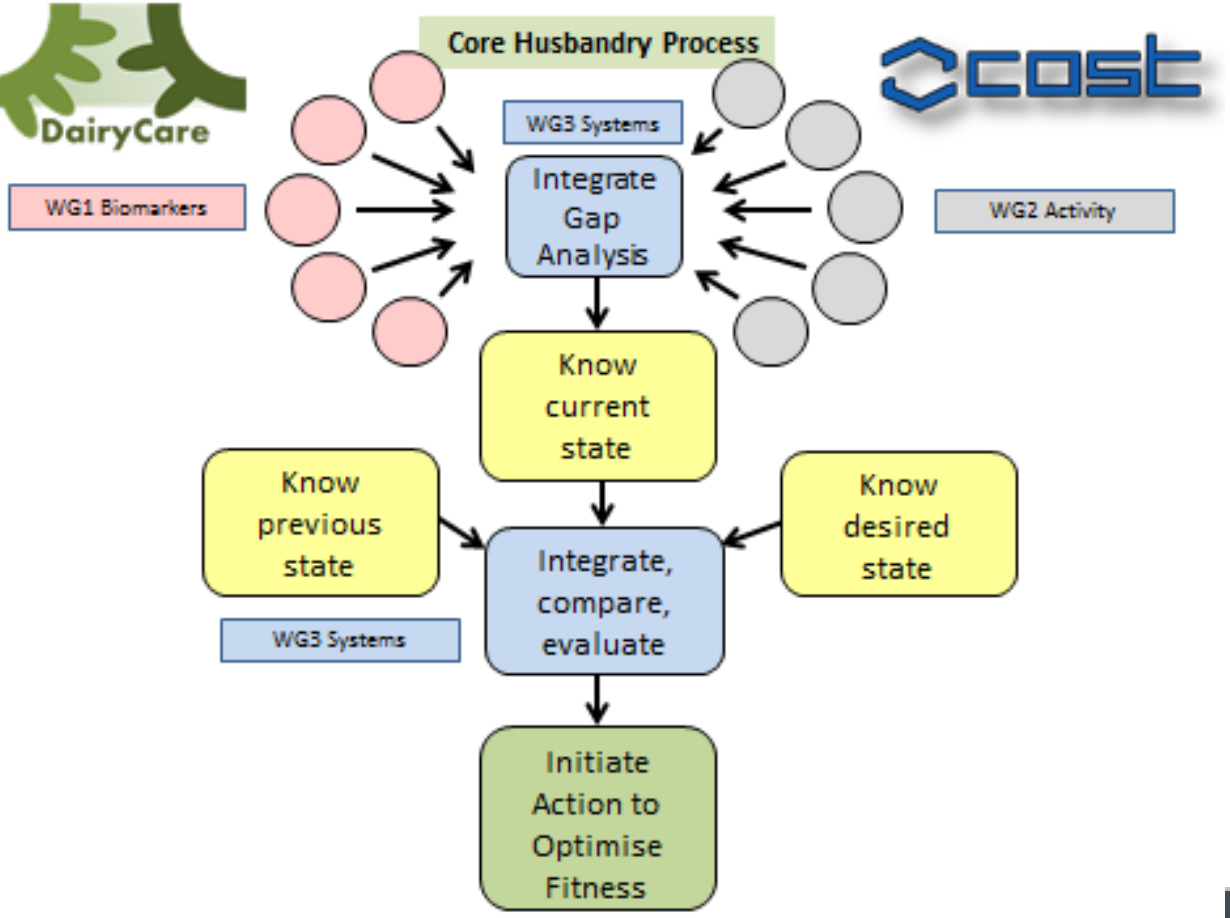
- A researcher network focused on dairy animal health and welfare
- Funded by COST: 170K € this year
- 400 members, 30+ countries (including Poland)
- Multidisciplinary
  - Biologists, ethologists, engineers, computer scientists, etc etc
- Organising and funding scientific conferences, researcher exchanges and other activities

DairyCare Key Objectives

- To improve the wellbeing of dairy animals through two mechanisms:
  - Accelerated development and application of relevant biotechnologies that will assist and promote good husbandry
  - Wider dissemination of best-practices

  - Note: COST does not fund actual research

DairyCare Core Scientific Focus: Knowing the Animal



- WG1 Biomarkers
- WG2 Activity
- WG3 Systems

DairyCare Deliverables (examples)

- Novel biotechnologies for:
  - Automated monitoring of dairy cow wellbeing
  - Automated detection of sub-clinical problems (eg SARA)
  - Automated monitoring of feeding behaviour
  - Automated detection of lameness
- Tailored "smart" husbandry support systems for automated herd management
- DairyCare "Blueprint for Action"

Knowledge translated into effective decision making

First DairyCare Conference

- Copenhagen, August 2014
- Health and Welfare of Dairy Animals
  - What data do we need?
  - What data can we get?
  - How can we use that data?
- WG sessions:
  - WG1 focus on 'omics technologies
  - WG2 focus on automated activity measures state of the art
  - WG3 focus on data acquisition and management

Second DairyCare Conference

- Cordoba, March 2015
- Health, Welfare and the Lameness/Reproduction Interface
- Scientific Sessions
- Industry Platforms
- Funding Workshop

Future DairyCare Activities in 2015

- WG1 Meeting, Switzerland
  - September 14th and 15th, Bern
  - Focus on cortisol
  - Gianfranco Gabai

- 3rd Conference, Croatia
  - October 5th and 6th, Zadar
  - Focus on feeding behaviour
  - Marcela Speranda

Biomarkers of Welfare

Biomarker:
"A characteristic that is objectively measured and evaluated as an indicator of normal biological processes, pathogenic processes, or pharmacologic response to a therapeutic intervention".
Biomarkers Definition Group (2001), Clin. Pharmacol. Ther., 69:89-95.

"New" biomarkers:
Usually interpreted as discovery of a novel protein, peptide, metabolite etc, *hence proteomics, peptidomics, metabolomics*

"Old" biomarker: SCC

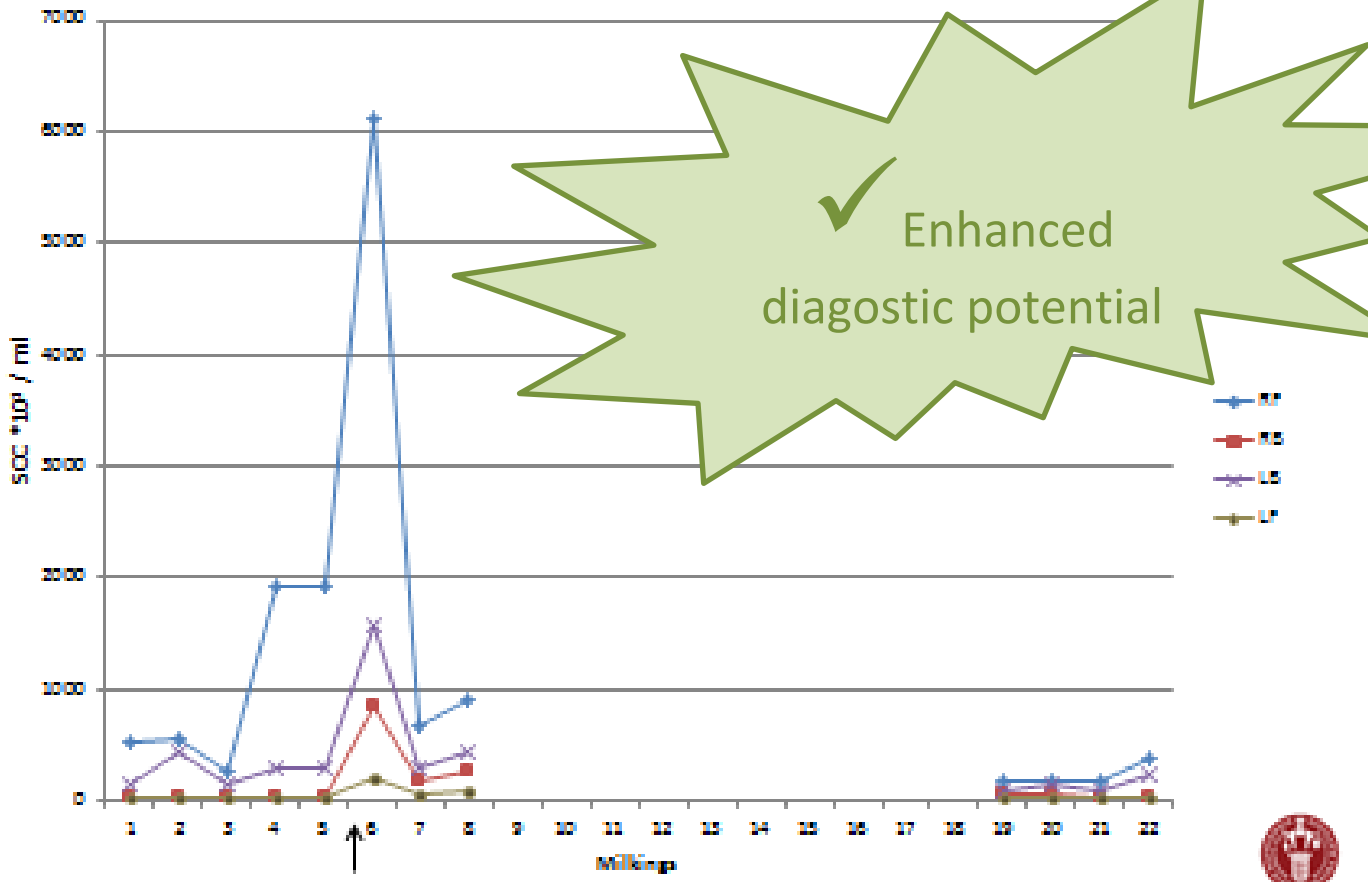
Question: Is there anything new about SCC?

Mastitis: not just a dairy cow problem

- SCC works because it is easy to monitor individual dairy cows repeatedly across time. Beef suckler cows present a problem, therefore!

- Objective: single-visit milk-based mastitis diagnostic test suitable for use in beef suckler cows.
- Hypothesis: high-dose oxytocin would create leaky mammary tight junctions and thereby provide a milk sample with enhanced diagnostic potential

SCC is increased after oxytocin



✓ Enhanced diagostic potential

Novel biomarkers

Existing biomarkers looked at in novel ways

- Focus on:
  - non-invasive sampling
  - automated (robotic) sampling
  - multiple application samples
  - minimal effective data

A novel approach to stress biomarkers

- Traditional stress biomarkers measured in novel ways

- Cortisol
- Inflammatory cytokines

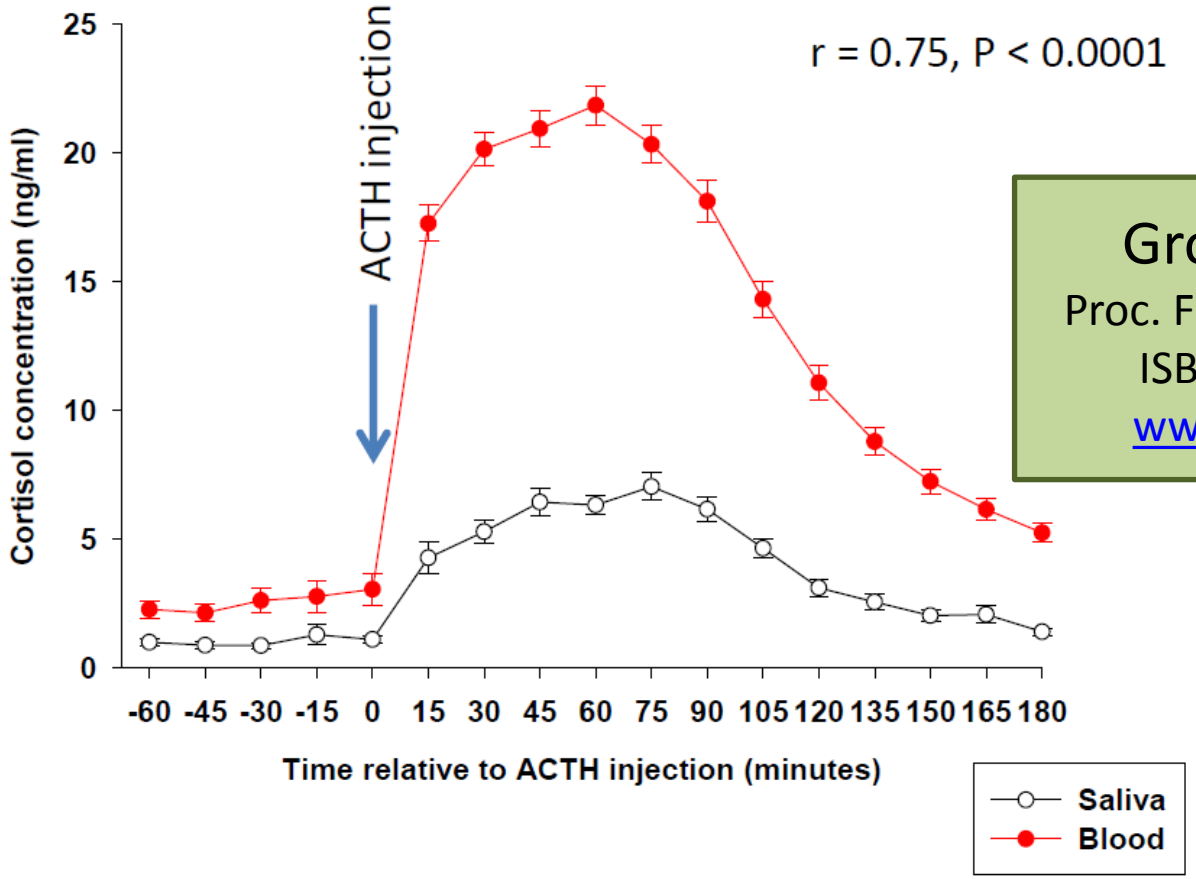
- In:
  - Plasma
  - Saliva
  - Milk
  - Sweat
  - Hair

Minutes
Hours
Days
Weeks

Systemic

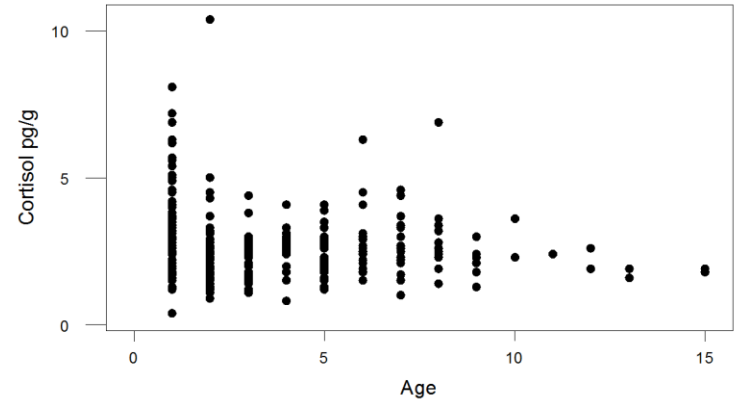
Local

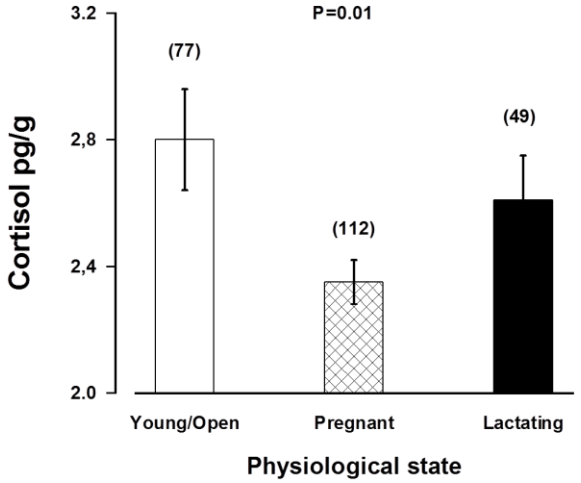
Salivary cortisol: a non-invasive gold standard?



Gross JJ *et al* (2014)
Proc. First DairyCare Conference
ISBN 978-0-9930176-0-5
www.dairycareaction.org

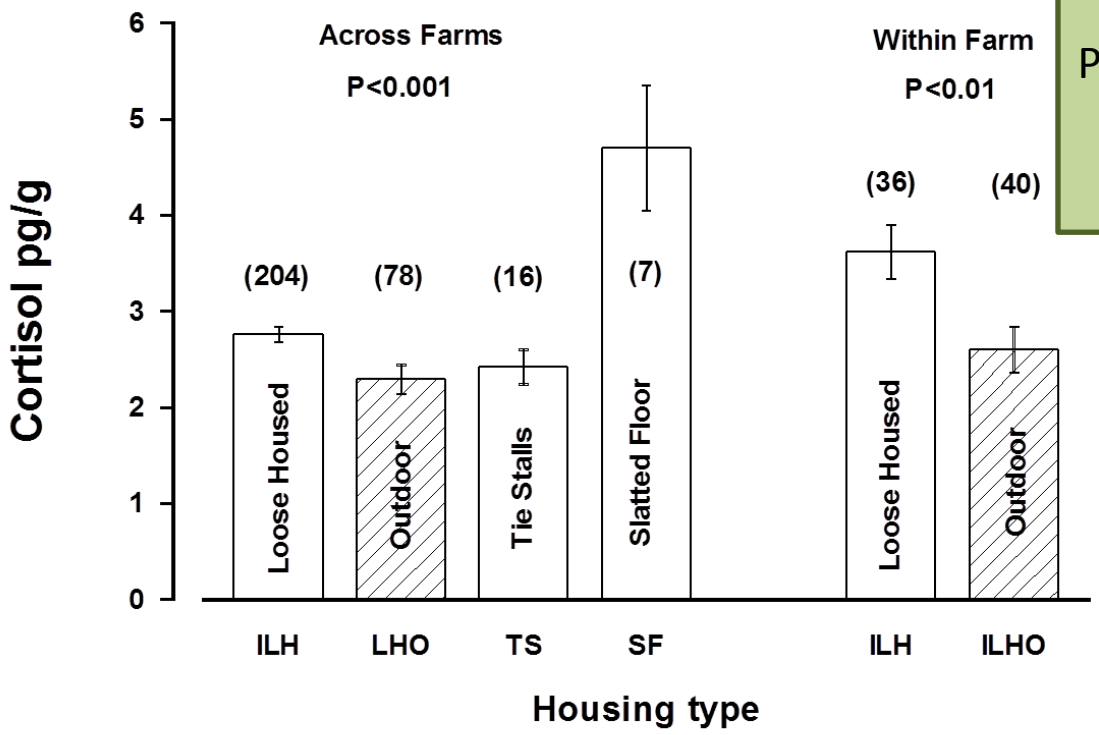
Hair cortisol: useful biomarker of chronic stress?





- Younger cattle had higher cortisol
- Pregnant cattle had lower cortisol than lactating cattle

Hair cortisol: effect of housing



Charmac R *et al* (2015)
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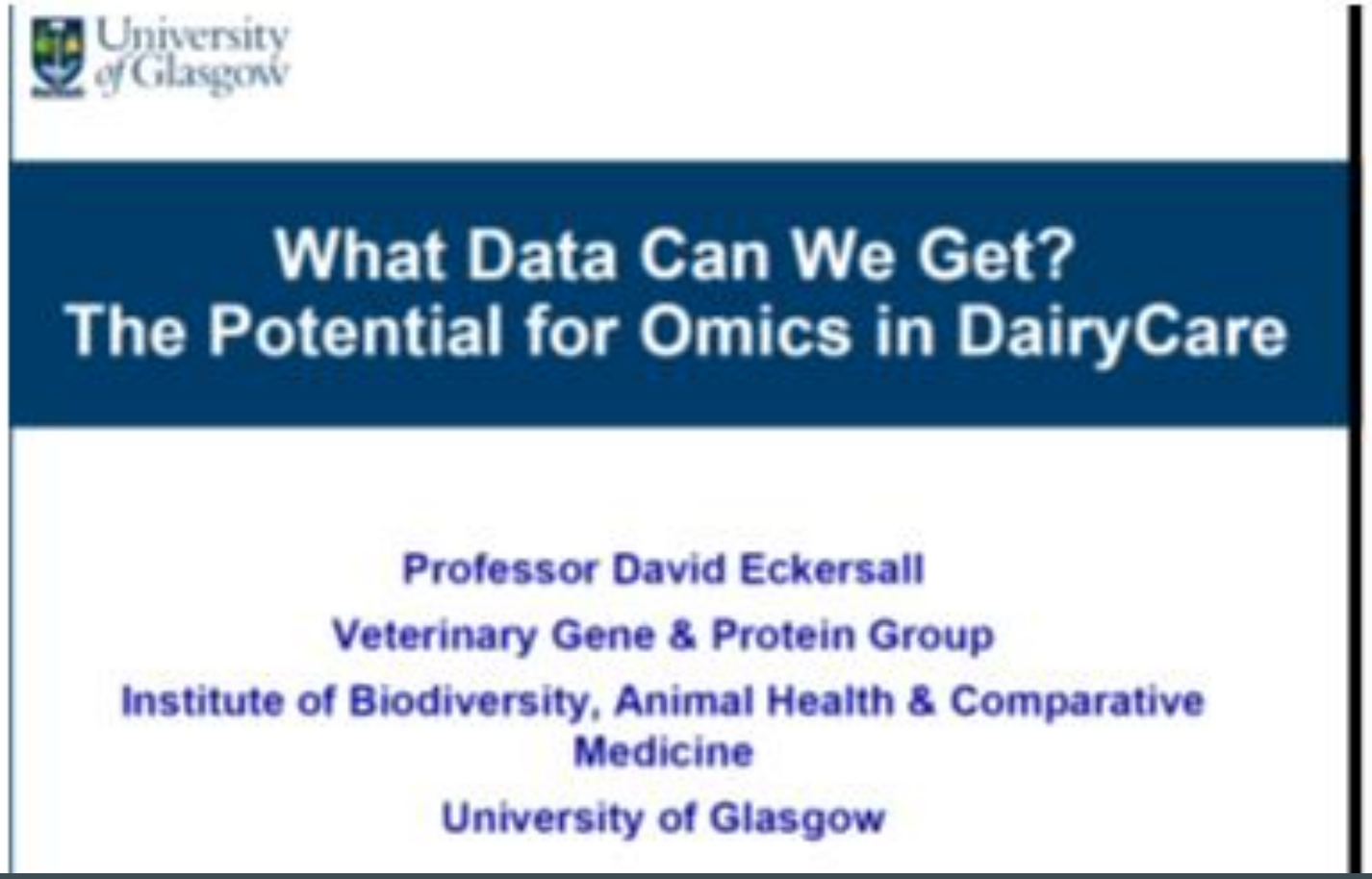
Interpretation: husbandry is not diagnostic

- How do we interpret different (cortisol) concentrations?

- If we find "useful" changes within the individual cow, does it matter?
- The objective is to deliver help to whom it is needed, when it is needed

Focus on the cow, not the needle!

DairyCare First Conference



DairyCare First Conference

State of the art of automated activity measuring technologies, and how to accelerate technology development

Matti Pastell
MTT Agrifood Research Finland

Focus on measures that are feasible on real farms

- Accelerometers
- Vision
- Sound

ERA Net: DairyICT

Herd Navigator:
Progesterone
LDH
BHB

Add SARA

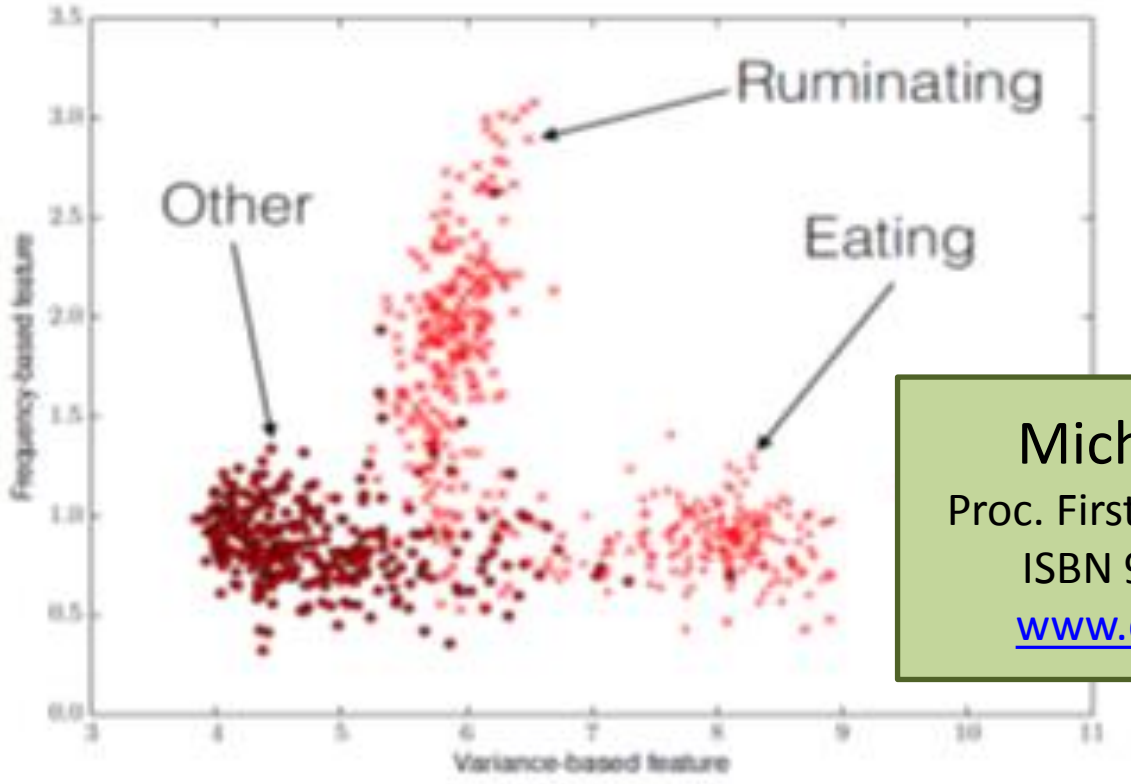
Add lameness

Add feeding activity

SilentHerdsman
Oestrus detection

Accelerometer data measuirng feed intake

Clustering Procedure



Michie *et al* (2014)
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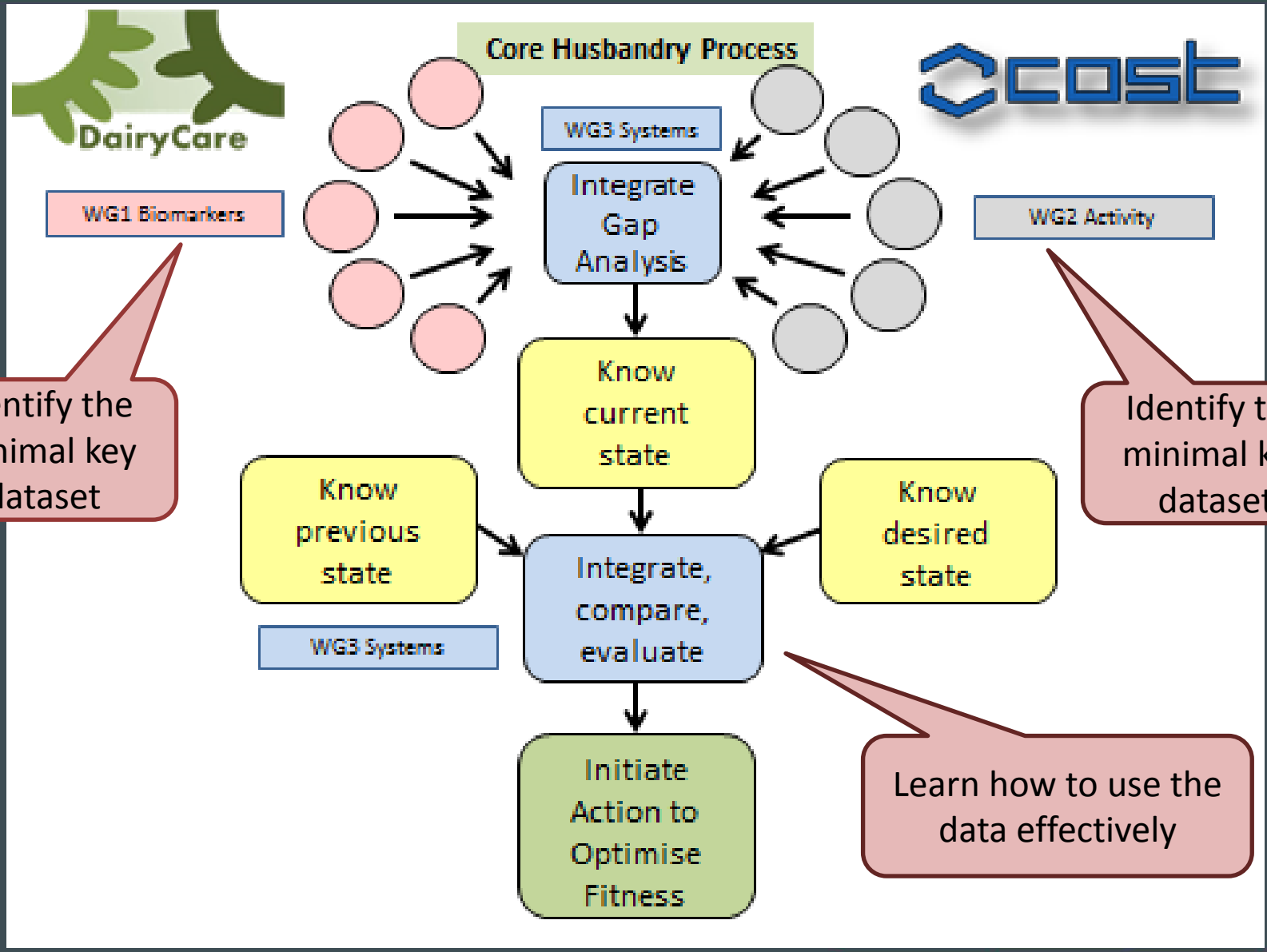
Conclusions

- There is a need for technologies capable of monitoring welfare and health of individual dairy animals in large herds
- Biomarkers can provide useful information
- Activity measures can provide useful information
- Fewer data may be better than more, as long as they are the right data
- Many stakeholders need to work together if we are to succeed….and we must!


DairyCare
Core Husbandry Process
cost
WG3 Systems
WG1 Biomarkers
WG2 Activity
Integrate Gap Analysis
Know current state
Know previous state
Know desired state
Integrate, compare, evaluate
WG3 Systems
Initiate Action to Optimise Fitness
Identify the minimal key dataset
Identify the minimal key dataset
Learn how to use the data effectively

Thank you for your attention!

COST Action FA1308, DairyCare

www.dairycareaction.org

Food Animal BioSciences Research Group

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