DairyCare: Monitoring of the Welfare and Health of Dairy Cows

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• 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 20, 2010

‘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...

8000 cows in 80 units

8000 cows in one unit. A realistic target?

Worst welfare

Best welfare
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

Core Husbandry Process:

- Integrate Gap Analysis
- Know current state
- Integrate, compare, evaluate
- Know desired state

Initiate Action to Optimise Fitness

WG1 Biomarkers

WG2 Activity

WG3 Systems
DairyCare Deliverables (examples)

- Novel biotechnologies for:
  - Automated monitoring of dairy cow wellbeing
  - Automated detection of sub-clinical problems (e.g. 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”.

“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 diagnostic 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

Systemic
Local

Minutes
Hours
Days
Weeks
Salivary cortisol: a non-invasive gold standard?

Proc. First DairyCare Conference
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

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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

University of Glasgow

What Data Can We Get? The Potential for Omics in DairyCare

Professor David Ekersall
Veterinary Gene & Protein Group
Institute of Biodiversity, Animal Health & Comparative Medicine
University of Glasgow
Focus on measures that are feasible on real farms

• Accelerometers
• Vision
• Sound
Add SARA

Add lameness

Add feeding activity
Accelerometer data measuring 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!
Identify the minimal key dataset

Learn how to use the data effectively

Identify the minimal key dataset
Thank you for your attention!

COST Action FA1308, DairyCare

www.dairycareaction.org

Food Animal BioSciences Research Group

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