intro
• Photo animaux avec BEA + et –
• Vaches corse
• Feedlot chine
• Cochons + et mois
• Poules batterie… vs pré
Purpose of this talk

A single point of view is not enough to understand animal welfare

Welfare is a wide term that embraces both the physical and mental well-being of the animal (Brambell report 1965)

- Animal welfare is a complex object:
  It includes not only adaptation but also perception
- Its study requires knowledge and methods from several scientific disciplines
- It is best understood by multidisciplinary approaches

A brief history of animal welfare science(s) will show how studies carried within the framework of unique disciplines progressively evolved into multidisciplinary research.
Animal Welfare: Towards transdisciplinarity

Isabelle VEISSIER – Mara MIELE
Early studies: separate disciplines, animal welfare not directly addressed

Animal welfare becoming an object of research
use of methods previously designed for other purposes

Bridging disciplines
to understand animal affects

Interdisciplinary approach
to develop a welfare assessment system

Next step: Transdiciplinarity
to address facts & values
EARLY STUDIES
several disciplines, animal welfare not directly addressed
Philosophy: the moral status of animals

Rousseau, Bentham (18th): Animals are sentient and this confers them a moral consideration

*The question is not, can they reason?, nor Can they talk?, but, *Can they suffer*?* (Bentham 1781)

- We should treat animals according to their ability to suffer

Still what affects the animals could feel was not defined
Stress: unspecific response of the body to an aggression that helps restore homeostasis. No mention of how the aggression is perceived.
Psychology: behaviourism

Watson (1913): new approach of psychology based on observable events

Operant conditionning: Skinner box
The behaviour of the animal is shaped until the desired response is obtained

**Behaviour**: adaptive response of an organism to stimuli from the environment.
What happens in the black-box is impossible to study
Zoology: ethology

Observation of animals in their natural environment

Innate behaviours, behavioural repertoire

**Importance of the** internal state (motivation)

Animal mind is again a black-box
Veterinary medicine

Description of clinical signs
↓
Identification of disorders
↓
Understanding of pathogeny
↓
Medical treatment

The disease is cured
What the animal feels is not taken into account
Early studies

- In philosophy, mental states started to be attributed to animals
- Stress physiology, behaviourism, ethology, veterinary medicine: considered that mental states are not possible to study
- The word ‘animal welfare’ was not used
ANIMAL WELFARE
BECOMING AN OBJECT OF RESEARCH
Use of methods previously designed for other purposes
Brambell report: We need to use *scientific evidence available concerning the feelings of animals* (1965)

The views of humans (Brambell report 1965)  
-  
+  

The views of hens (Hughes & Black 1975)  
(time spent on each floor, no. eggs)  
+  
-  

The views of hens differ from that of humans!
The study of animals’ preferences

Use of operant conditioning: animals are required to work to obtain a reward or avoid a punishment

Readiness to work

power on the door (N/s)

-80  -60  -40  -20

min before oviposition

(Cooper & Appleby, 2003)

The results are described into preferences, aversions, or needs
Naturalistic approach

Stolba & Wood-Gush 1984
- Observations in natural environment:
  Identification of key features for pigs to express their behaviour
- Reproduction in farm conditions

Welfare is improved
Production is increased

Welfare is improved
Production is increased

Veissier & Miele, ISNH-ISRP 2011
### Indices of poor welfare (stress responses)

**Gilts in 5 housing conditions**

<table>
<thead>
<tr>
<th>Housing Condition</th>
<th>Cortisol</th>
<th>Abnormal behaviour</th>
<th>Champing Biting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stall + neck tether</td>
<td>↑</td>
<td></td>
<td>3 %</td>
</tr>
<tr>
<td>Pair – pen 4mx1.8m</td>
<td>↑ ↑</td>
<td></td>
<td>3.6</td>
</tr>
<tr>
<td>Group – pen 4.1mx3.5m</td>
<td>↑</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Group 15mx15m</td>
<td>↑</td>
<td></td>
<td>0.4</td>
</tr>
<tr>
<td>Group Paddock 41mx17m</td>
<td>↑</td>
<td></td>
<td>0.7</td>
</tr>
</tbody>
</table>

*A prolonged rise in blood cortisol is a sign of poor welfare*  
(Barnett and Hemsworth 1990)
Animal welfare: a science on its own

Fundamental questions in animal welfare science

1. To what extent are the animals used by humans capable of emotions? In other words, what affective states can they feel?
2. How does an animal perceive its environment? In other words, what are the situations which are perceived negative vs. positive, or what are the elements animals like vs. dislike?
3. How can we assess the level of animal welfare in a given situation?
4. What are the impacts of the ways we treat animals (during their life or at slaughter) on the welfare of these animals?
5. What recommendations can we make as to improve animal welfare?

(Veissier & Forkman 2008)
BRIDGING DISCIPLINES
to understand animal affects
The stress concept refined

Mason 1971

Corticoids’ metabolites in urine

Fastening stresses monkeys only if they are aware of it

The un-specificity of stress responses comes from the common emotion that triggers them

Psychology helps understand physiological reactions

Veissier & Miele, ISNH-ISRP 2011
Cognitive psychology

An emotion is triggered by the evaluation of the situation according to a series of checks (Lazarus 1984, Scherer 1999)

- Suddenness
- Familiarity
- Predictability
- Pleasantness
- Expectation
- Controllability
- Social norms

Eliciting situation

Cognitive component

Subjective component

Physiological component (e.g. heart rate, cortisol...)

Behavioural component (e.g. facial expression, startle)
The study of emotions (2/4)

Checks

<table>
<thead>
<tr>
<th></th>
<th>High</th>
<th>H</th>
<th>L</th>
<th>H</th>
<th>VL</th>
<th>L</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suddenness</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Familiarity</td>
<td>Low</td>
<td>L</td>
<td>VL</td>
<td>H</td>
<td></td>
<td></td>
<td>L</td>
</tr>
<tr>
<td>Predictable</td>
<td>L</td>
<td>L</td>
<td>Medium</td>
<td>L</td>
<td>VH</td>
<td>M</td>
<td>L</td>
</tr>
<tr>
<td>Pleasantness</td>
<td>L</td>
<td>open</td>
<td></td>
<td>VH</td>
<td></td>
<td></td>
<td>VL</td>
</tr>
<tr>
<td>Consistent to expectation</td>
<td>L</td>
<td>L</td>
<td>VL</td>
<td>H</td>
<td>H</td>
<td>H</td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>L</td>
<td>H</td>
<td>H</td>
<td>VL</td>
<td>M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social norms</td>
<td>L</td>
<td>L</td>
<td></td>
<td></td>
<td></td>
<td>H</td>
<td>L</td>
</tr>
</tbody>
</table>

(Sanders et al., 2005)
The use of appraisal theories to study sheep
Ex: Relevance of the check Predictability

Experimental paradigm
Lamb eating concentrates
Object falling suddenly behind the trough
The fall is preceded or not by a light signal

Startle (% response)

Δ Heart rate (bpm)

Veissier & Miele, ISNH-ISRP 2011
Sheep emotions (4/4)

**Checks**
Outcome of checks experimentally manipulated

<table>
<thead>
<tr>
<th></th>
<th>High</th>
<th>L</th>
<th>VL</th>
<th>M</th>
<th>H</th>
<th>L</th>
<th>VL</th>
<th>H</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suddenness</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Familiarity</td>
<td>L</td>
<td>L</td>
<td>VL</td>
<td>H</td>
<td>L</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Predictable</td>
<td>L</td>
<td>L</td>
<td>Medium</td>
<td>L</td>
<td>VH</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pleasantness</td>
<td>L</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consistent to</td>
<td>L</td>
<td>L</td>
<td>VL</td>
<td>H</td>
<td>H</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>expectation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>L</td>
<td>H</td>
<td>H</td>
<td>VL</td>
<td>M</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social norms</td>
<td>L</td>
<td>L</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>H</td>
</tr>
<tr>
<td><strong>Emotion</strong></td>
<td>Fear</td>
<td>Rage</td>
<td>Anger</td>
<td>Despair</td>
<td>Boredom</td>
<td>Happiness</td>
<td>Pride</td>
<td>Shame</td>
<td>Disgust</td>
</tr>
</tbody>
</table>

*(Veissier et al 2009)*

Human psychology helps understand animal affects
Affective states and diseases

Stressful event → Appraisal → Emotional arousal → Defensive behaviour → Failure

Physical illness

Behavioural despair
Depressive-like symptoms

Force-swimming test: when ill mice move more but stop moving earlier

Cytokines

Health helps understand behaviour & vice versa

(Renault & Aubert 2006)

Veissier & Miele, ISNH-ISRP 2011
Disciplines need to talk to each other

Veissier & Miele, ISNH-ISRP 2011
INTERDISCIPLINARY STUDIES to develop a welfare assessment system
Welfare Quality® project

- 2004-2009, 40 partners
- One core objective: to design an on-farm welfare assessment system for cattle, pigs, poultry

Veissier & Miele, ISNH-ISRP 2011
Interdisciplinarity in Welfare Quality®

Initial organisation

Year 1-3
- **Social scientists**
  - Societal expectations

Year 4-5
- **Animal scientists**
  - Farm assessment

Together
Implementation

Steps
1. Definition of welfare dimensions
2. Definition of welfare measures
3. Design of a scoring model

Appl ethol
Physiology
Vet med
Animal prod ...

Veissier & Miele, ISNH-ISRP 2011
### Step 1: welfare dimensions to be covered

<table>
<thead>
<tr>
<th>Principles</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good feeding</td>
<td>1. Absence of prolonged hunger</td>
</tr>
<tr>
<td></td>
<td>2. Absence of prolonged thirst</td>
</tr>
<tr>
<td>Good housing</td>
<td>3. Comfort around resting</td>
</tr>
<tr>
<td></td>
<td>4. Thermal comfort</td>
</tr>
<tr>
<td></td>
<td>5. Ease of movement</td>
</tr>
<tr>
<td>Good health</td>
<td>6. Absence of injuries</td>
</tr>
<tr>
<td></td>
<td>7. Absence of disease</td>
</tr>
<tr>
<td></td>
<td>8. Absence of pain induced by management procedures</td>
</tr>
<tr>
<td>Appropriate behaviour</td>
<td>9. Expression of social behaviours</td>
</tr>
<tr>
<td></td>
<td>10. Expression of other behaviours</td>
</tr>
<tr>
<td></td>
<td>11. Good human-animal relationship</td>
</tr>
<tr>
<td></td>
<td>12. Positive emotional state</td>
</tr>
</tbody>
</table>

Veissier & Miele, ISNH-ISRP 2011
Step 2: Definition of welfare measures (priority is given to measures on animals)

- Body condition
- Lying down
- Cleanliness
- Injuries
- Social behaviour
- Fear of humans
- Lameness

Veissier & Miele, ISNH-ISRP 2011
Step 3: Design of a scoring model

- Body condition
- Lying down
- Social behaviour
- Injuries
- Lameness
- Cleanliness

Scoring:
A synthesis of information
Going from a mere description to a value judgment

Data

Veissier & Miele, ISNH-ISRP 2011
Value-based questions

1- Shall we consider the **average** state of animals in a herd vs. put more attention on the **worse animals**?

2- Can one aspect of welfare **compensate** for another?

3- Shall the judgement be based on what seems good welfare in theory or on what can realistically be achieved in practice?
Interdisciplinarity in Welfare Quality®

Final organisation

Social scientists \rightarrow Animal scientists

Societal expectations \leftrightarrow Farm assessment

Together Implementation

- Common tasks
- Integration workshops
- Survey among all scientists to set acceptability levels
- ...

Veissier & Miele, ISNH-ISRP 2011
Interactions between scientists and society to design the welfare assessment system in Welfare Quality®

Social scientists ↔ Animal scientists

Societal expectations ↔ Farm assessment

Together Implementation

Society
- Citizens
- Producers
- Retailers

- websites, newsletters
- meetings, workshops, conferences,
- interviews, focus groups, citizen & farmers juries
- Advisory committee...
What did we gain from these interactions?

Naturalness is put forward by citizens
- Access to pasture was added for cattle
- Citizens want to go beyond absence of suffering
  - Investigation of measures of positive affects

Values underlying the scoring system were made clear
- The animals in poor states are given priority
- Some criteria are given more importance (thirst > hunger)
- Little compensation between criteria
- Overall assessment based on theoretical objectives and pragmatic rules
FINAL WORDS
Our understanding of animal welfare is both values-based and science-based. [...] animal welfare is like many other topics of "mandated" science such as food safety and environmental sustainability where the tools of science are used within a framework of values (Fraser 2008)

- Assessing animal welfare requires a transdisciplinary approach where scientists from various disciplines – specially animal and social scientists – work together and with society
- People need to discuss both facts and values
Transdisciplinarity

‘a specific form of interdisciplinarity in which boundaries between and beyond disciplines are transcended and knowledge and perspectives for different scientific disciplines as well as non-scientific sources are integrated’

(Flinterman et al 2011)
Further steps towards transdiciplinarity

• Scientists should be ready to
  – quit their disciplinary home, at least for the time of a project
  – try to reason with the framework of other disciplines
  – engage in common tasks with scientists from other disciplines and non-scientists

• Researches should be evaluated not only on publications (usually within disciplines) but also on impacts
Early studies: separate disciplines, animal welfare not directly addressed

Animal welfare becoming an object of research use of methods previously designed

Bridging disciplines to understand animal affects

Interdisciplinary approach to develop a welfare assessment system

Next step: Transdiciplinarity to address facts & values

For a complete picture of animal welfare
Thank you for your attention