



# Animal welfare: towards transdisciplinarity - The European experience

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# Animal Welfare: Towards transdisciplinarity

**Isabelle VEISSIER – Mara MIELE**















# 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**

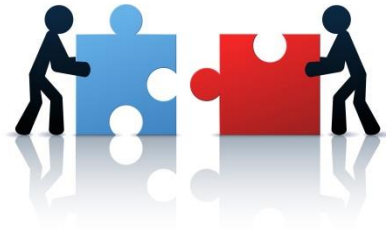




Early studies: separate disciplines,  
animal welfare not directly addressed



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



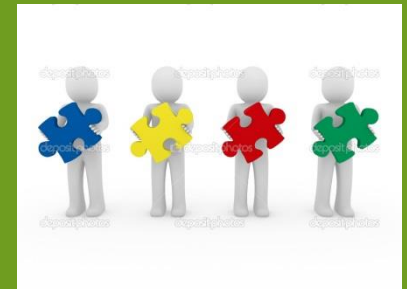
Next step: Transdisciplinarity  
to address facts & values



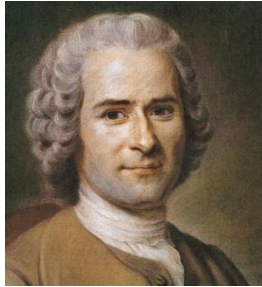


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**EARLY STUDIES**  
several disciplines,  
animal welfare not directly addressed

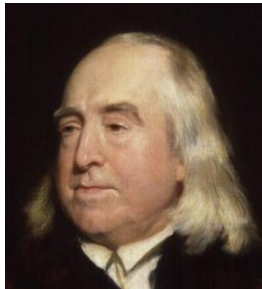


# Philosophy: the moral status of animals



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

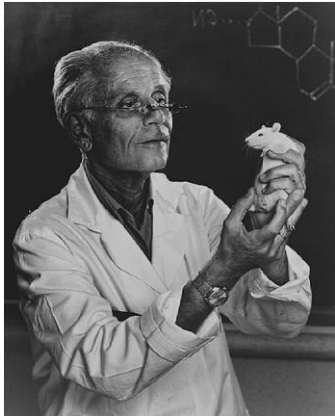
*The question is not, can they reason?, nor Can they talk?, but, **Can they suffer?** (Bentham 1781)*



- We should treat animals according to their ability to suffer

Still what affects the animals could feel was not defined

# Physiology: stress syndrome



(Selye 1936)

electric shocks  
cold  
infections ...

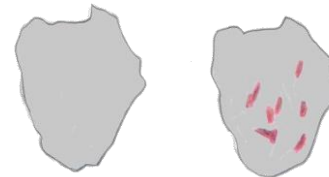
catecholamines  
corticoïdes



adrenals hypertrophy



thymus atrophy



gastric ulcers

**Stress:** unspecific response of the body to an aggression that helps restore homeostasis.  
No mention of how the aggression is perceived

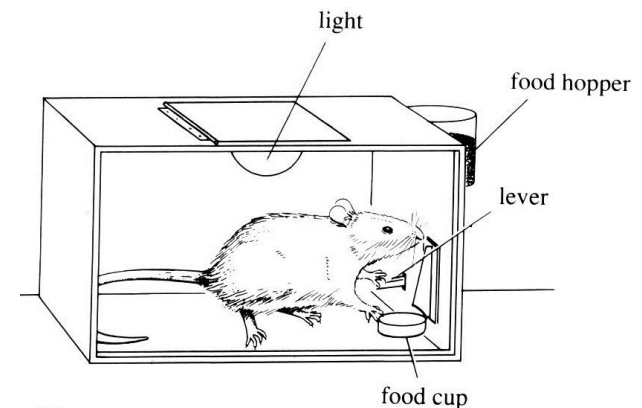
# Psychology: behaviourism



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

stimulus → **Black-box** → response

Operant conditioning: 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



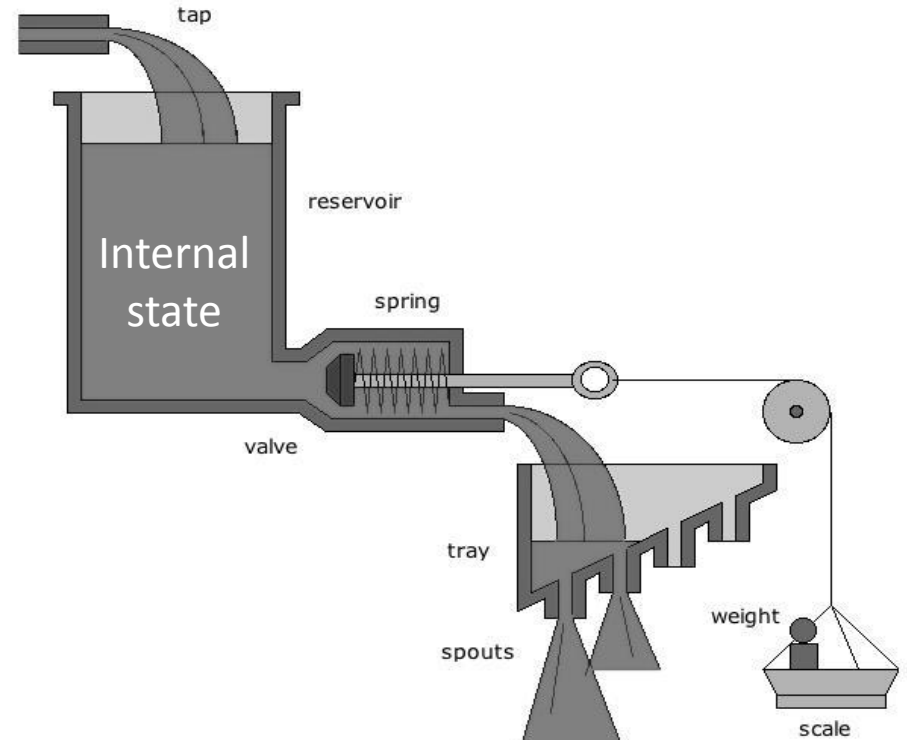
# Zoology: ethology



Observation of animals in their natural environment



Lorenz



**Innate behaviours, behavioural repertoire**  
**Importance of the** internal state (motivation)  
Animal mind is again a black-box

# Veterinary medicine



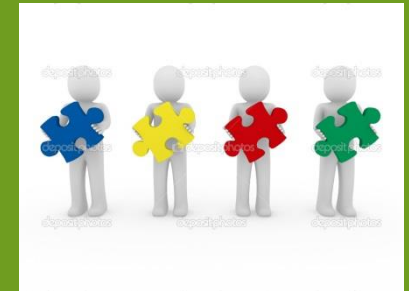
The disease is cured  
What the animal feels is not taken into account

# 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

# 2

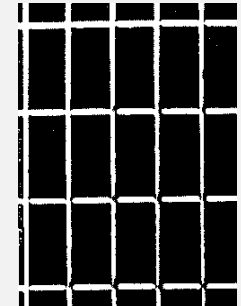
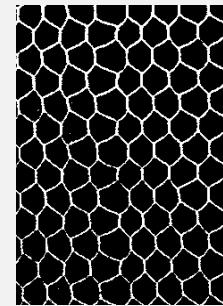
**ANIMAL WELFARE  
BECOMING AN OBJECT OF RESEARCH**  
Use of methods previously designed for  
other purposes



# Brambell report: We need to use *scientific evidence available concerning the feelings of animals* (1965)



Flooring for hens



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!

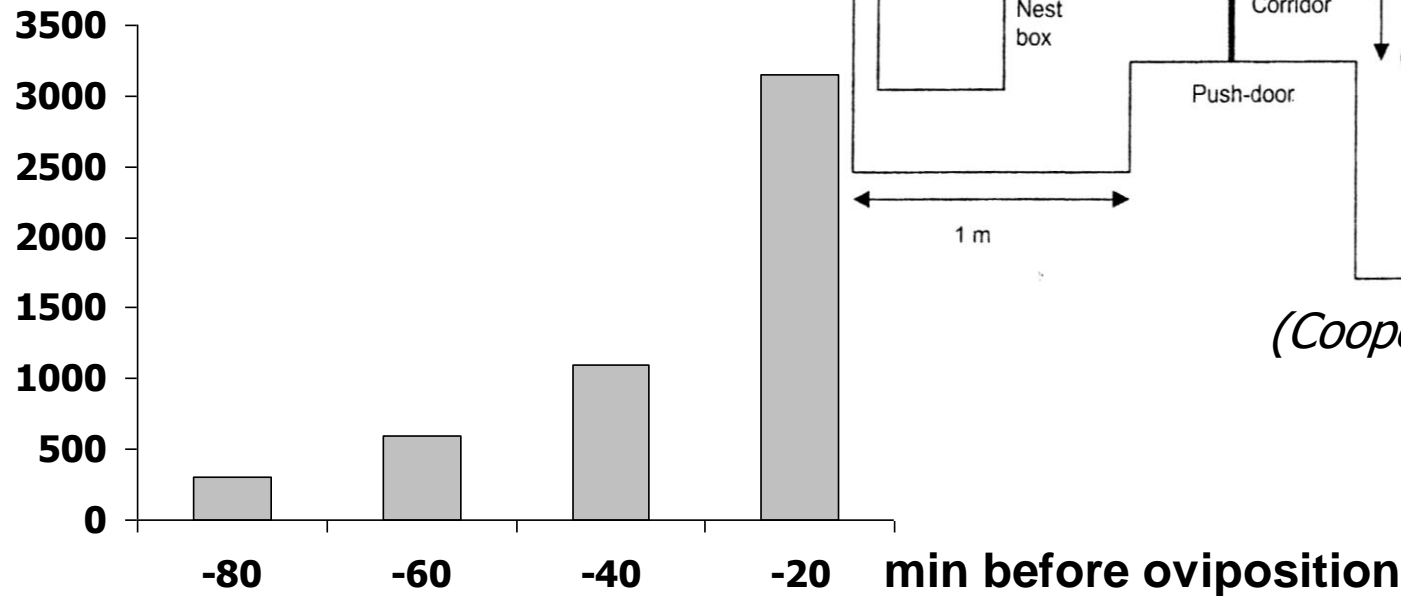


# The study of animals' preferences

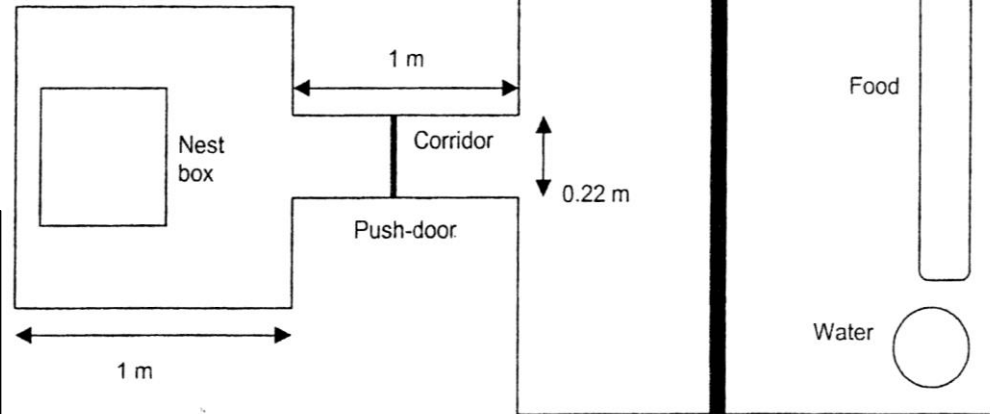
Use of operant conditioning: animals are required to work to obtain a reward or avoid a punishment

## Readiness to work

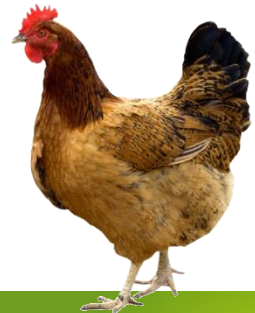
power on the door  
(N/s)



hen pushing door  
to access a nest



*(Cooper & Appleby, 2003)*



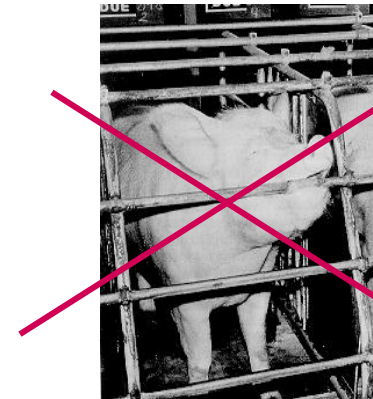
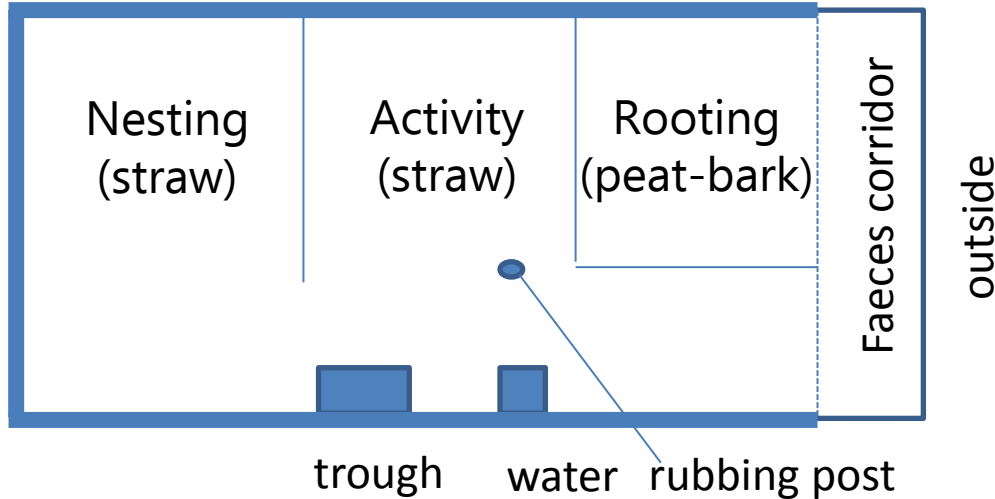
The results are described into preferences, aversions, or needs

# Naturalistic approach



Stolba & Wood-Gush 1984

- Observations in natural environment:  
Identification of key features for pigs to express their behaviour
- Reproduction in farm conditions

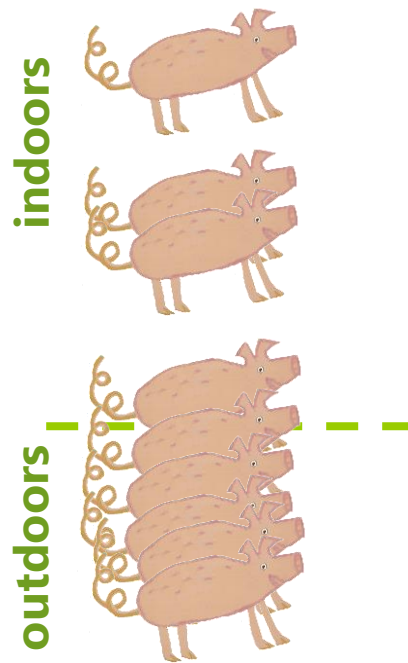


Abnormal  
behaviour

Welfare is improved  
Production is increased

# Indices of poor welfare (stress responses)

## Gilts in 5 housing conditions



	Cortisol	Abnormal behaviour
Stall + neck tether	↗	3 %
Pair – pen 4mx1.8m	↗ ↗	3.6
Group – pen 4.1mx3.5m	→	1
Group 15mx15m	↗	0.4
Group Paddock 41mx17m	↗	0.7

Champing  
Biting

(Barnett et al 1984)

*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)*

3

## **BRIDGING DISCIPLINES** to understand animal affects

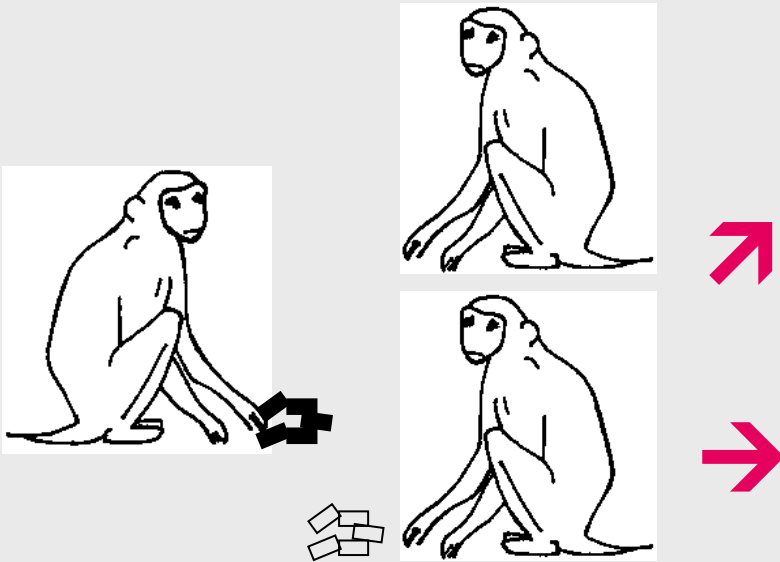




# The stress concept refined

*Mason 1971*

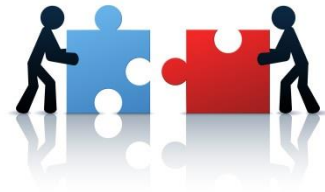
Corticoids' metabolites in urine



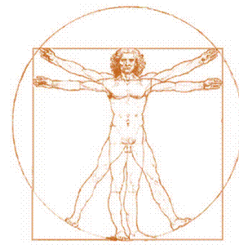
Fastening stresses monkeys only if they are aware of it

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

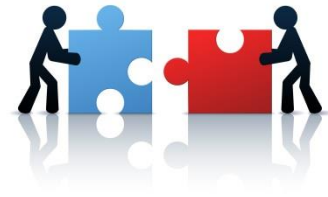
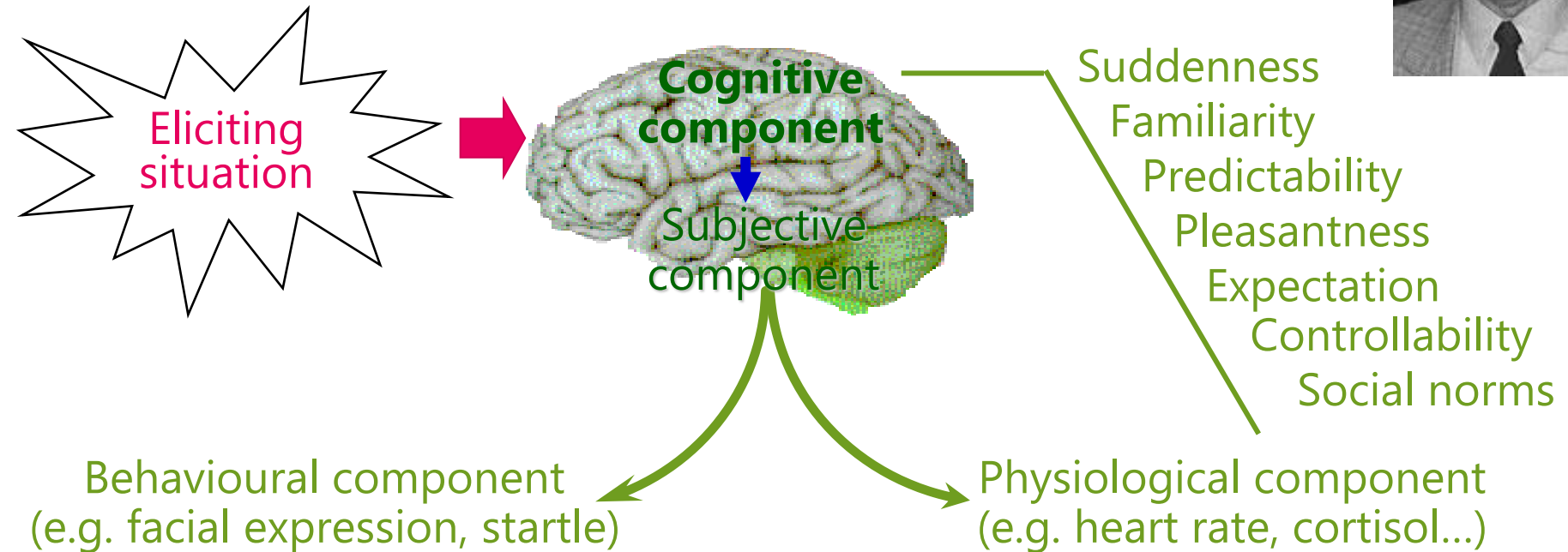
**Psychology helps understand physiological reactions**



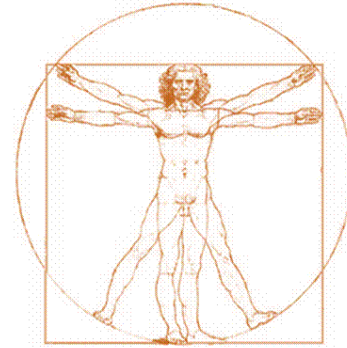
# The study of emotions (1/4)



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



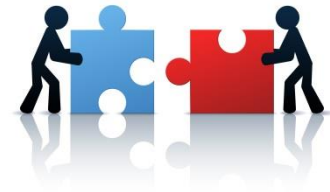
# The study of emotions (2/4)



## Checks

Suddenness	High	H	L	H	VL	L		L	
Familiarity	Low	L		VL	H				L
Predictable	L	L	Medium	L	VH	M			L
Pleasantness	L	open				VH			VL
Consistent to expectation	L	L		VL	H	H			
Control	L	H	H	VL	M				
Social norms		L	L				H	L	
Emotion	Fear	Rage	Anger	Des pair	Bore dom	Happi ness	Pride	Shame	Disgust

(Sanders et al., 2005)



# The use of appraisal theories to study sheep

## Ex: Relevance of the check Predictability



at random



signalled

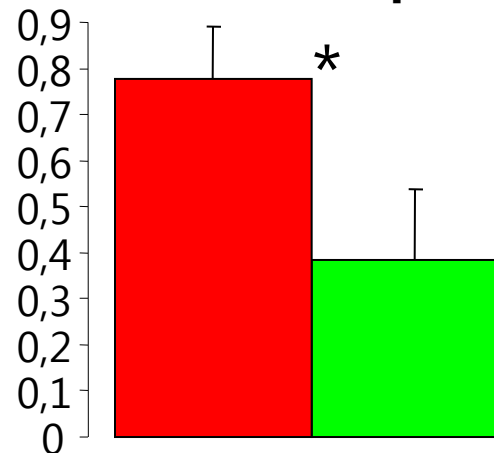
### Experimental paradigm

Lamb eating concentrates

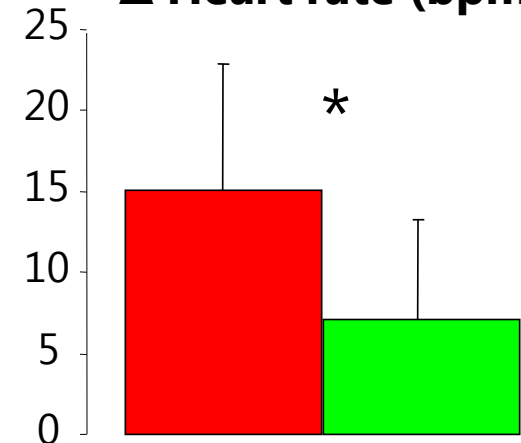
Object falling suddenly behind the trough

The fall is preceded or not by a light signal

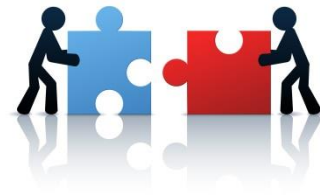
### Startle (% response)



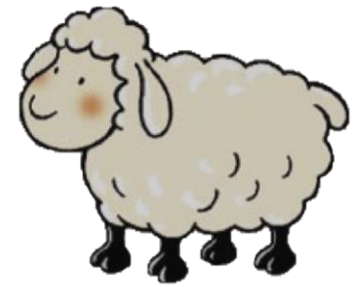
### $\Delta$ Heart rate (bpm)



*(Greiveldinger et al 2007)*



# Sheep emotions (4/4)

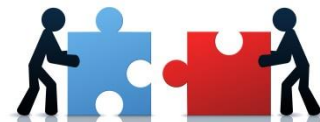


## Checks

Outcome of checks experimentally manipulated

Suddenness	High	H	Low	H	VL	L		L	
Familiarity	L	L		VL	H				L
Predictable	L	L	Medium	L	VH	M			L
Pleasantness	L					VH			VL
Consistent to expectation	L	L		VL	H	H			
Control	L	H	H	VL	M				
Social norms		L	L				H	L	
Emotion	Fear	Rage	Anger	Des pair	Bore dom	Happi ness	Pride	Shame	Disgust

(Veissier et al 2009)

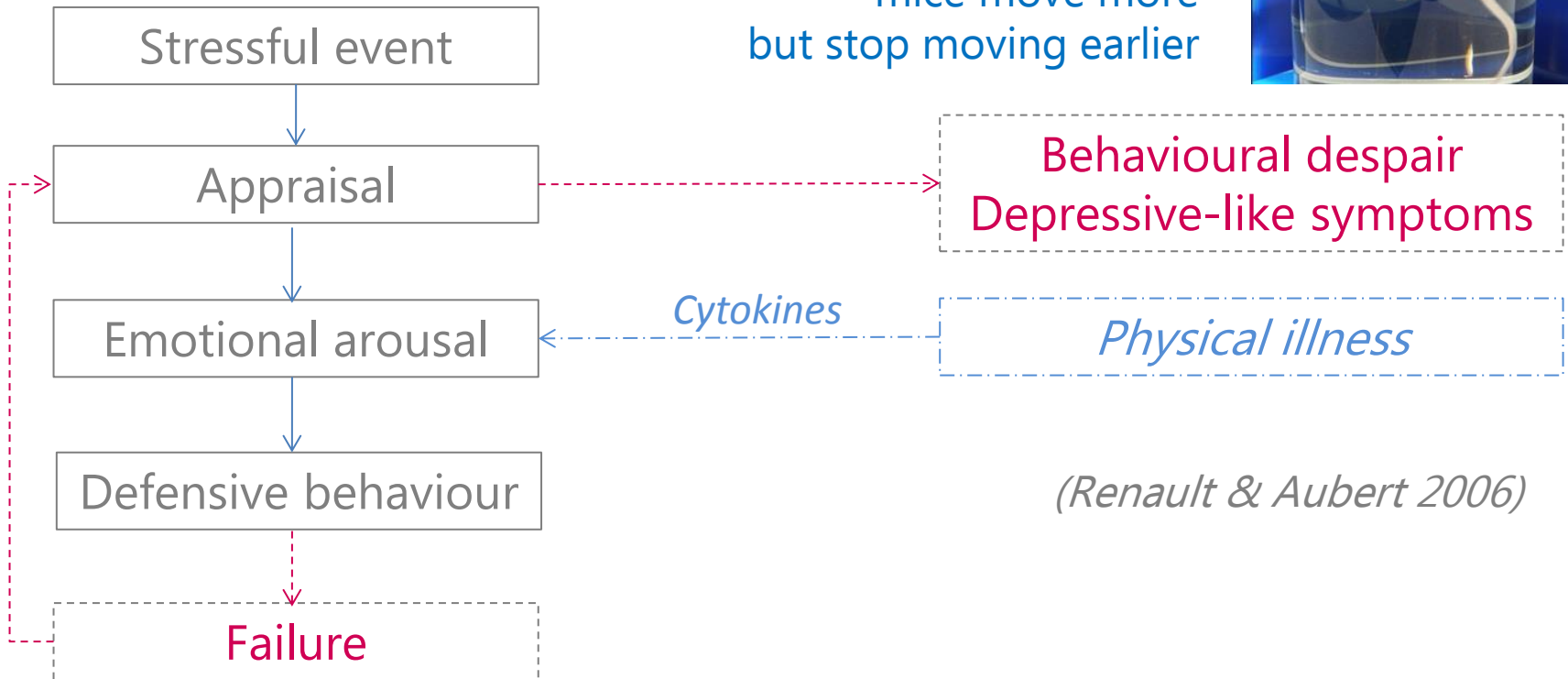


Human psychology helps understand animal affects



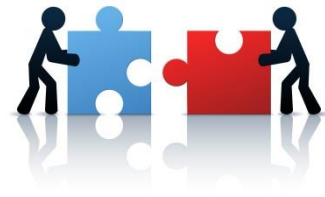
# Affective states and diseases

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



*(Renault & Aubert 2006)*

**Health helps understand behaviour & vice versa**





Behaviour

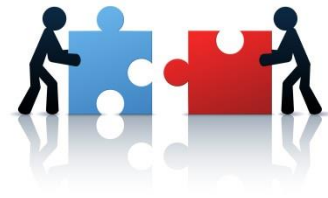
Physiology



Psychology

Health

**Disciplines need to talk to each other**



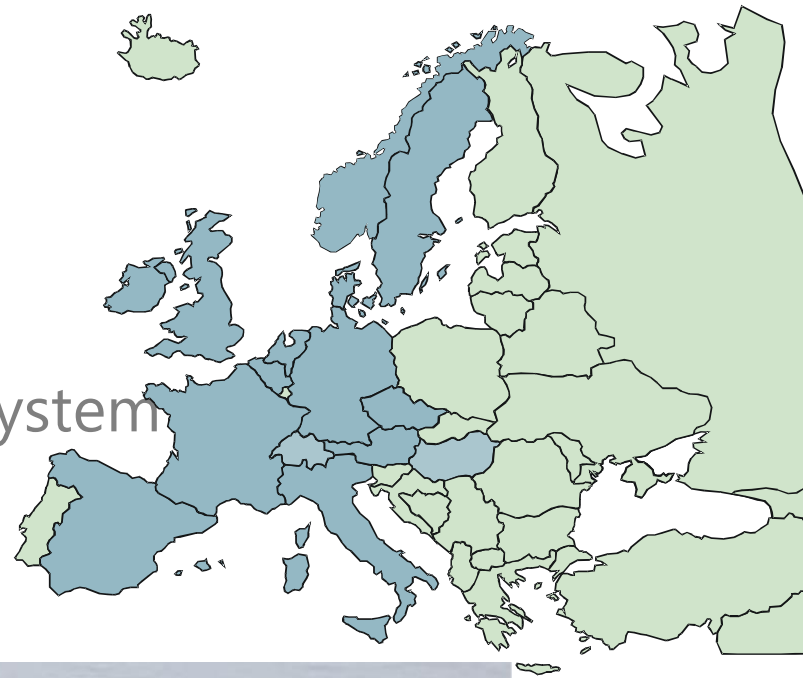
# 4

**INTERDISCIPLINARY STUDIES**  
to develop  
a welfare assessment system



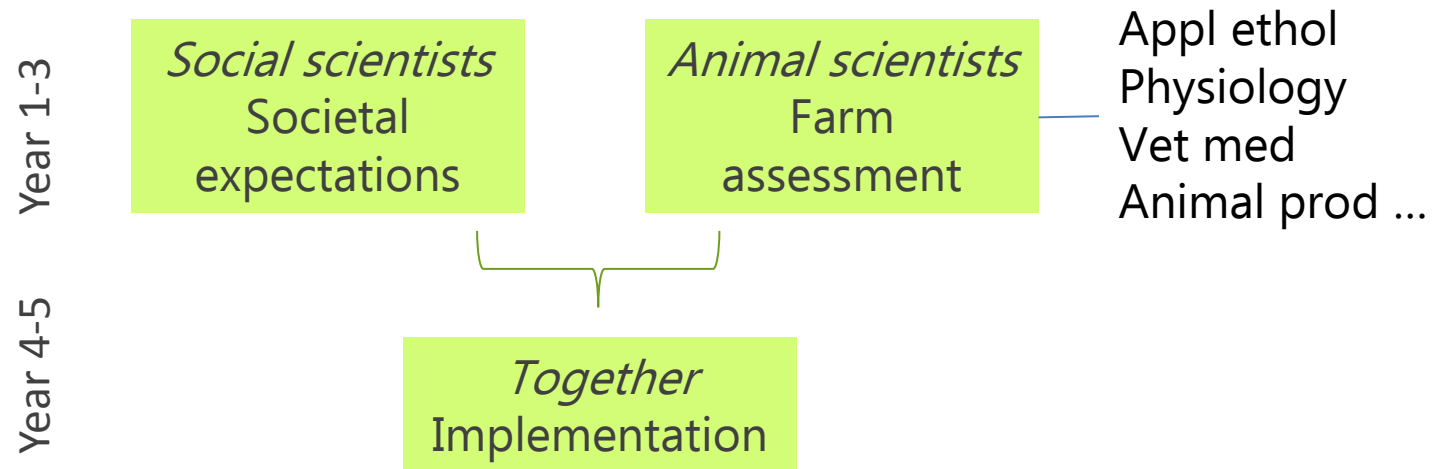
# Welfare Quality® project

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



# Interdisciplinarity in Welfare Quality®

## Initial organisation





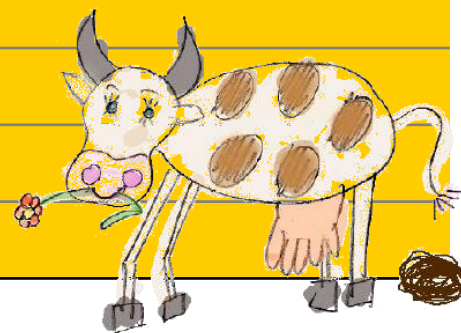
## Steps

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



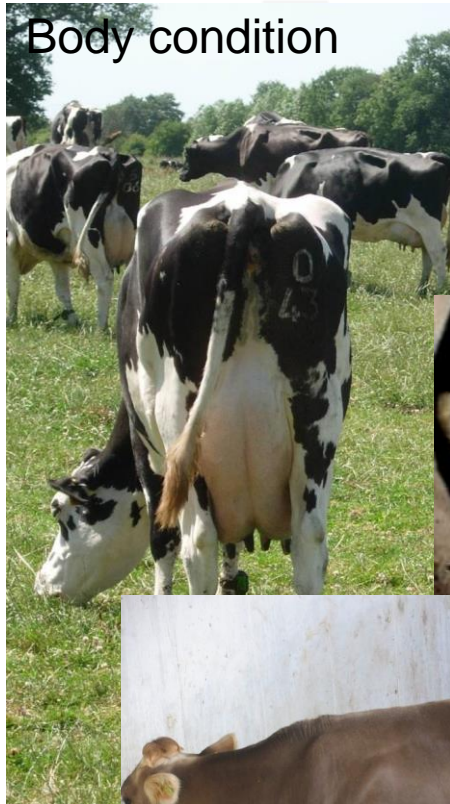
# Step 1: welfare dimensions to be covered

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



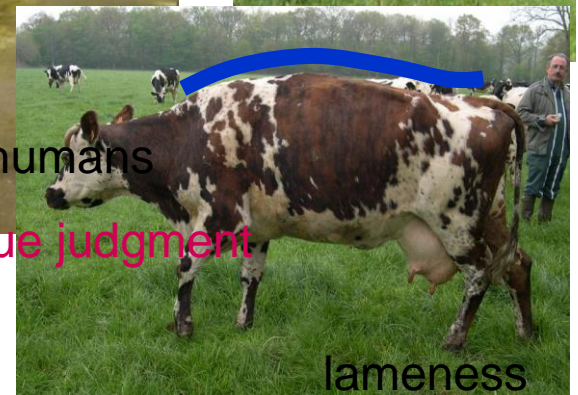
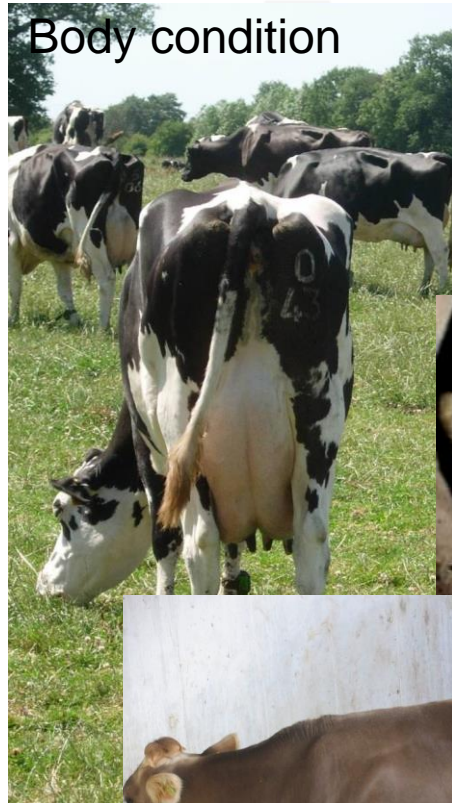


## Step 2: Definition of welfare measures (priority is given to measures on animals)





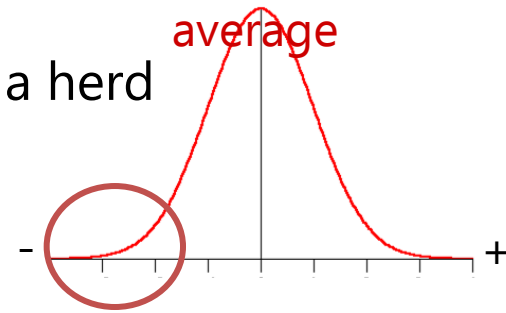
# Step 3: Design of a scoring model



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

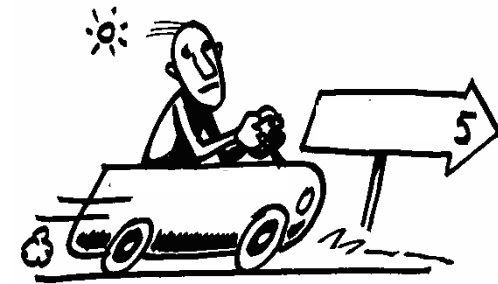
# Value-based questions

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



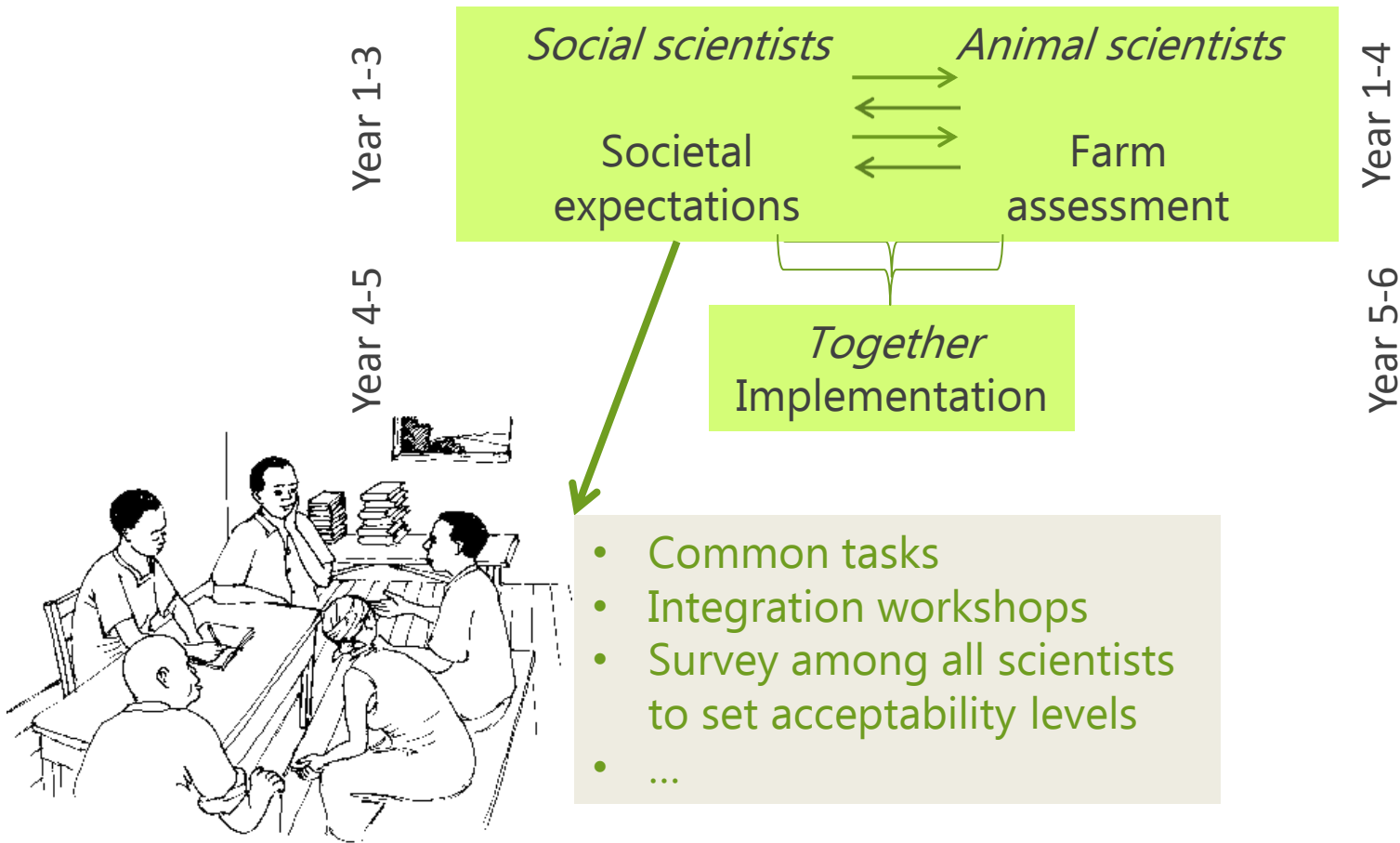
2- Can one aspect of welfare **compensate** for another?

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

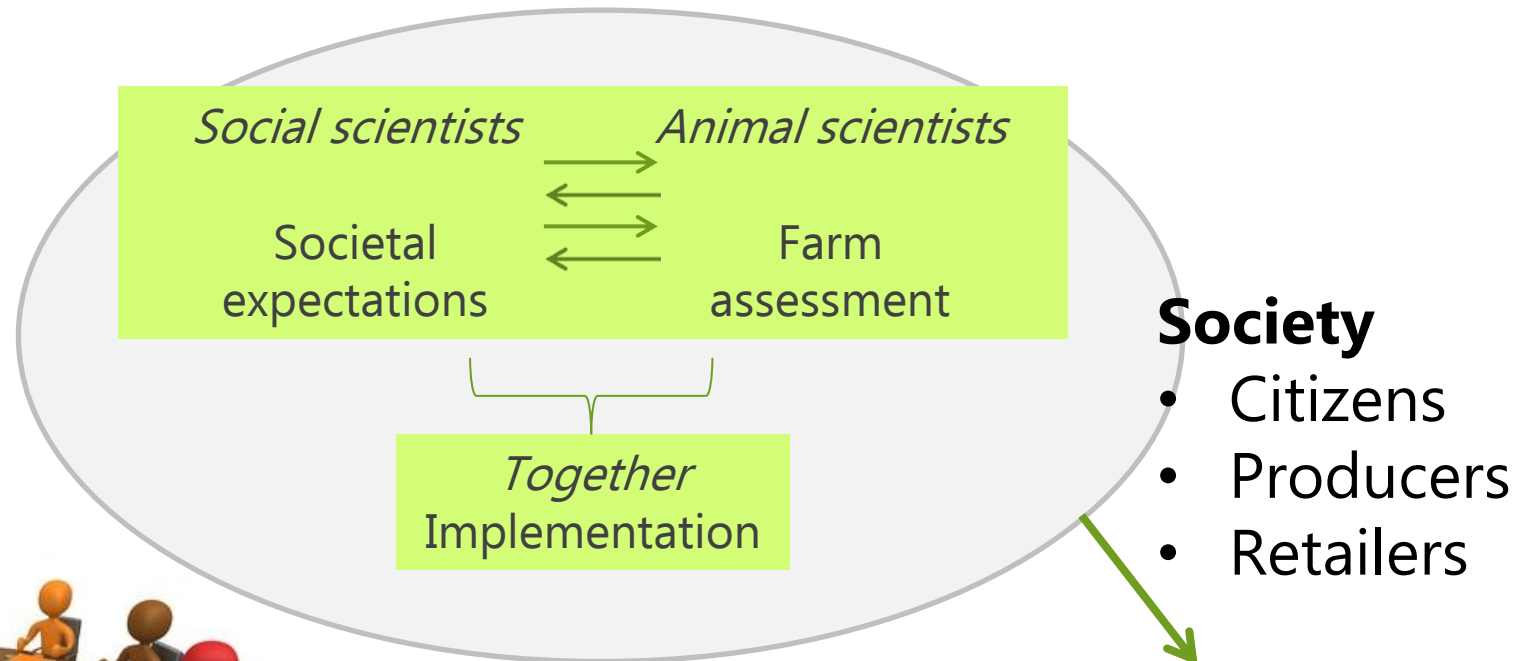


# Interdisciplinarity in Welfare Quality®

## Final organisation



# Interactions between scientists and society to design the welfare assessment system in Welfare Quality®



- websites, newsletters
- meetings, workshops, conferences,
- interviews, focus groups, citizen & farmers juries
- Advisory committee...



Electronic newsletter of the Welfare Quality  
Project FOOD-CT-2004-508508



# What did we gain from these interactions?

Naturalness is put forward by citizens

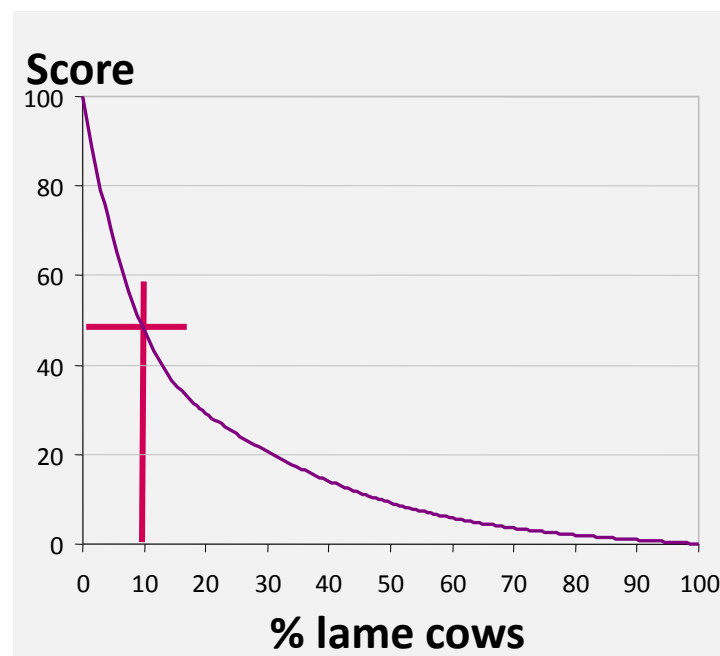
- Access to pasture was added for cattle

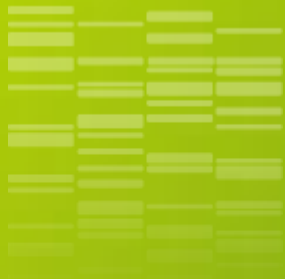
Citizens want to go beyond absence of suffering

- 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



# A mandated science

*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)*

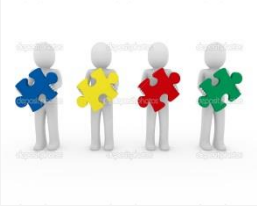


# Further steps towards transdisciplinarity



- 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: Transdisciplinarity  
to address facts & values



## For a complete picture of animal welfare







**Thank you for  
your attention**