The Animal Welfare
Science Centre

www.animalwelfare-science.net

"Human-animal relationships: consequences for the behaviour and welfare of laboratory animals?"

Paul Hemsworth

THE UNIVERSITY OF MELBOURNE

AGRICULTURE VICTORIA

THE OHIO STATE UNIVERSITY

Topics for discussion:

Effects of the HAR on

- farm animals – evidence and opportunities.
- laboratory animals - ?.

‘Stockmanship’

British Codes of Recommendations for the Welfare of Farm Livestock (Ministry of Agriculture, Fisheries and Food, 1983):

“Stockmanship is a key factor because, no matter how otherwise acceptable a system may be in principle, without competent, diligent stockmanship, the welfare of animals cannot be adequately catered for”.

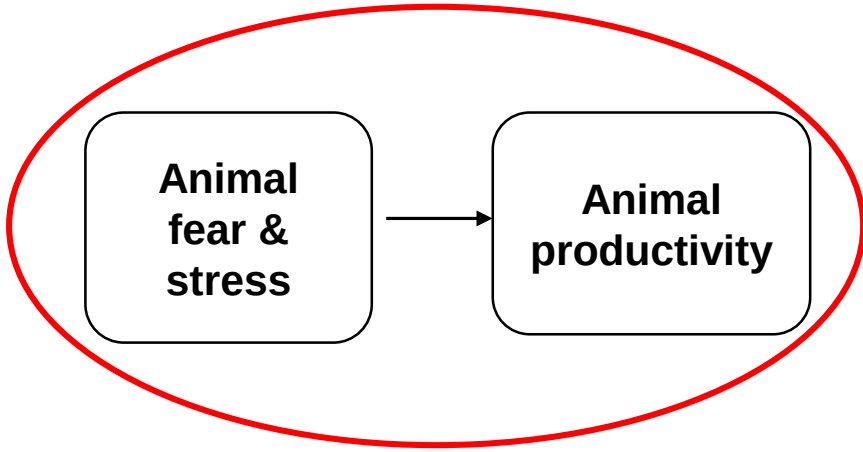
Effects of the HAR on farm animals

Since the 1980s there has been an ever-increasing body of evidence accumulating on the effects of human-animal interactions on the welfare of farm animals.

There are three main lines of evidence:

1. field observations on human–animal interactions;
2. handling studies in laboratory settings; and
3. intervention studies in field settings.

A model of human-animal interactions in the livestock industries



- Pigs (Hemsworth et al., 1981, 1989, 1994b).
- Dairy cows (Breuer et al., 2000; Hemsworth et al., 2000; Waiblinger et al., 2003).
- Meat chickens (Hemsworth et al., 1994a; Cransberg et al., 1996; Hemsworth et al., 1996).
- Laying hens (Barnett et al., 1992; Edwards, 2009; Waiblinger et al., 2018)

Handling stress and productivity

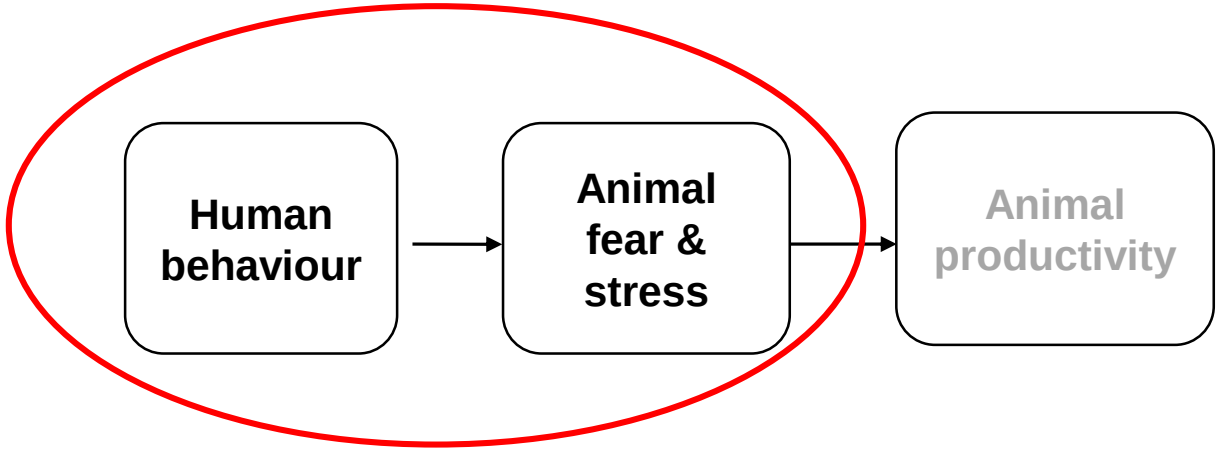
Experiment	Cortisol	Productivity
Hemsworth et al. (1981)	⇑	⇓ Growth rate
Gonyou et al. (1986)	⇑	⇓ Growth rate
Hemsworth et al. (1986)	⇑	⇓ Pregnancy rate
Hemsworth et al. (1987)	⇑	⇓ Growth rate
Hemsworth & Barnett (1991)	-	⇓ Growth rate
Hemsworth et al. (1996)	⇑	⇓ Growth rate

Handling stress and productivity

Variables	Handling				P value
	+ve	Control	Inconsistent	-ve	
Time to interact (s)	10 [a]	92 [b]	175 [c]	160 [c]	0.05
Growth rate (g/day)	455 [b]	458 [b]	420 [ab]	404 [a]	0.05
Basal free cortisol (ng/ml)	1.6 [x]	1.7 [x]	2.6 [y]	2.5 [y]	0.01

Hemsworth et al. (1987)

A model of human-animal interactions in the livestock industries

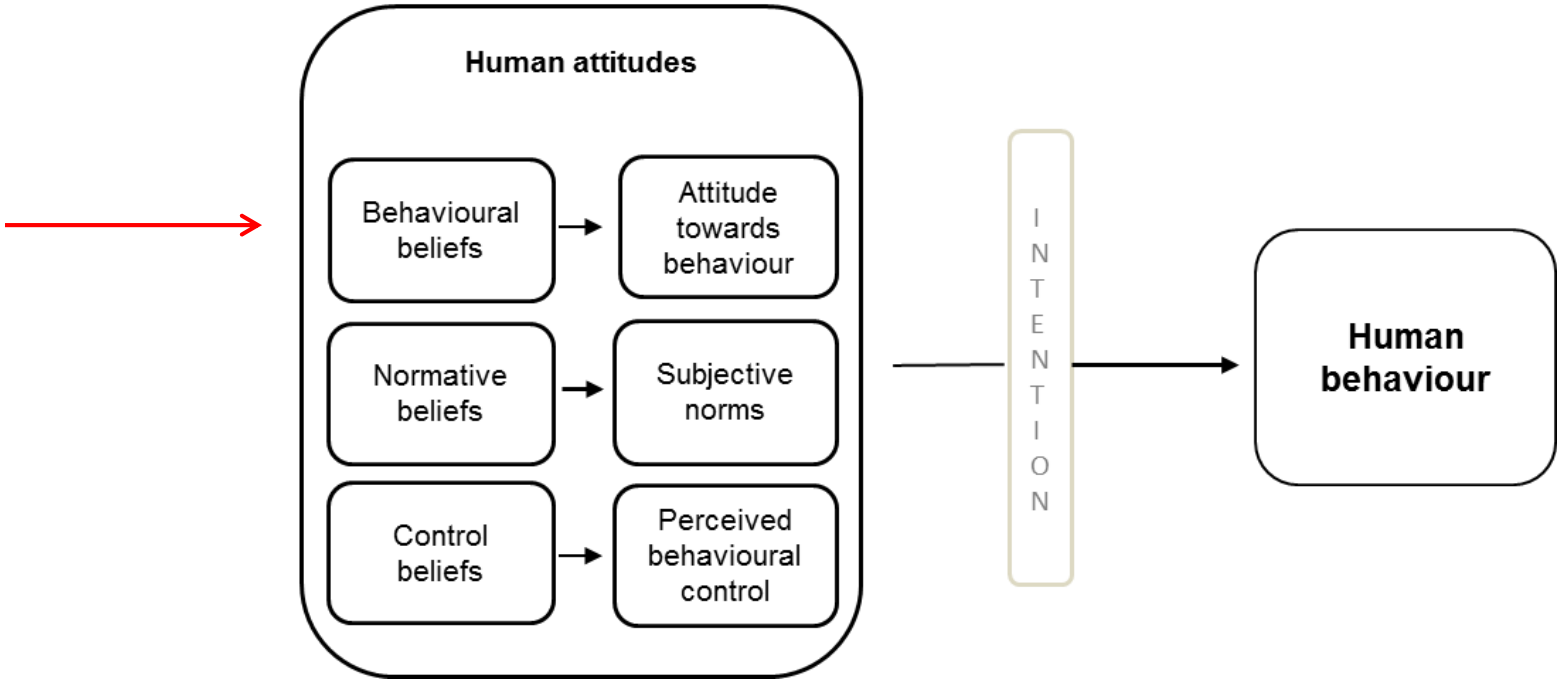


- Pigs (Hemsworth et al., 1989, 1994b).
- Dairy cows (Hemsworth et al., 2000; Waiblinger et al., 2003).
- Meat chickens (Hemsworth et al., 1994a; Cransberg et al., 1996; Hemsworth et al., 1996).
- Laying hens (Barnett et al., 1992; Edwards, 2009; Waiblinger et al., 2018)

Attitudes

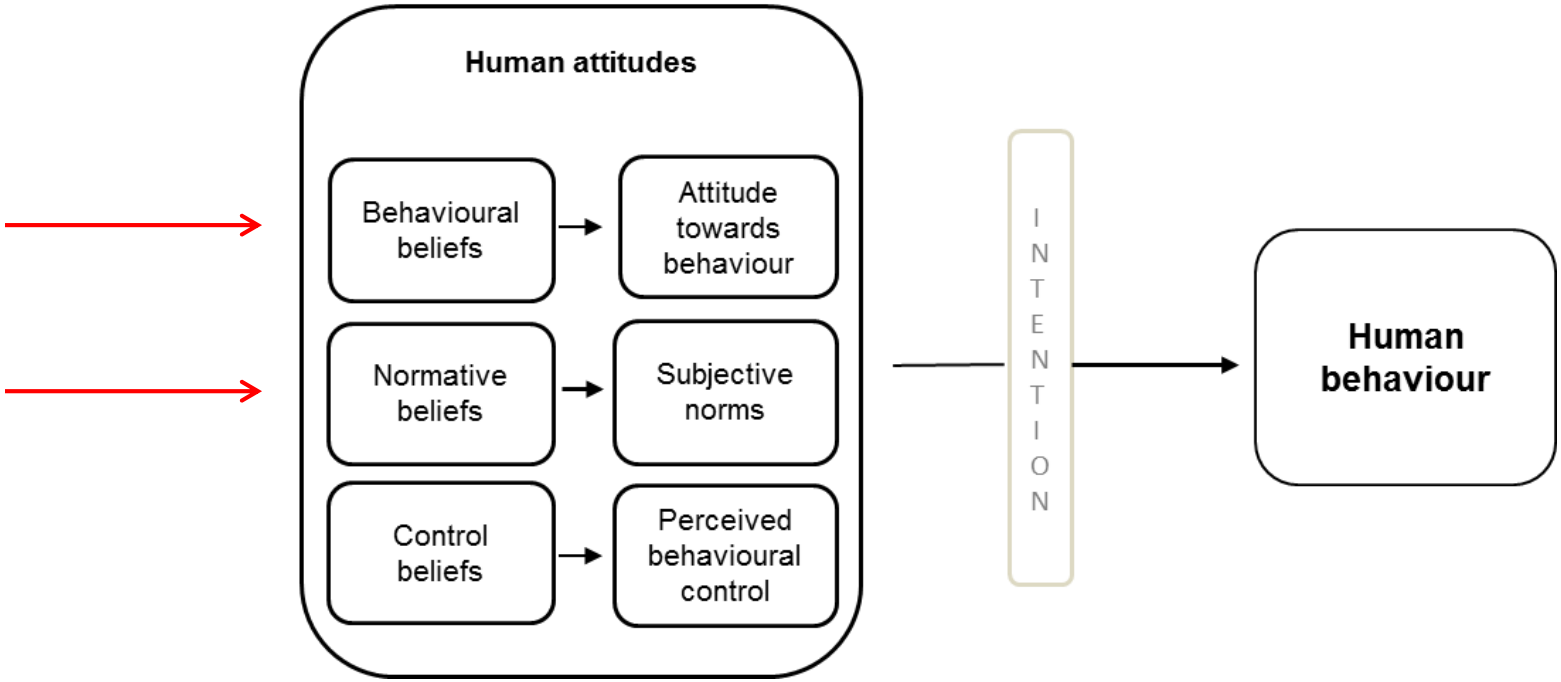
- **Attitudes tend to direct our behaviour or, at least, our intended behaviour.**
- Although attitudes are relatively stable and resistant to change, **nevertheless they are learned and can be modified.**
- Attitudes are **shaped by the reinforcements associated with direct and indirect experience.**

Measuring attitudes



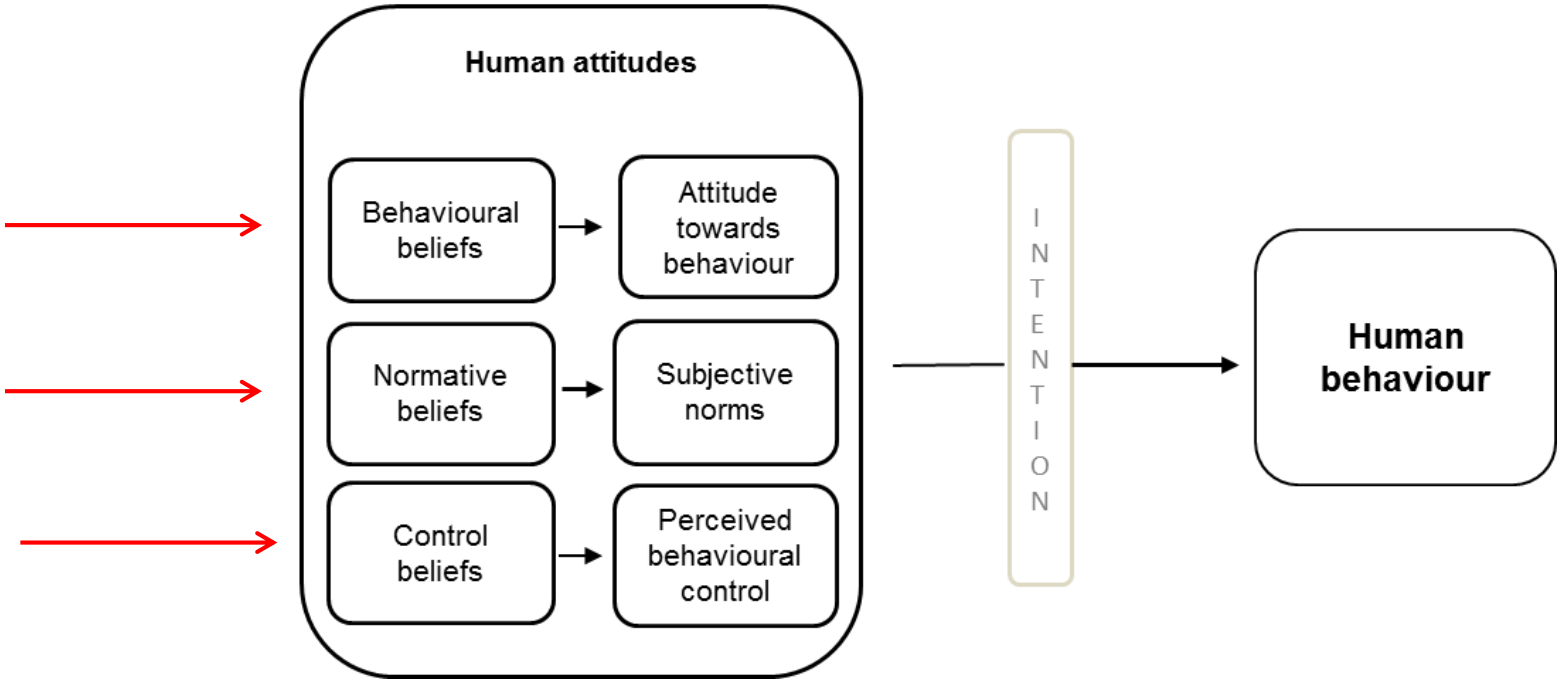
Theory of Planned Behaviour

Measuring attitudes



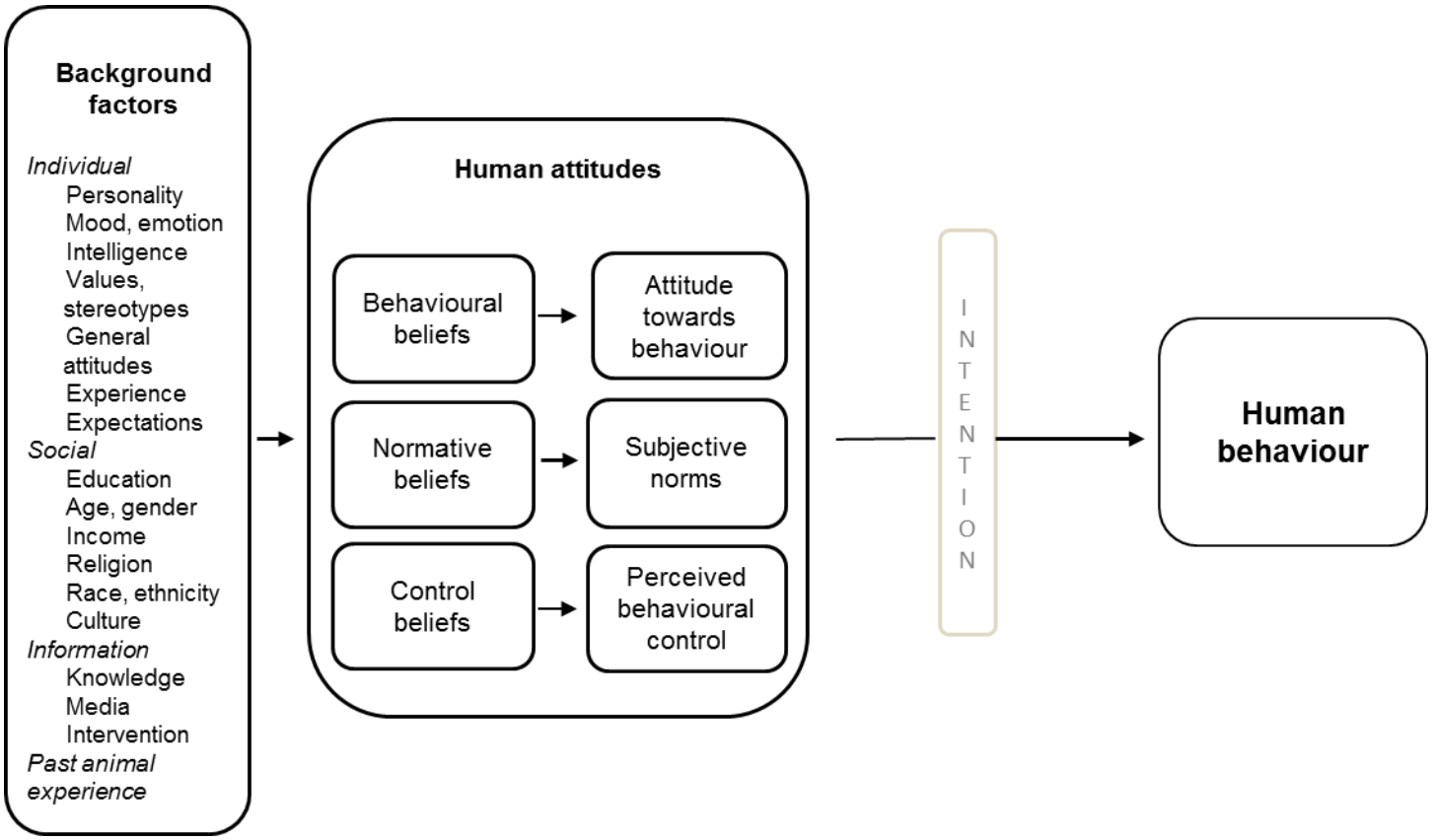
Theory of Planned Behaviour

Measuring attitudes



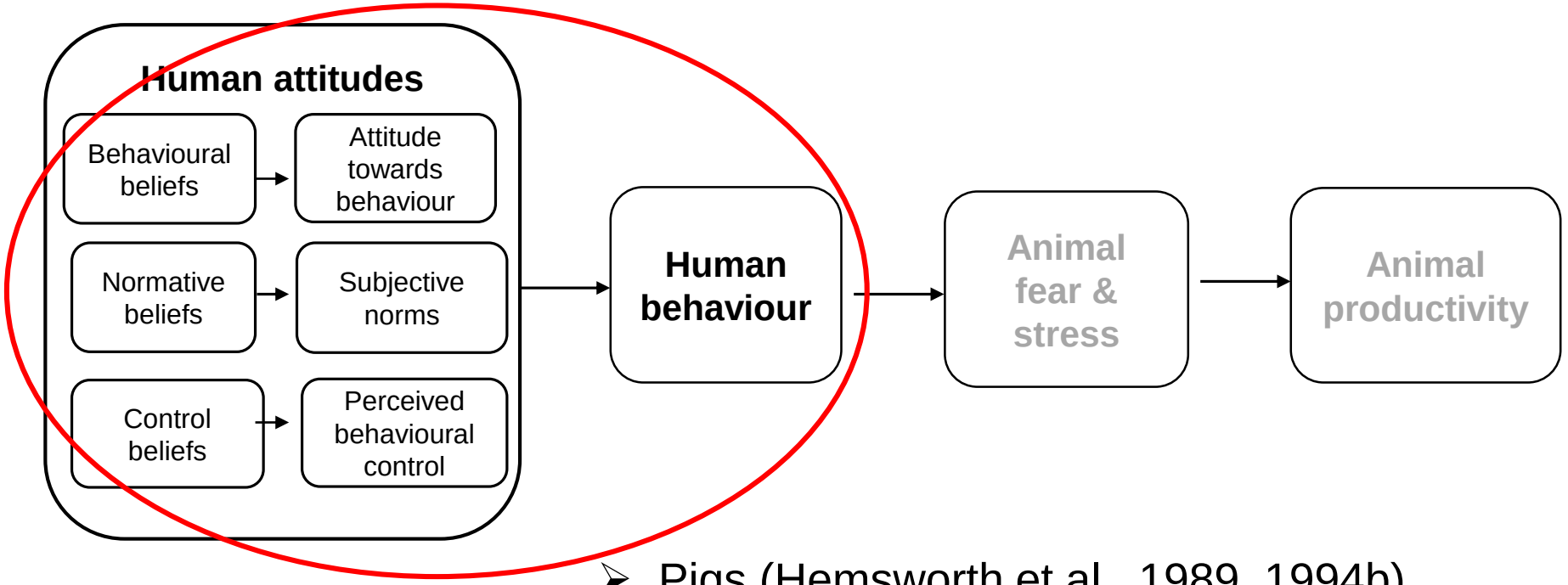
Theory of Planned Behaviour

Measuring attitudes



Theory of Planned Behaviour

A model of human-animal interactions in the livestock industries



- Pigs (Hemsworth et al., 1989, 1994b).
- Dairy cows (Hemsworth et al., 2000;, 2002; Waiblinger et al., 2003).
- Laying hens (Edwards, 2009; Waiblinger et al., 2018)

Targeting stockperson behaviour

- The best way to predict how stockpeople will interact with their animals is by **knowing what their attitude** is toward the activity itself.
- The idea that attitudes best predict how stockpeople behave towards their animals has been applied in our previous research and the subsequent training programs that have been developed.

Cognitive-behavioural interventions

- To change the behaviour of stockpeople towards farm animals ultimately requires:
  - targeting the **beliefs** that underlie the behaviour,
  - targeting the **behaviour** in question, and
  - then maintaining these changed beliefs and behaviours.
- It is important to target both attitudes and behaviour because of the reciprocal relationship between these two characteristics.

Evidence of causal relationships

Training targeting attitudes & behaviour

Two treatments imposed:

- **Intervention -** cognitive-behavioural intervention procedure, targeting key stockperson attitudes and behaviour.
- **Control -** no intervention was attempted.

Training targeting attitudes & behaviour

Measurements

- **Stockperson attitudes** - behavioural beliefs about handling animals.
- **Stockperson behaviours** - number and percentage of –ve behaviours.
- **Animal behaviour** - behavioural response to humans.
- **Animal productivity**

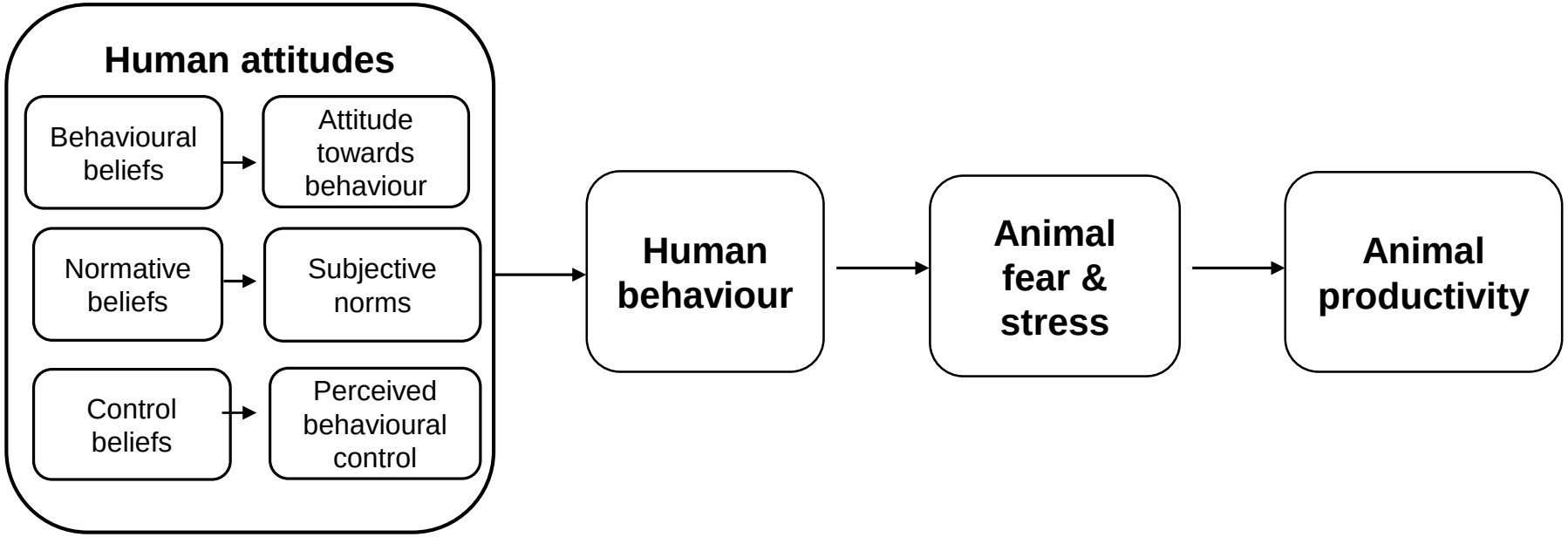
Variables	Change following Training (relative to Control)	P value
Stockperson attitudes		
+ve Beliefs about 'effort'	16% ↑	**0.001**
+ve Beliefs about 'petting'	25% ↑	**0.01**
Stockperson behaviour		
-ve behaviour	50% ↓	**0.001**
Cow behaviour		
Flight distance (m)	7% ↓	**0.05**
Cow physiology		
Milk cortisol (nM/L)	32% ↓	**0.06**
Cow productivity		
Milk yield (L/cow/month)	5% ↑	**0.02**

From Hemsworth et al. (2002)

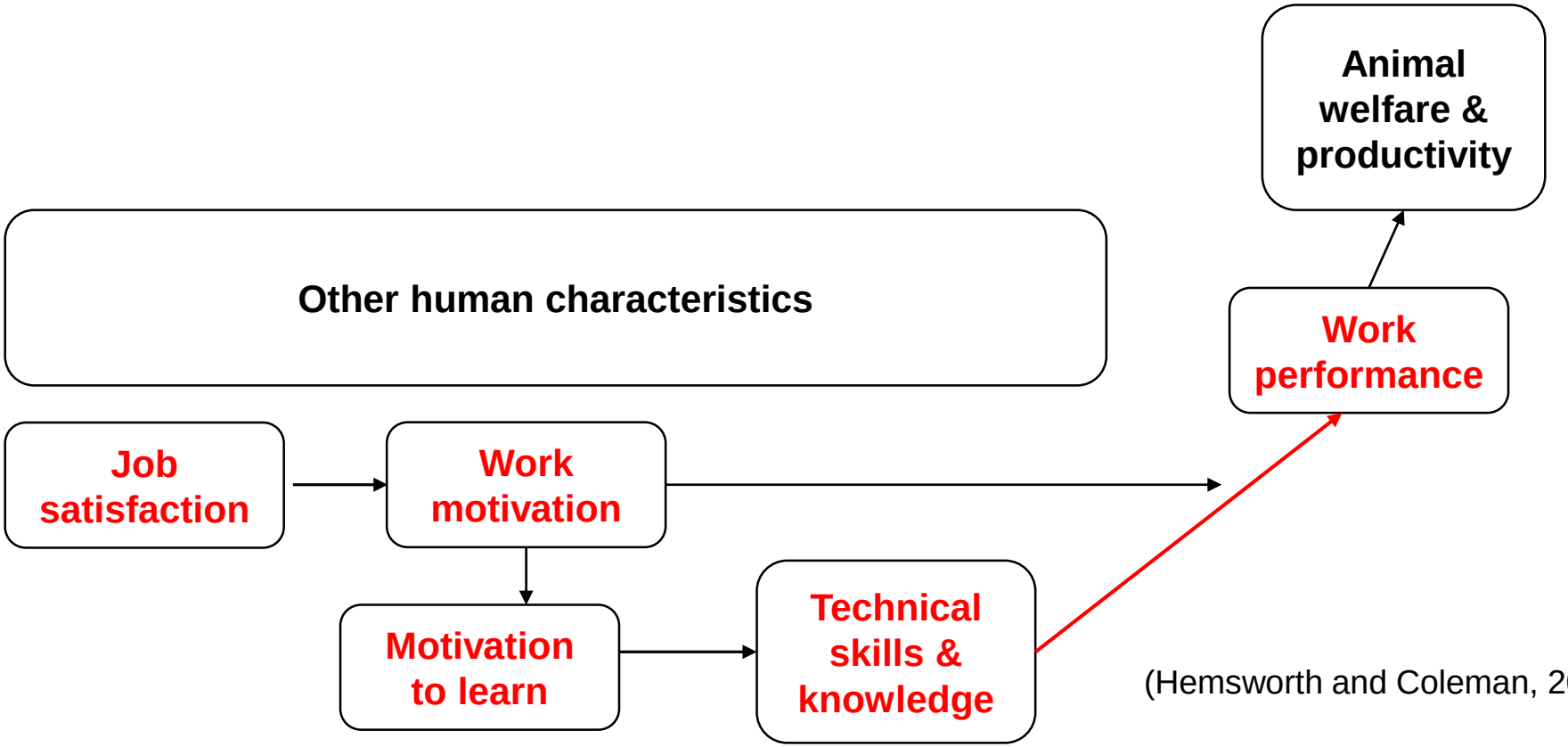
Variables	Change following Training (relative to Control)	P value
Stockperson attitudes		
+ve Beliefs about 'petting'	15% ↑	0.05
Stockperson behaviour		
-ve (%)	31% ↓	0.01
Sow behaviour		
Time near experimenter (s)	40% ↑	0.05
Sow productivity		
Piglets/sow/year	7% ↑	0.10

From Hemsworth et al. (1994)

A model of human-animal interactions in the livestock industries

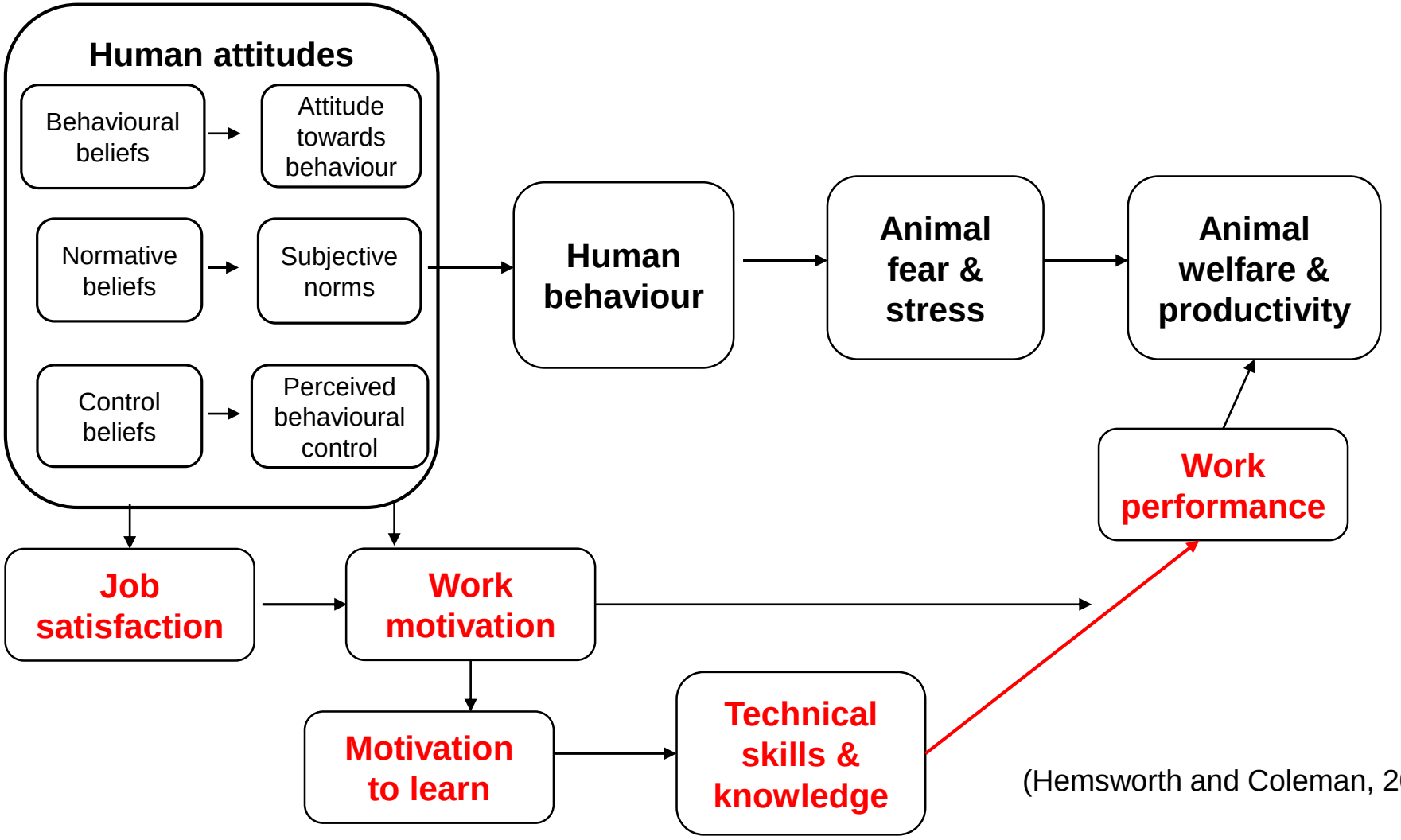


A model of human-animal interactions in the livestock industries



(Hemsworth and Coleman, 2011)

A model of human-animal interactions in the livestock industries



(Hemsworth and Coleman, 2011)

Conclusion on effects of the HAR on farm animals

The research highlights

- the important role and responsibility of the human in the development of human–animal relationships in the livestock industries, and
- the opportunities to improve the HAR in order to safeguard animal welfare.

Cognitive-behavioural training programs available

- Pig stockpeople
- Dairy stockpeople
- Pig stockpeople at abattoirs
- Sheep and cattle stockpeople at abattoirs*
- Transport drivers*

- EU 6th Framework Sub-project 3 “Minimising Handling Stress”: Training packages developed for cattle, pigs & laying hens.

Effects of the HAR on laboratory animals?

Biomedical research and the use of animals in science in general

- "Why science without welfare thinking isn't science worth doing" (Garner, 2019).
  - "A growing suspicion that the failure of translation from animal work to human outcomes may in some way reflect issues in animal research itself."
- "Experimenters intending to manipulate one isolated aspect of an animal's biology may simultaneously and unintentionally also tweak others." (Garner et al. 2017).
  - For example, background methodology and husbandry may mask or confound factors under study.

Biomedical research and the use of animals in science in general

- Many sources of laboratory-related variability remain unidentified, and the relative impact of known factors is unclear.
- Data were collected in the normal course of our ongoing study of the genetic mediation of pain and analgesia to examine.

Chesler et al., 2002

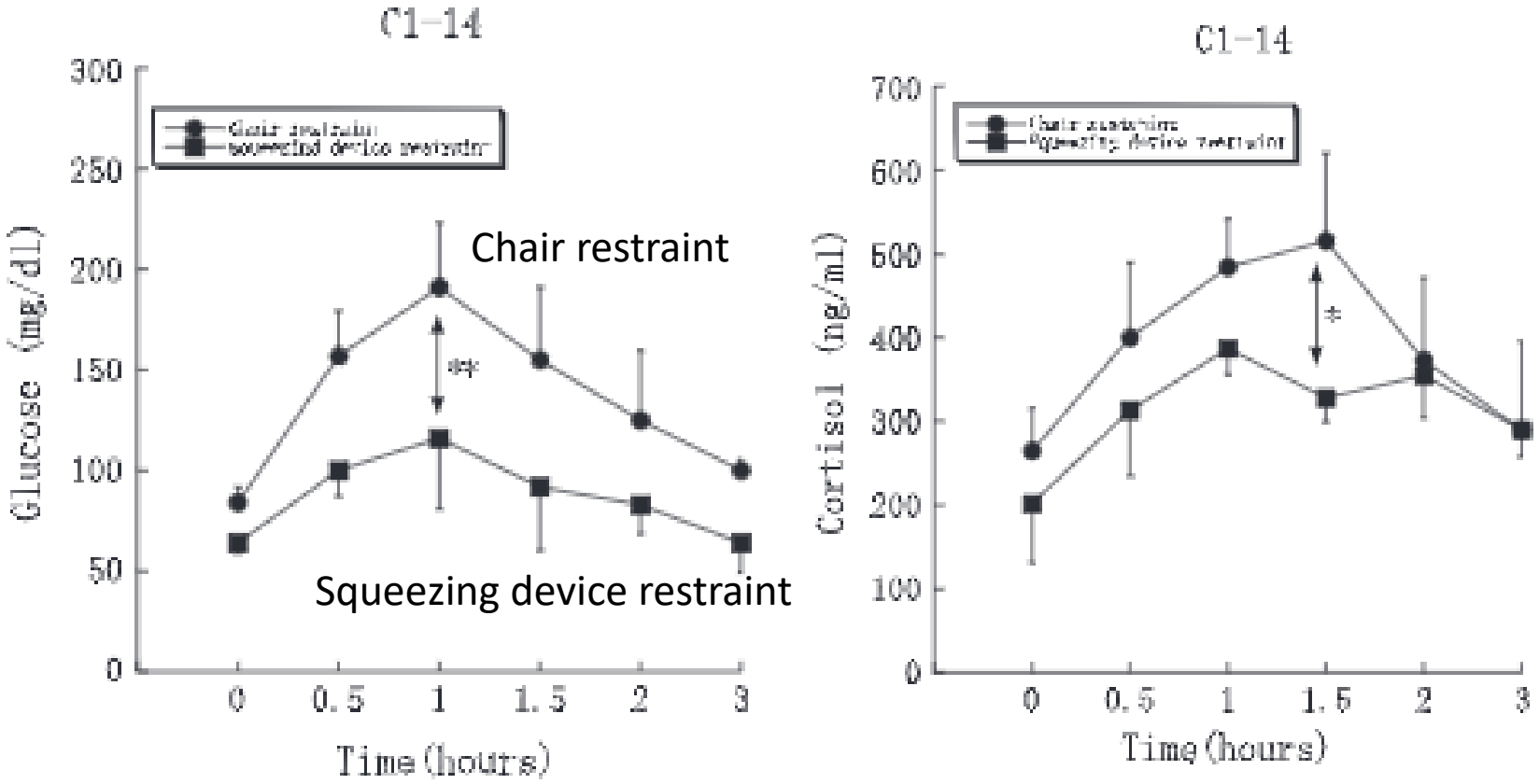
Ranked sources of variability in mice pain responses to a standard on a common assay of thermal nociception (the 49°C hot water tail-flick/withdrawal test) (Chesler et al., 2002)

Factor[a]	Number of factor levels	Score[b]
Experimenter	11	100.0
Genotype	40	78.0
Season	4	35.8
Cage density	7	20.4
Time of day	3[c]	17.4
Sex	2	14.6
Humidity	4[d]	12.0
Order of testing	7	8.7

Background methodology and husbandry factors affecting laboratory animals (review by Wurbel, 2002).

Caging system	Illumination	Contact persons	Protection wear
Cage distributor	Light/dark (LD) pattern	Direct animal-contact	Gloves
Cage ID	Light on	No direct animal-contact	Mask
Cage material	Light off	Human presence (time)	Face-shield
Cage size	Light-intensity (light phase)	Handling	Protection-suite
Lid distributor	Light color (light phase)	– with hands	Hood
Lid material	Light-intensity (dark phase)	– with tweezers	Laboratory-coat
Lid ID	Light color (dark phase)	– with net	Laboratory-shoes
Raised lid	Disturbance LD pattern	– with transfer box	
Filter top	Light-source	Certificated caretakers	
Filter top distributor		Allergic persons	
Enrichment		Perfume users	
Bedding material		Smokers	
Climatic conditions	**Animals**	**Room specifications**	**Health & hygiene status**
Ventilated cages (vcs)	Max. animals/cage	Acoustic background	Health monitoring
Total air/h within vcs	Max. animals in total	Room space (m^2)	Health checks/year
Fresh air/h within vcs	Gender	Acoustic deprivation	Parasitology
Total air/h	Group composition	White noise	Bacteriology
Fresh air/h	Other species in room		Serology
Aur condition			SPF-conditions
Temp. light phase			
Temp. dark phase			
Humidity			

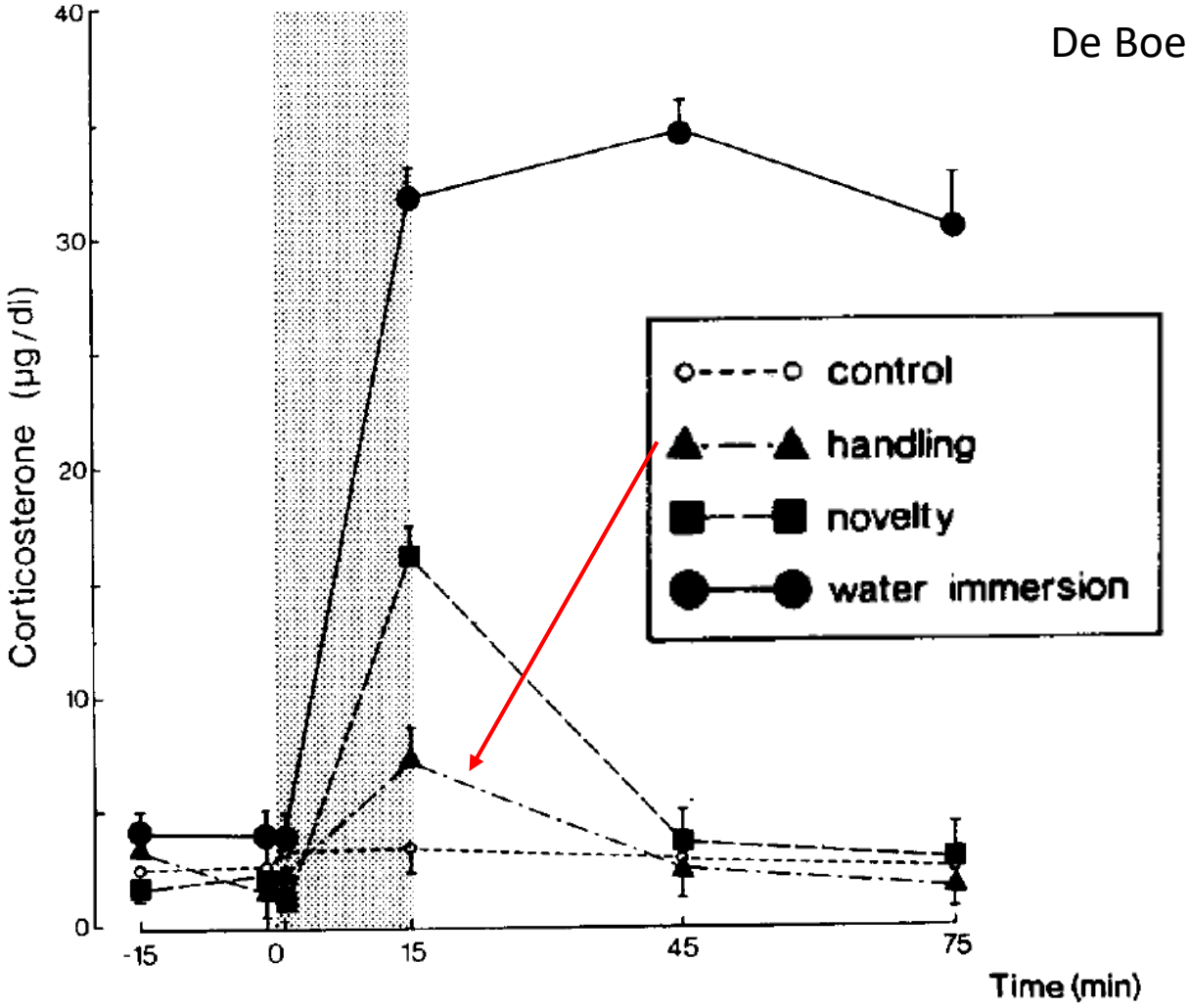
Effects of two forms of restraint on an oral glucose tolerance test in cynomolgus monkeys (Shirasaki et al., 2013)



- Physiological stress impairs glucose tolerance

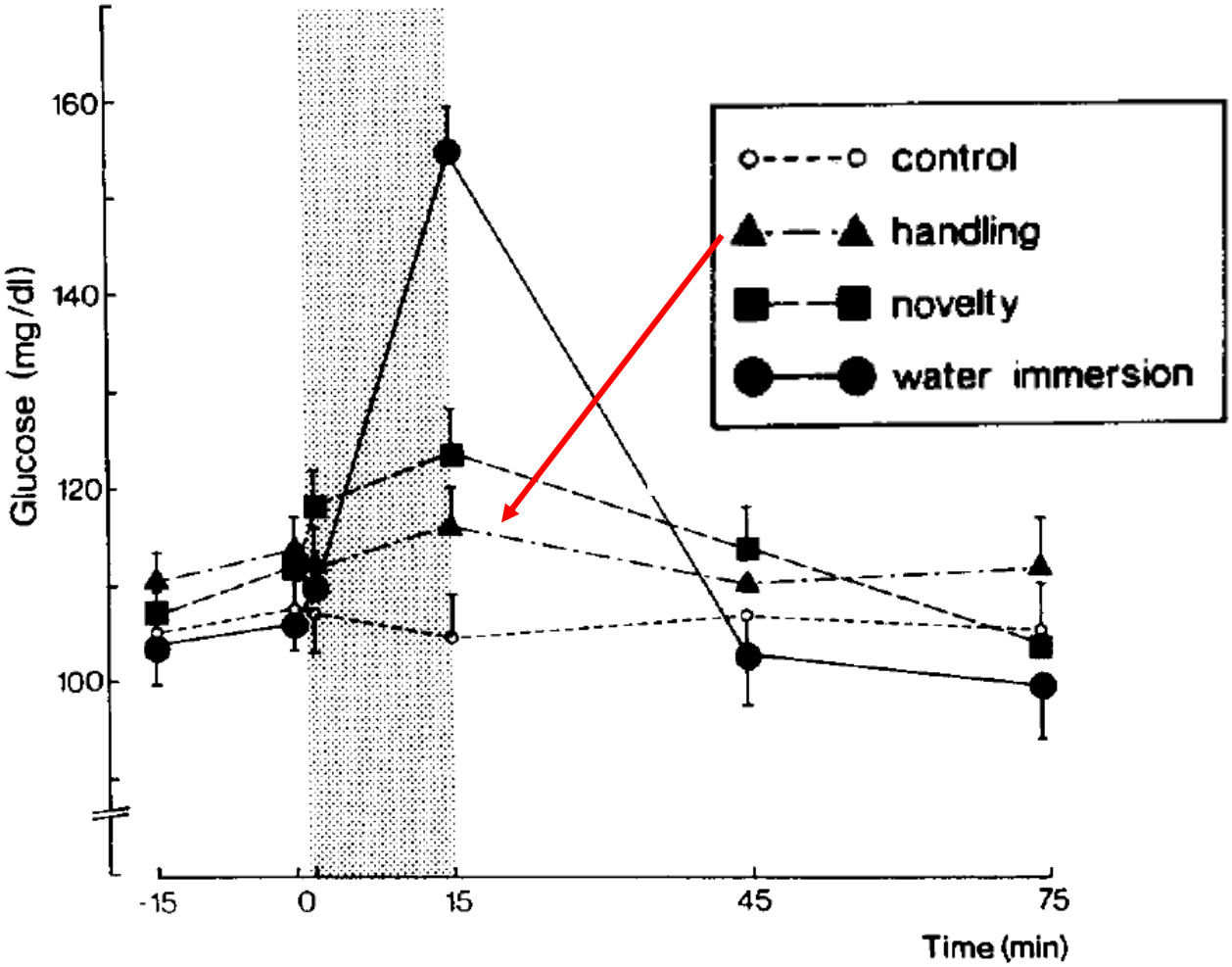
Handling stress

De Boer et al. (1990)



Handling stress

De Boer et al. (1990)

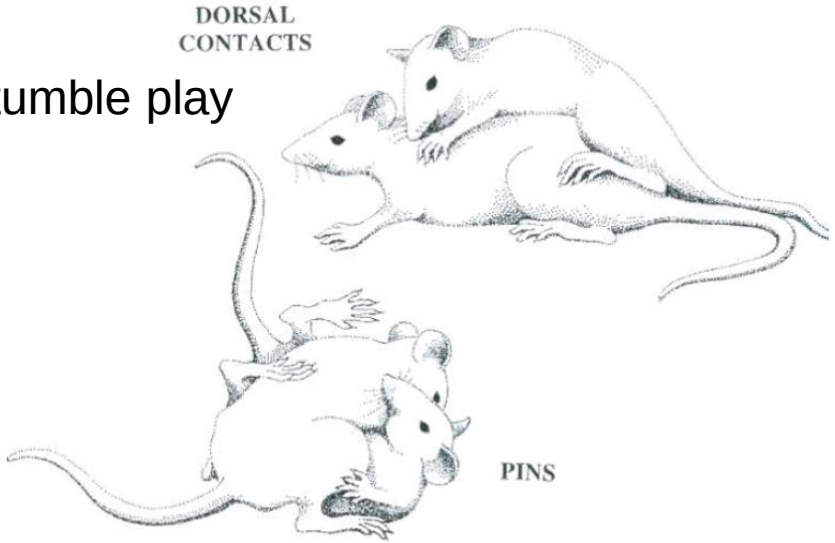


Tickling rats

Rats typically produce two categories of ultrasonic vocalizations (USVs):

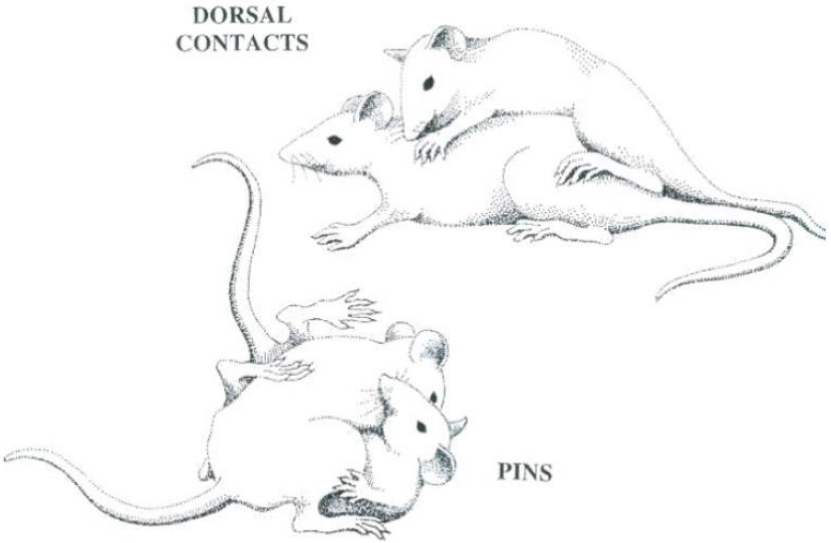
- 22-kHz USVs generally occur when anticipating aversive events – i.e., indicative of a negative emotional state.
- 50-kHz USVs generally associated with rewarding situations.
  - Note - audible vocalizations are usually associated with, and therefore used as markers of, physical pain and discomfort.

Rough-and-tumble play



Cloutier et al. (2018)

Tickling rats

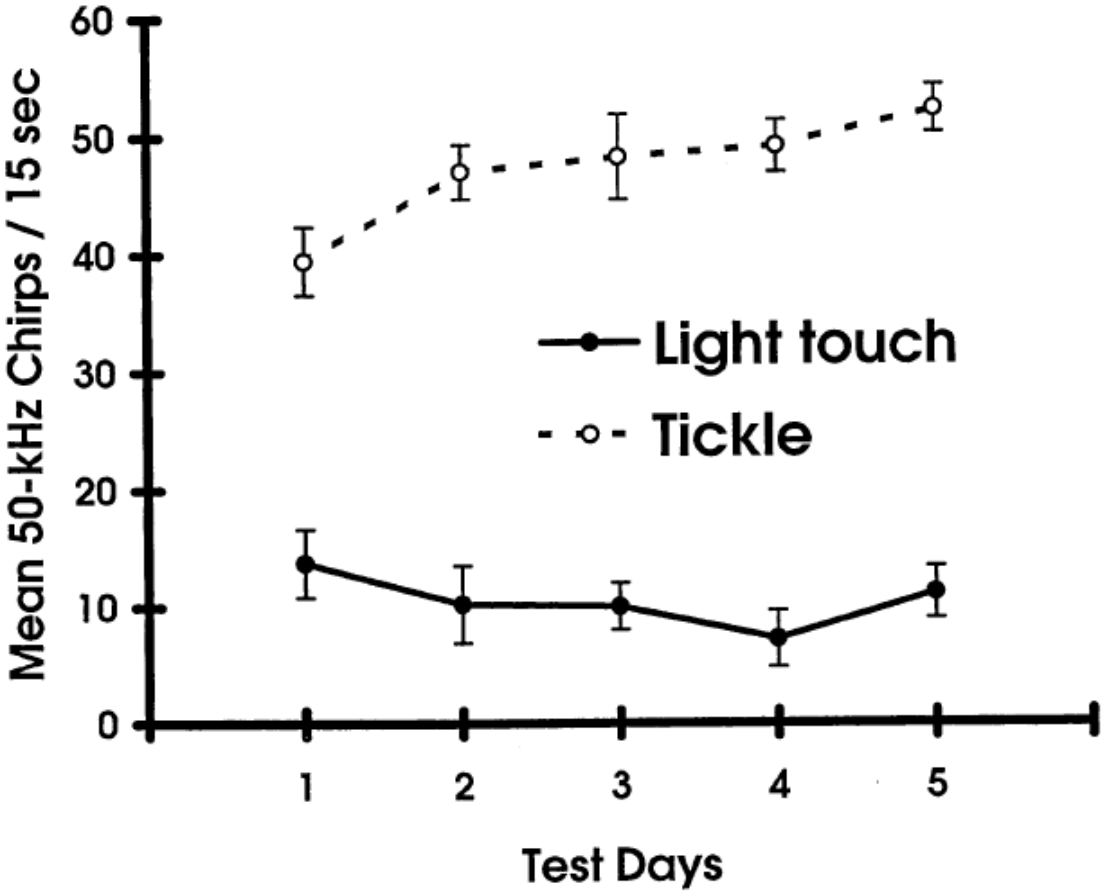


Human handlers can aspects of rough-and-tumble play by alternating between contact with a rat's nape (dorsal contact) and ventral surface (pin) using vigorous, quick movements of the fingers similar to those used when tickling a child.

https://www.jove.com/video/57190/

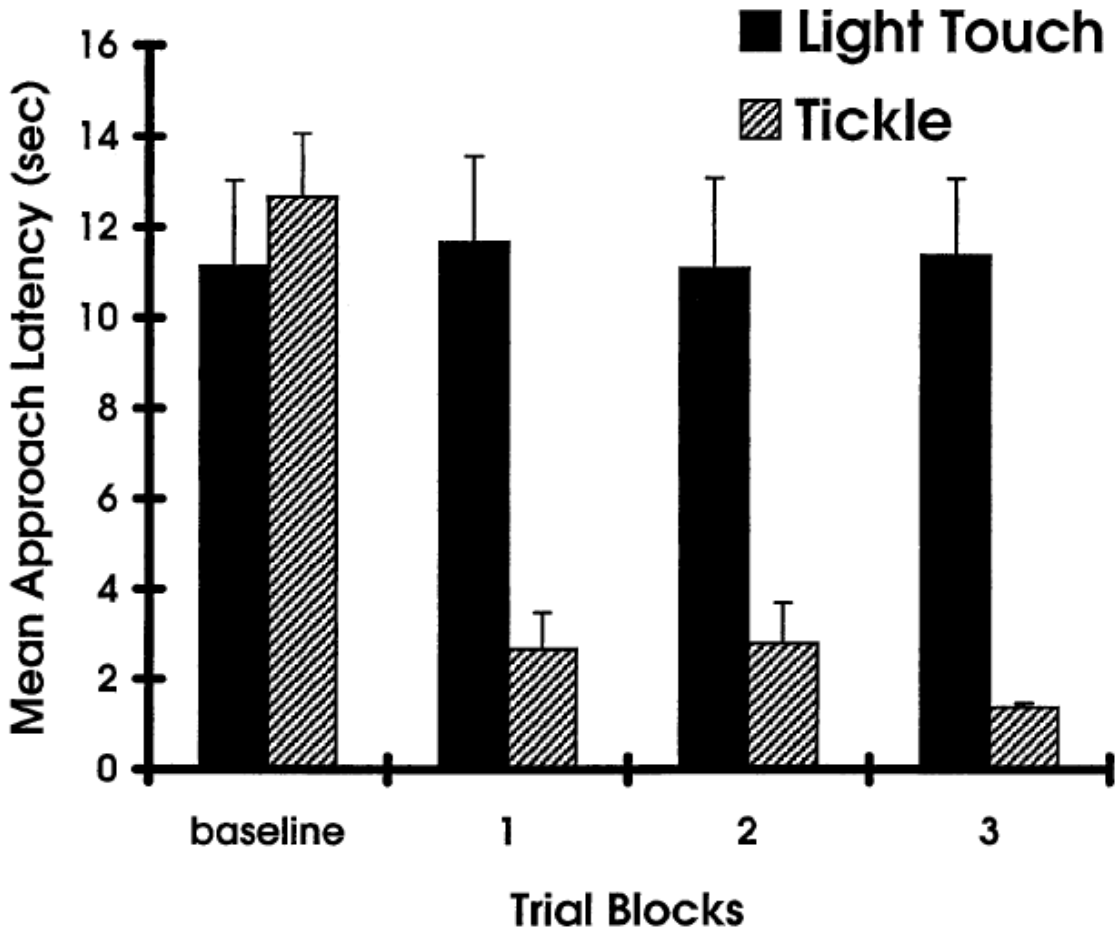
Cloutier et al. (2018)

Tickling rats



Burgdorf and Panksepp (1990)

Tickling rats



Burgdorf and Panksepp (1990)

Effects of the HAR on laboratory animals

- Understanding stockperson–farm animal relationships has implications for improving farm animal welfare and productivity. Stockperson attitudes are amenable to change, so stockperson training can improve human–animal relationships in the livestock industries.
- While less research has been conducted on laboratory, companion and zoo animals, limited evidence indicates similar opportunities to safeguard the welfare of domestic and zoo animals through understanding the regulation of the human–animal relationship in these animal use settings.

Thank you