What can mother hens teach us about chicken welfare?

Jo Edgar

Christine Nicol, Liz Paul, Suzanne Held, Ilana Kelland
School of Clinical Veterinary Science
Animal Welfare and Behaviour Research Group
Measuring welfare is important

• It is not simple

• Subjective assessments are not accurate

• Behaviour is one important component of the story

• Other measures are also needed in combination – Physiology – Assessments of mental state
A little about me...

• BSc Zoology
• MSc Applied Animal behaviour and welfare
• Research technician – Welfare of GM mice and welfare indicators in hens
• PhD and postdoc – Maternal care and empathic responses in hens
• Fellowship – Simulation of maternal care in chickens
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Empathy and social buffering in chickens?
Emotional empathy - occurs when one individual (the observer) detects the emotional responses of another individual (the demonstrator), in response to a stimulus, triggering a matching emotional response in the observer.

Cognitive empathy – occurs when the matching response results from the observer comprehending the demonstrator’s perspective, even if this differs from its own.

Social buffering - the amelioration of demonstrator distress caused by the presence of an observer.

Why study empathic responses and social buffering?
Empathy in animals - previous research

• Rats reduce bar pressing in response to the electric shock of a conspecific (Church, 1959)

• Rats will press a bar to lower a conspecific suspended by a hoist (Rice & Gainer, 1962)

• Sheep and pigs not affected by witnessing the slaughter of conspecifics (Anil et al., 1996; 1997)

• Rats will open a door to release a trapped conspecific (Bartal, 2011)
Potential confounding variables in empathy studies

• Motivation for social contact

• Observer animals restrained and physiological processes measured invasively

• Observer animal stressed by the cues directly from apparatus rather than cues of stressed conspecifics
Arousal vs. valence

• Valence is the defining feature of all states that can be considered to be “emotional” or “affective” (Russell, 2003)

• Behavioural/physiological arousal indicates interest/heightened attention
Assessing valence

• Valence is a prerequisite for labelling an animal as showing emotional empathy
• Tests can be applied to identify situations in which animals experience relatively more positive or negative states

e.g. Nicol et al., 2009
Exploring empathy within the mother-offspring bond in chickens

• Behavioural and physiological responses
  – Relevant to the situation of the demonstrator
    • Habituation and non-invasive measures
    • Control for the direct effects of the stressor on the observer

• Valence
  – Emotional response in observer and demonstrator

• Cognitive influences
Mother hens and chicks

- Empathy likely evolved to facilitate parental care

- Hens pay considerable attention to the behaviour of their chicks

- Sensitive to situations in which their chicks make apparent mistakes (Nicol & Pope, 1996)
Do hens respond to the mild distress of their chicks?

Control with noise (CN)
Air puff to chick (APC)
Control (C)
Air puff to hen (APH)

Pre-treatment period | Treatment period
10 mins | 10 mins
Results – Heart rate

C=Control, CN=Control with Noise, APC= Air Puff to Chicks, APH=Air Puff to Hen
Results – Eye temperature

C=Control, CN=Control with Noise, APC= Air Puff to Chicks, APH=Air Puff to Hen
Hens show behavioural and physiological responses to mild chick distress

• Increased heart rate and time spent standing alert and vocalising

• Decreased surface body temperature and time spent preening

However:

• There must be clear evidence for the existence of an emotional response in an observer and a demonstrator

Do mother hens (and chicks) find chick distress aversive?
Time spent in two areas

Air puff

Control

% of time
The story so far…

• Hens respond to mild chick distress
• Arousal/interest rather than distress
• But, are they responding to chick distress cues or their perception of the situation?
Do hens respond to perceived, as well as actual, chick distress?
Distress vocalisations

Preening

Hens' expectation of chicks' experience

% of time

% of time
Hens respond to perceived, as well as actual chick distress

• Behavioural changes when hen perceived chick distress, regardless of chick perceptions

• Signs of SIH only when hens’ and chicks’ perceptions are the same

• Chick behaviour influenced by hens’ perceptions

……..does the hen act as a social buffer for her chicks?

Do hens act as a social buffer for their chicks?

Compare chick behaviour:
1) During AP with mother
2) During AP without mother
3) During Control with mother
4) During Control without mother
Do hens act as a social buffer for their chicks?

How is socially-mediated arousal correlated with social buffering?

An increased capacity for empathic arousal may result in reduced social buffering.
How is socially-mediated arousal correlated with social buffering?

Or, a greater capacity for empathic arousal might enable an animal to display appropriate behaviours to ameliorate the distress of a conspecific.
How is socially-mediated arousal correlated with social buffering?

More S-M arousal

More social buffering
How is socially-mediated arousal correlated with social buffering?

An increased capacity for empathic arousal results in reduced social buffering.
Emotional and cognitive influences on the avian maternal response - summary

- Mother hens show socially-mediated arousal in response to chick distress
- Undetermined whether this is associated with a valenced, emotional response
- Mother hens have a strong influence on how their chicks respond to stressors
- Relevance to animal welfare
Applied relevance:

*Maternal care strongly influences chick behavioural development*

- Mother hen influences:
  - What chicks peck at
  - Chick activity/resting
  - How chicks react to stressors

- Resulting brooded chicks are:
  - Less fearful
  - More behaviourally synchronised
  - Less reactive to stressors

(Edgar et al., in prep)
The problem:
Simulation of maternal care to improve welfare in chickens - objectives:

1. **What are the effective features of maternal care?**
   Determine the extent of individual variation in maternal care and the degree to which this influences fear, stress and behavioural synchrony in brooded chicks.

2. **Can effective features of maternal care be simulated artificially?**
   Artificially simulate up to four effective features of maternal care to determine their effects on fear, stress and behavioural synchrony in non-brooded chicks in the lab.

3. **Does simulation of maternal care improve chicken welfare on farm?**
   Select up to two of the most feasible simulations and scale up to commercial level, to investigate the effects on commercial chicks and on long-term chicken welfare.
Dark brooders

Gilani, Knowles & Nicol (2012)
Broody hen ‘pheromones’

MHUSA

Graph showing 'Active' chicks during 24 hour scans (%):
- Control: 15%
- MHUSA: 35%

Graph showing Mean duration of tonic immobility (s):
- Control: 70 s
- MHUSA: 30 s
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Thank you for listening