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# Do facial skin redness and head feather position vary depending on the affective states of adult domestic hens (*Gallus gallus domesticus*)?



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- Facial expressions in mammals and facial skin redness in humans vary depending on their affective states (Benitez-Quiroz et al., 2019; Descovich et al., 2017; Pellon et al., 2020; Phelipon et al., 2024; Thorstenson et al., 2018, 2019)
- Juvenile domestic hens show changes in head feather position and facial skin redness (cheeks, ear lobes, wattles, comb) depending on their affective states (Arnould et al., 2024; Soulet et al., 2024)
- In adult hens, the **comb and wattles**, which grow and redden during sexual maturation, are:
  - **secondary sexual characters** (Hardesty, 1931)
  - **functional visual signals** communicating dominance status, health status, reproductive cycle... (Bradshaw, 1992; Cloutier et al., 1996; Cornwallis & Birkhead, 2006; Mukhtar & Khan, 2012; O'Connor et al., 2011; Wilson et al., 1958; Zuk et al., 1990)

## Do facial skin redness, including the secondary sexual characters, and head feather position of adult hens vary depending on their affective states?

12 adult Pekin hens were filmed during spontaneous behaviours or tested in situations associated with contrasted affective states:

### METHODS

#### Fear, frustration (neg high)

• **Frustration Test:** thwarting access to mealworms (2 min 30, 1 repetition)

• **Capture Test:** gently capture and hold in hand (1 min, 1 repetition)

#### Arousal High

#### Reward (pos high)

• **Rewarding Test:** access to mealworms (2 min 30, 1 repetition)

• **Dustbathing**

Negative

Depression (neg low)

Low

Positive

• **Resting**

• **Preening**

• **Feeding**

**Calm, contentment (pos low)**

Valence

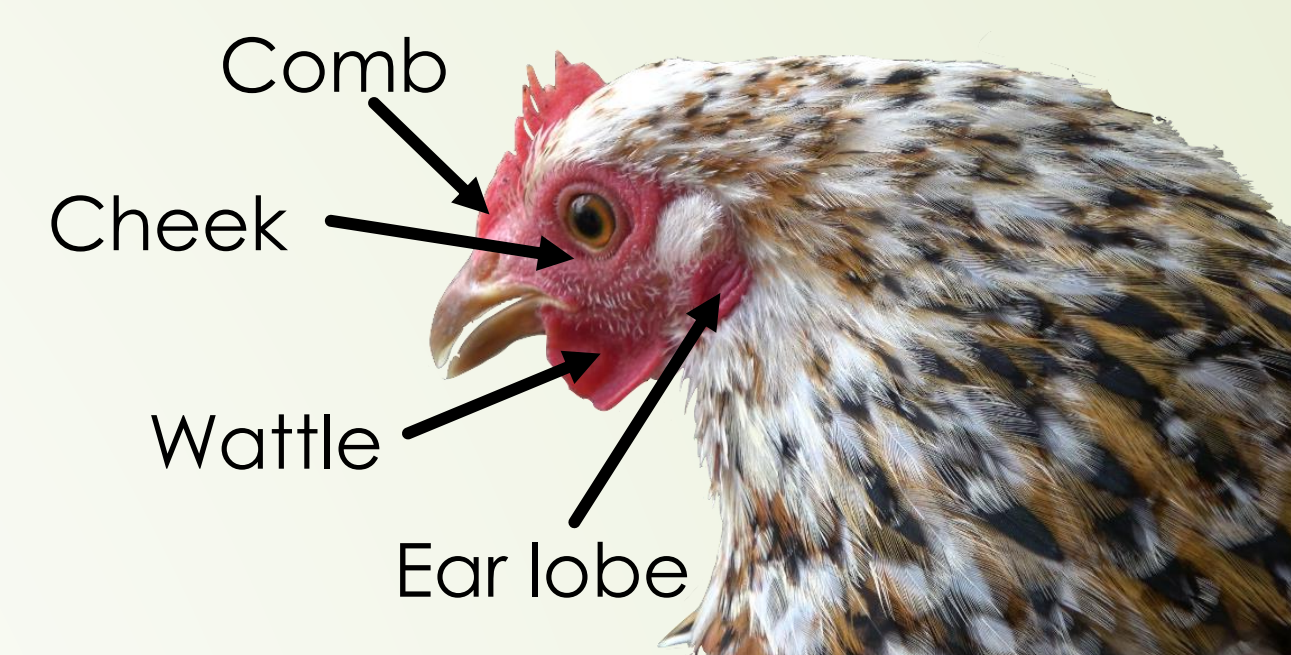
Adapted from Mendl et al., 2010

$$\text{Redness} = \frac{\text{red}}{\text{red} + \text{green} + \text{blue}}$$

(Pérez-Rodríguez & Viñuela, 2008; Bertin et al., 2023)

20 images/hen/situation  
1680 images

### Measure of redness for the comb, wattles, ear lobes and cheeks

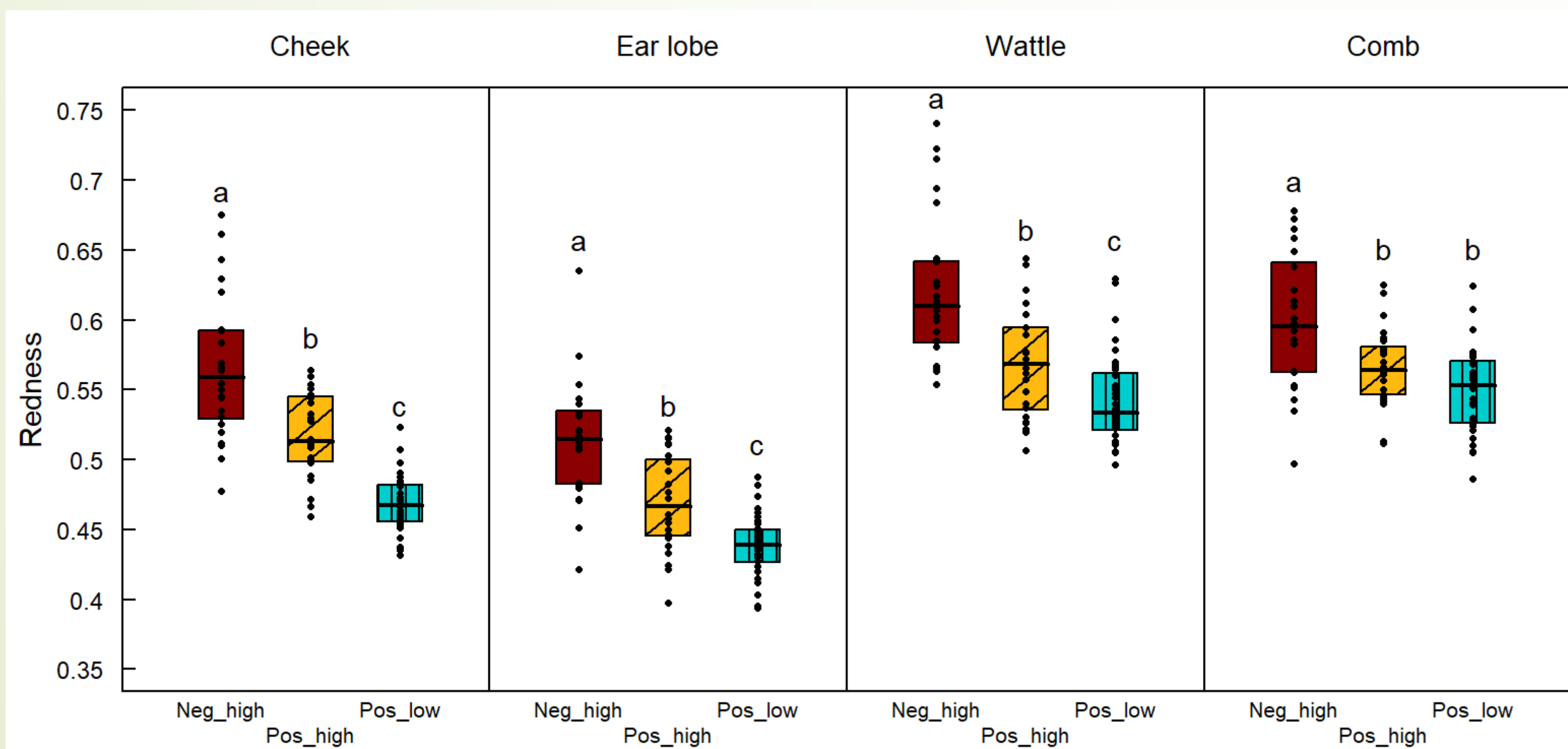


### Position of head feathers



### Measure of redness for the comb, wattles, ear lobes and cheeks

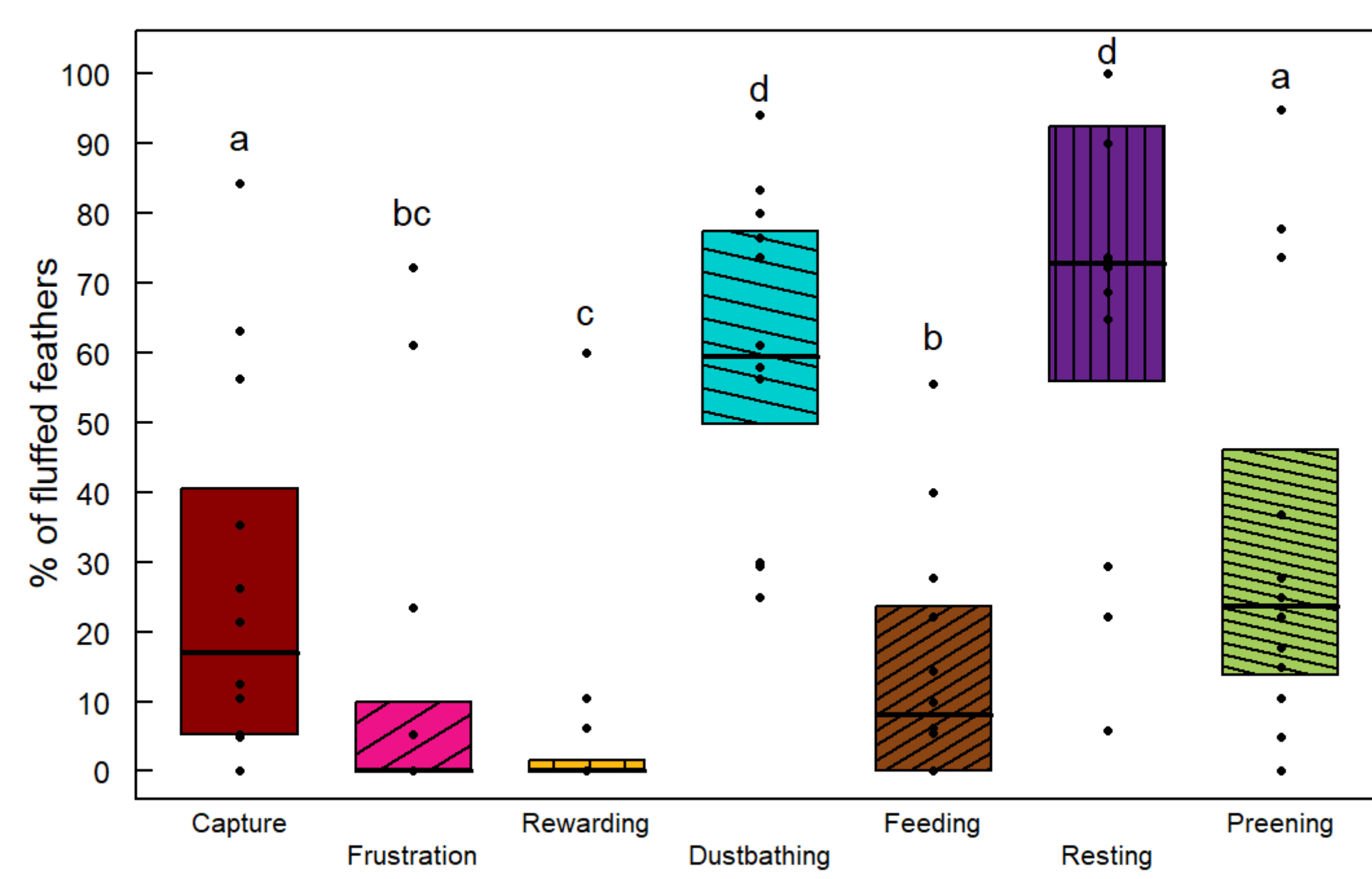
### RESULTS



GLM: facial regions, affective states and their interaction:  $p < 0.001$  for all; Different letters:  $p < 0.05$

Facial skin redness varies depending on the affective states for all regions: similarly for the cheek, ear lobe and wattle; to a lesser extent for the comb (no significant differences between the two positive states)

### Position of head feathers

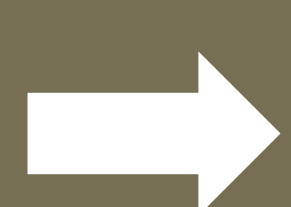


GLM:  $p < 0.001$ ; Different letters:  $p < 0.05$

Feather position varies depending on the situations: often fluffed in positive situations and sleeked in all feed-related situations

### CONCLUSION

- **Redness of the cheeks and ear lobes varies similarly with affective states:** in accordance with other species (juvenile domestic fowl, some parrots or vultures...)
- **Secondary sexual characters vary with affective states:**  
Wattles: similar to cheeks and ear lobes / Comb: lower variations
- **Head feather position is influenced by affective states, but appears to be more dependent on the situation**



The variation in redness of secondary sexual characters suggests an additional function related to affective states