

The impact of breeding on poultry behaviour

Focussing on measuring behaviour and improving activity and feather pecking

11 May 2021, Esther Ellen



Content presentation

- Behaviour in poultry
- How to measure?
- Reducing feather pecking
- Activity of broilers

Acknowledgement



Malou van der Sluis



Piter Bijma



Nieuwe technologie
mogelijk maken

Behaviour in poultry

Explorative
behaviour

Fearfulness

Sociality

Feeding
behaviour



Behaviour in poultry

Feather
pecking



Smothering

Measuring behaviour

A large flock of white chickens is shown in a crowded enclosure. The chickens are packed closely together, with many visible in the foreground and background. They are standing on a dark, possibly wooden or metal, surface. The lighting is bright, highlighting the white feathers and red combs of the birds.

Recognize behaviours?

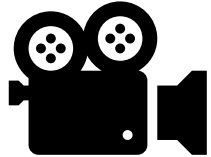
Identification

Monitoring

Time consuming

Possibilities

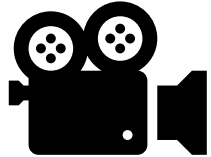
- New technologies



InnoBroilerImage

Possibilities

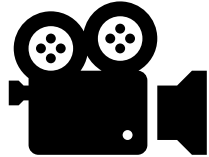
- New technologies



Breed4Food individual tracking

Possibilities

■ New technologies



■ Proxy trait

- Activity
- Survival time
- Plumage condition
- Tonic immobility

Reducing feather pecking

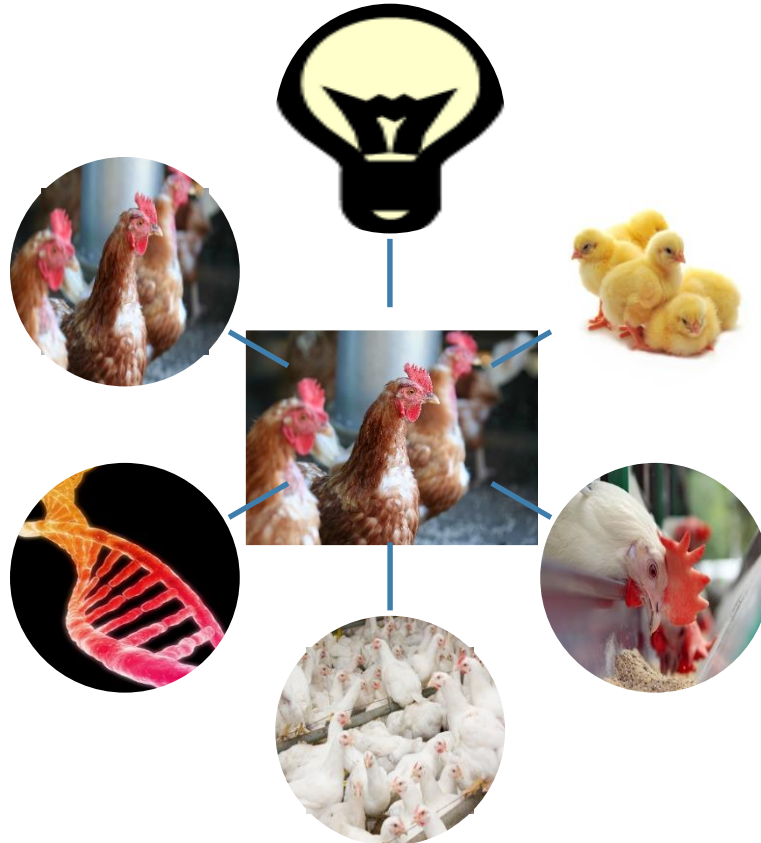
**Genetics of survival in
cannibalistic laying hens**



The contribution of social effects

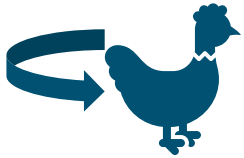
Esther Ellen

Feather pecking



Social interactions

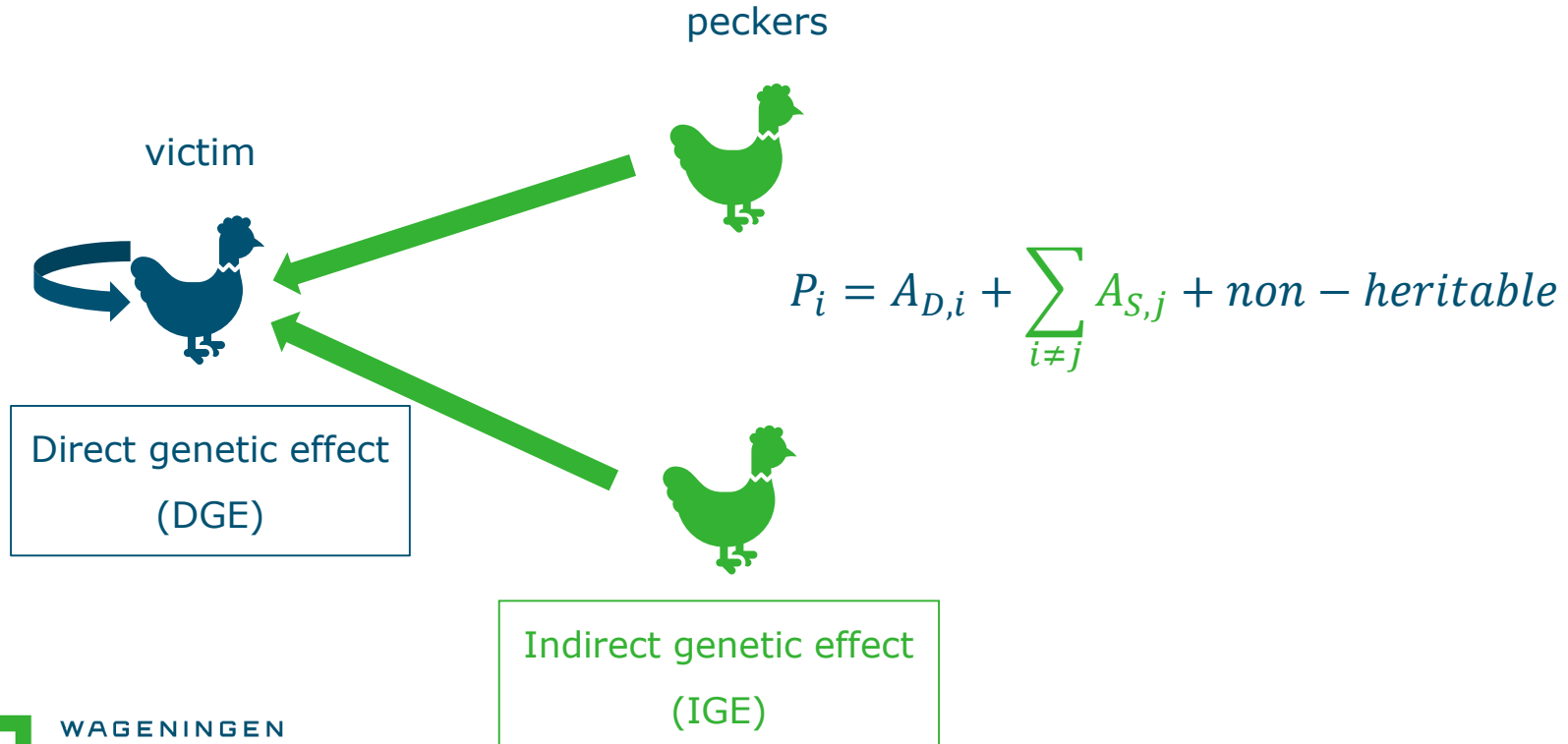
victim



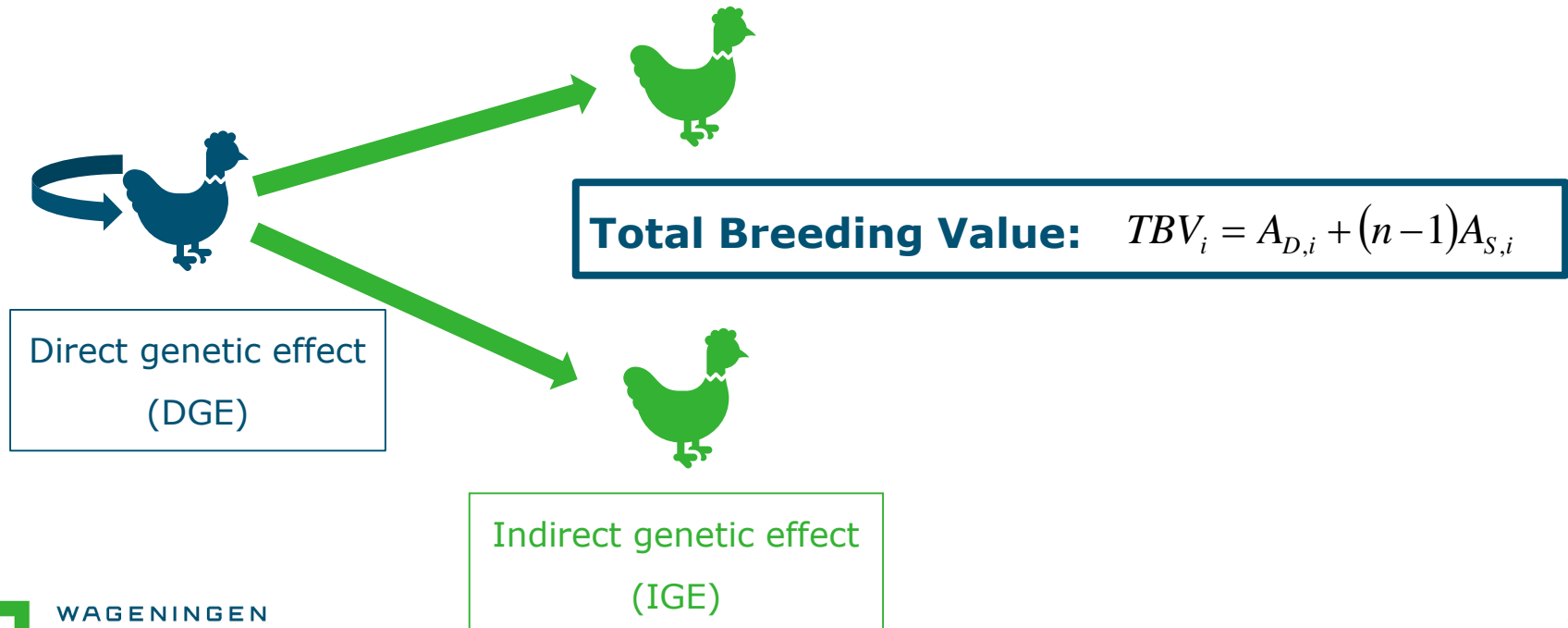
Direct genetic effect
(DGE)

$$P_i = A_{D,i} + E_{D,i}$$

Social interactions



Total heritable variation



Feather pecking behaviour

- Behavioural observations
 - Time consuming
 - What kind of observations?
 - Difficult to collect data on both victim and pecker
 - Not feasible in animal breeding
- Solution: Statistical methods

Statistical methods

- Allows to identify victim and pecker
- Using direct-indirect effects model
 - Victim - h^2 4 – 10%
 - Pecker (group member)

} T^2 10 – 54%



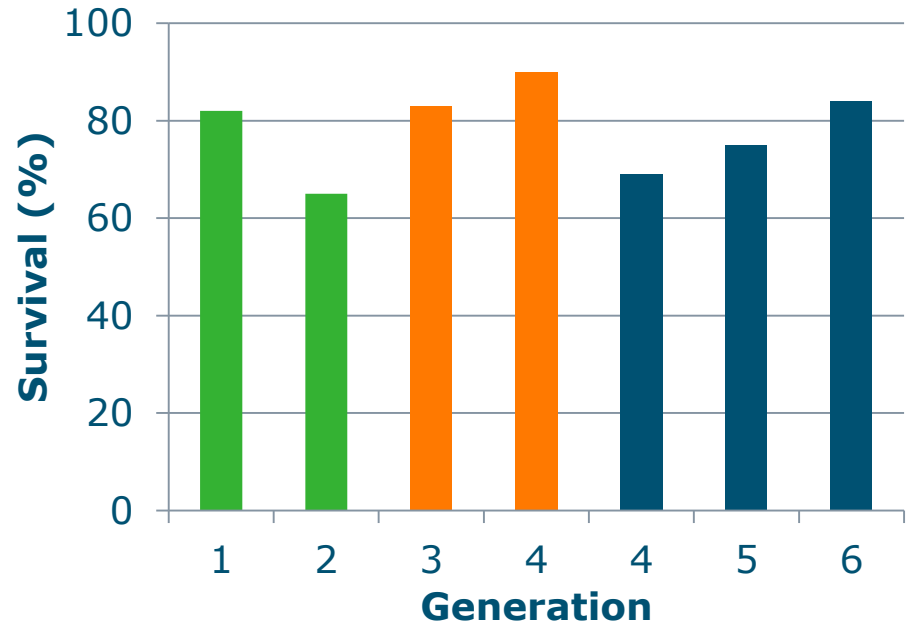
33% - 94% of total genetic variation

Genetic selection

- Take into account victim (DGE) and pecker (IGE)
- Group housing – express DGE and IGE
- Family groups

Genetic selection

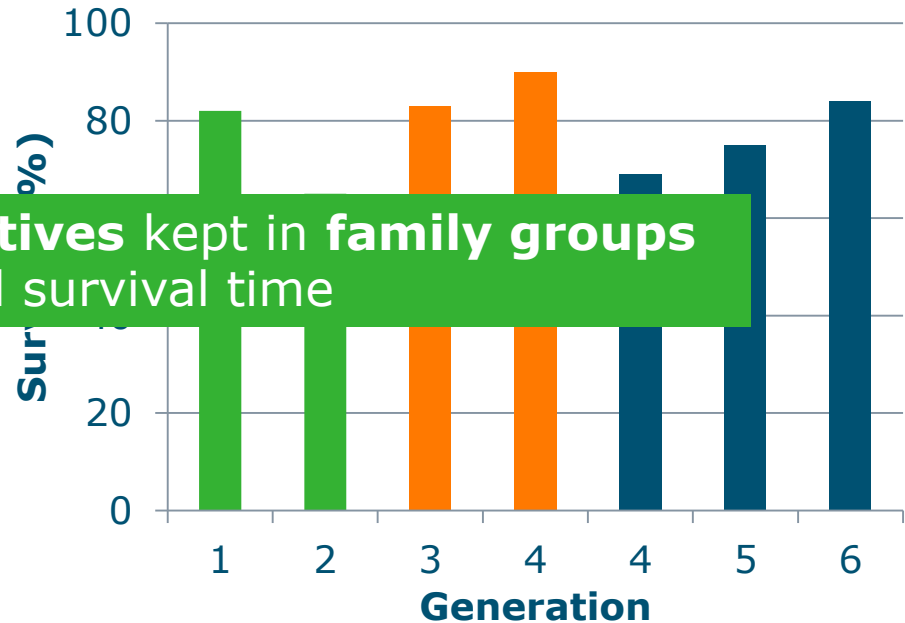
- Take into account victim (DGE) and pecker (IGE)
- Group housing – express DGE and IGE
- Family groups



Genetic selection

- Take into account DGE and IGE
- Group housing – express DGE and IGE
- Family groups

Selection based on **relatives** kept in **family groups** improved survival time



Future applications



- IMAGEN project: a better life for pigs and laying hens
- Feather pecking and smothering
- New technologies

Activity of broilers



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Individual activity levels

- Individual activity levels informative



Health *e.g. illness (Gregory, 1998)*



Welfare *e.g. leg weakness (Van Hertem et al., 2018)*

➤ Implement automated system to monitor individual animals

Sensor approaches

Ultra-wideband (UWB) tracking

- Tag: 3.8 x 3.9 cm, ~ 25 g
- From 2 weeks old
- Coordinates

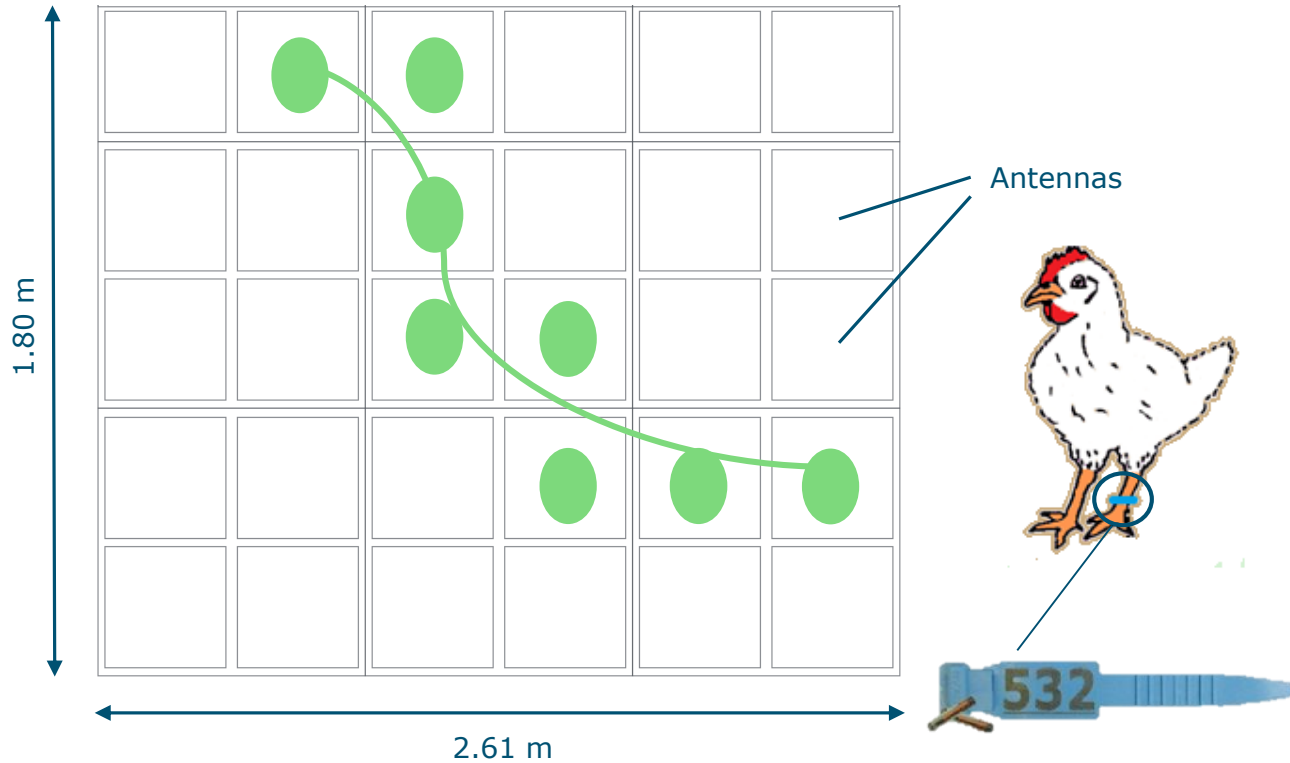


Radio frequency identification (RFID)

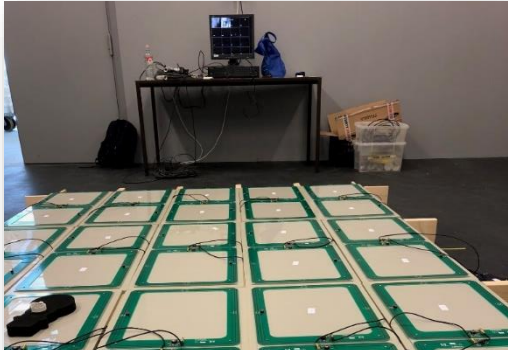
- Tag: 1.5 cm, < 1 g
- From 1 day old
- Absence / presence



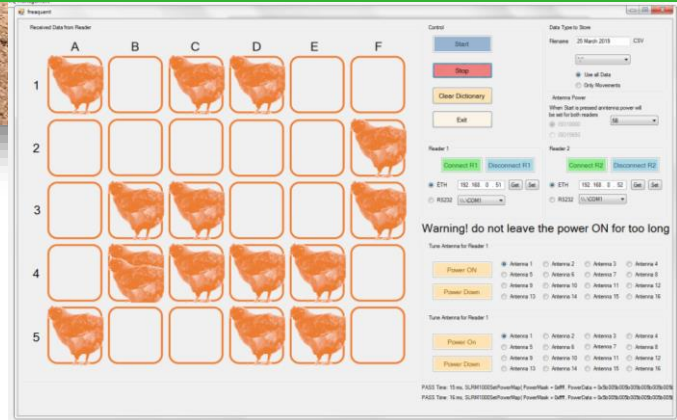
RFID tracking



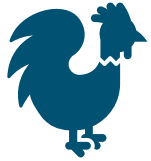
RFID system on farm



Rank correlation video-RFID: 0.82, $p < 0.001$ (van der Sluis et al., 2020)



Experimental design



387 Purebred male broilers - Pedigree is known



Pen with ~80 broilers - 5 rounds of data



Location every second - From hatching onwards

Traits



Bodyweight: start BW, D8, D15, D22, D29, final BW



Growth rate: average daily gain

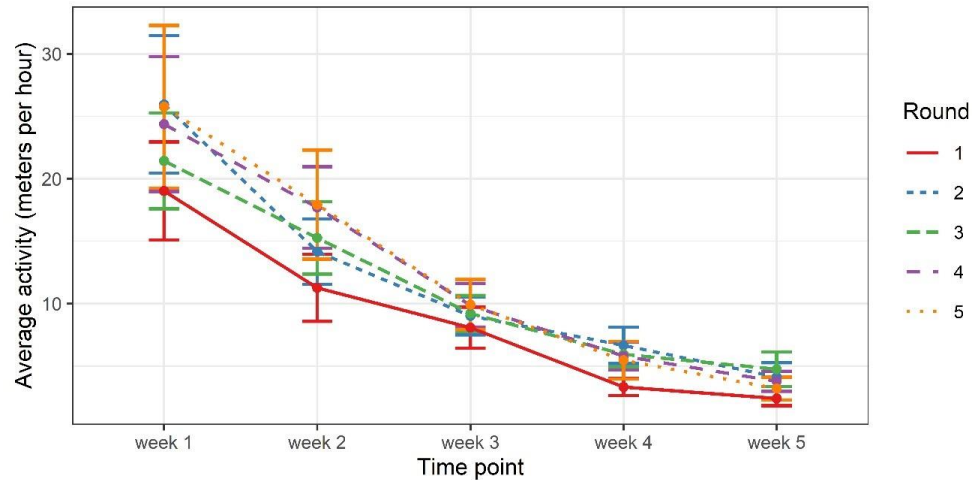
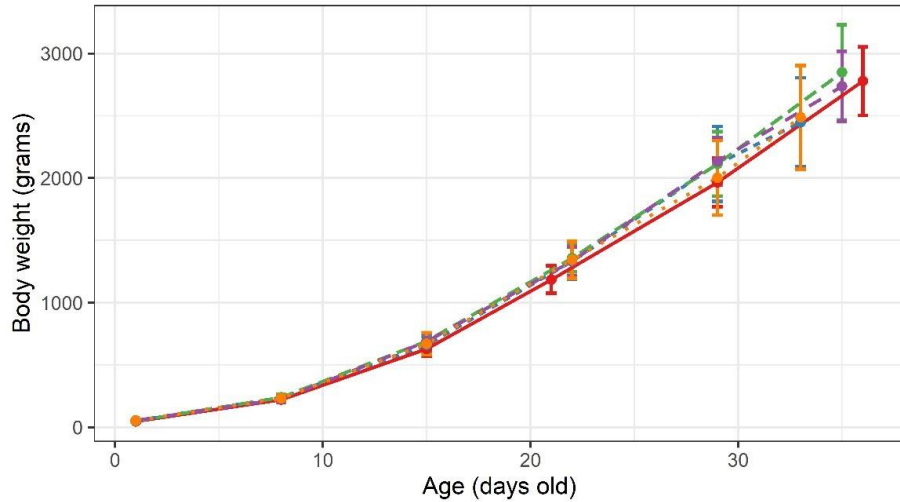


Locomotion



Activity

Body weight and activity over time



Genetic variation



$$h^2 \sim 0.30$$

Trade-offs?

- Performance
- Welfare & Health



$$h^2 \sim 0.35$$



Potential to improve activity

In summary

- Difficult to measure behaviour
- Proxy traits can be used
- Selection reduces mortality due to feather pecking
- Take into account victim and actor
- New technologies

