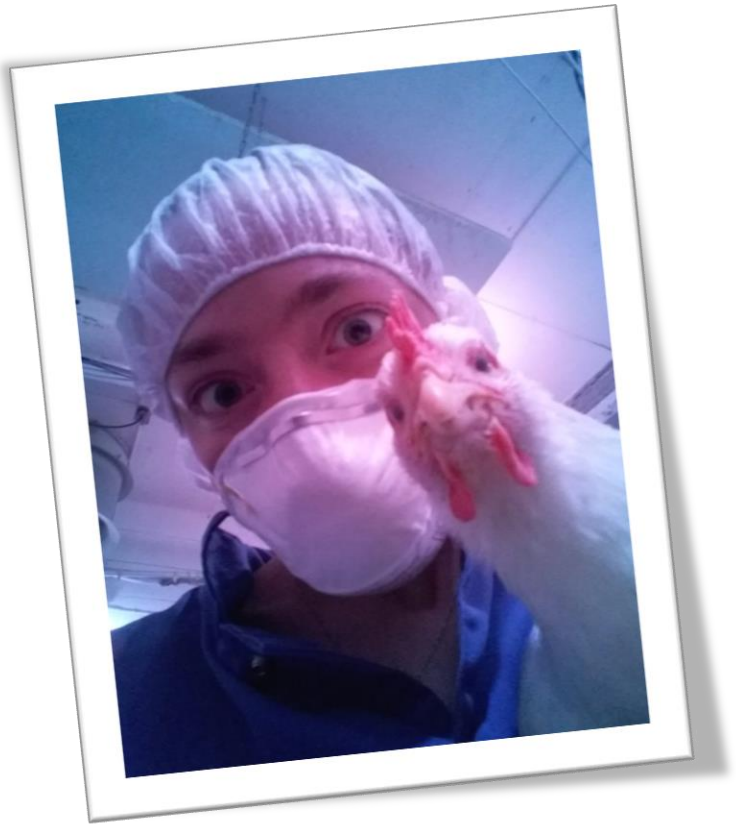
Poultry Research Centre
innovation since 1986



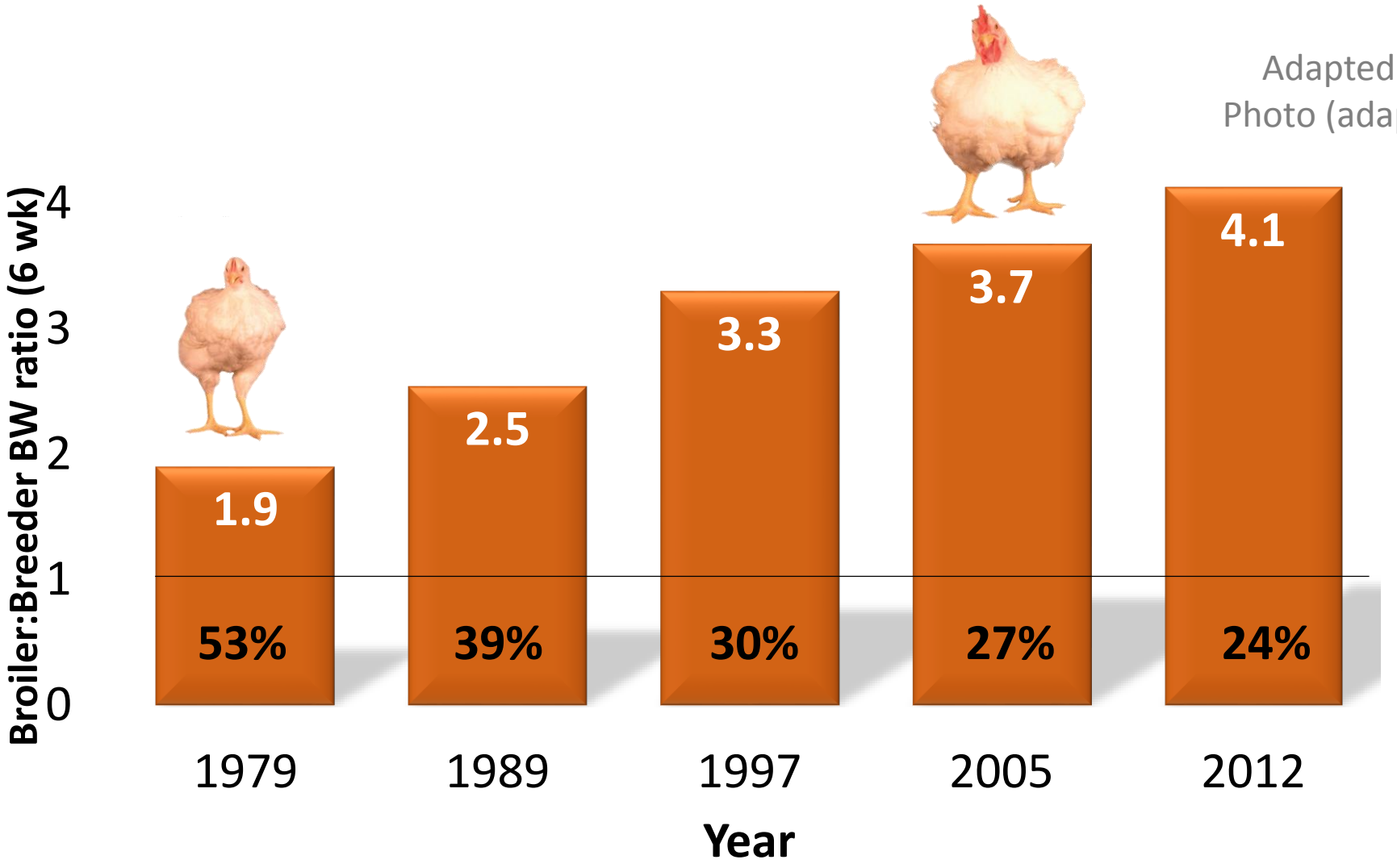
Feeding Uniform Breeders

Sasha van der Klein

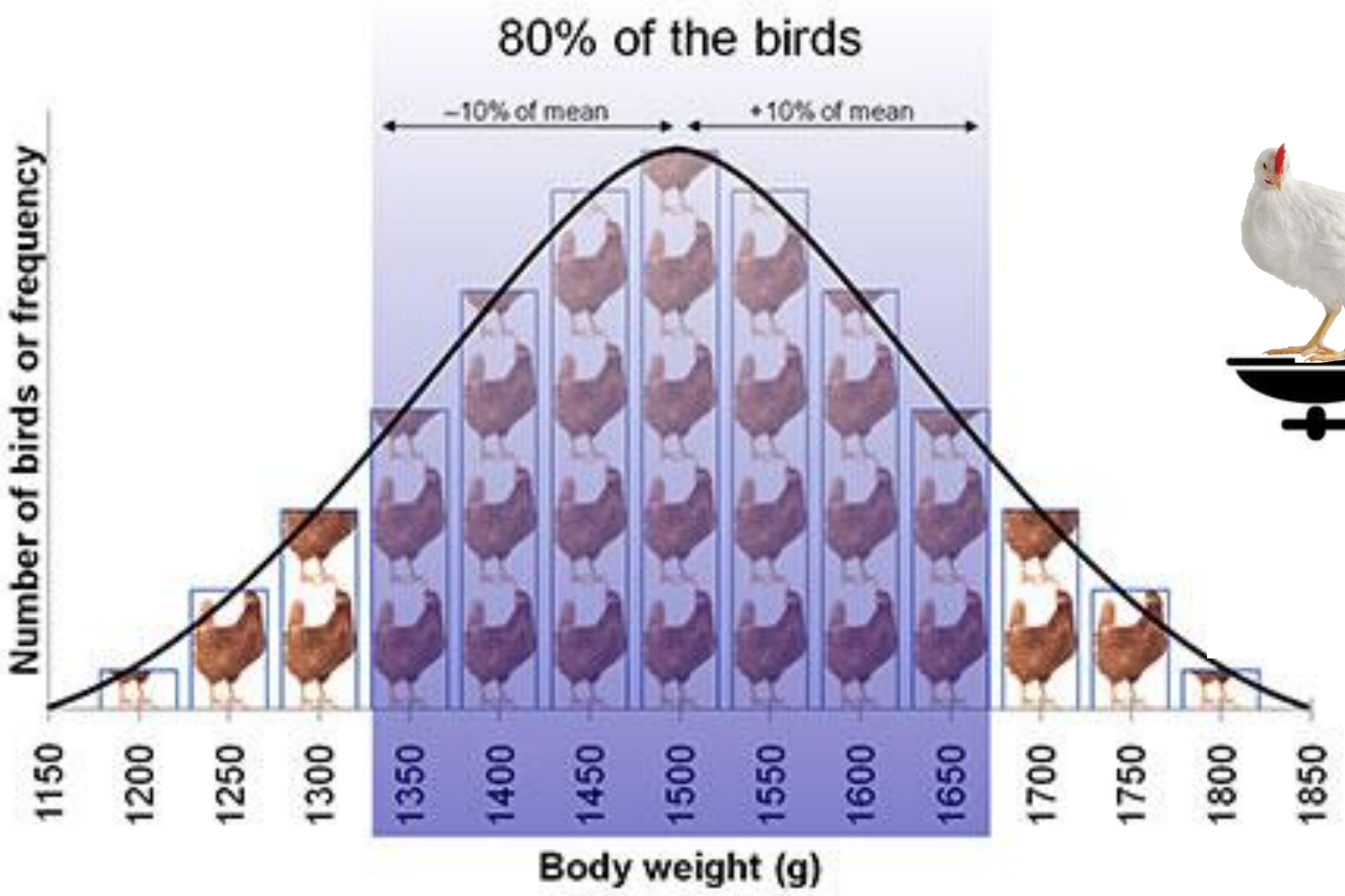
Department of Agricultural, Food and Nutritional Science, University of Alberta, Edmonton, AB, T6G 2P5, Canada

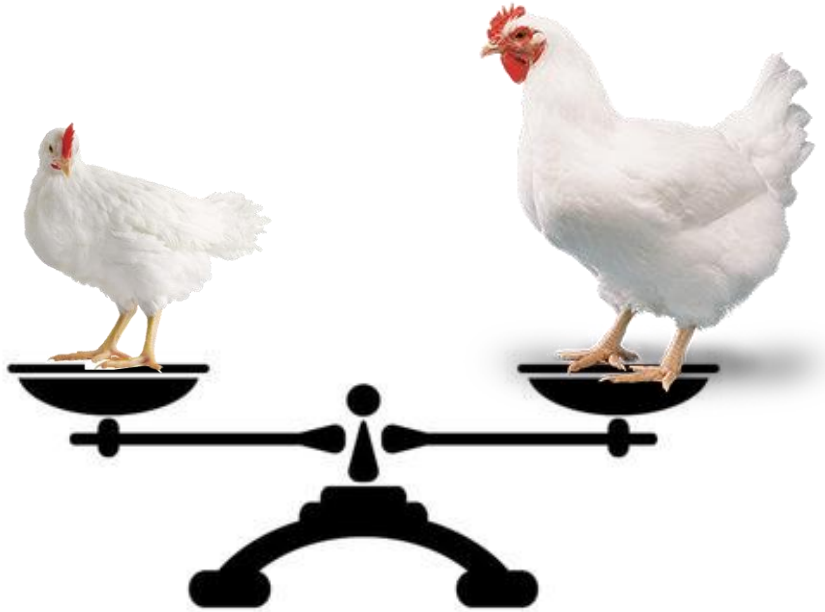
Evolution of broiler body weight has outpaced parent stock

Adapted from Renema et al., 2007
Photo (adapted): Zuidhof et al., 2014



Breeder body weight uniformity



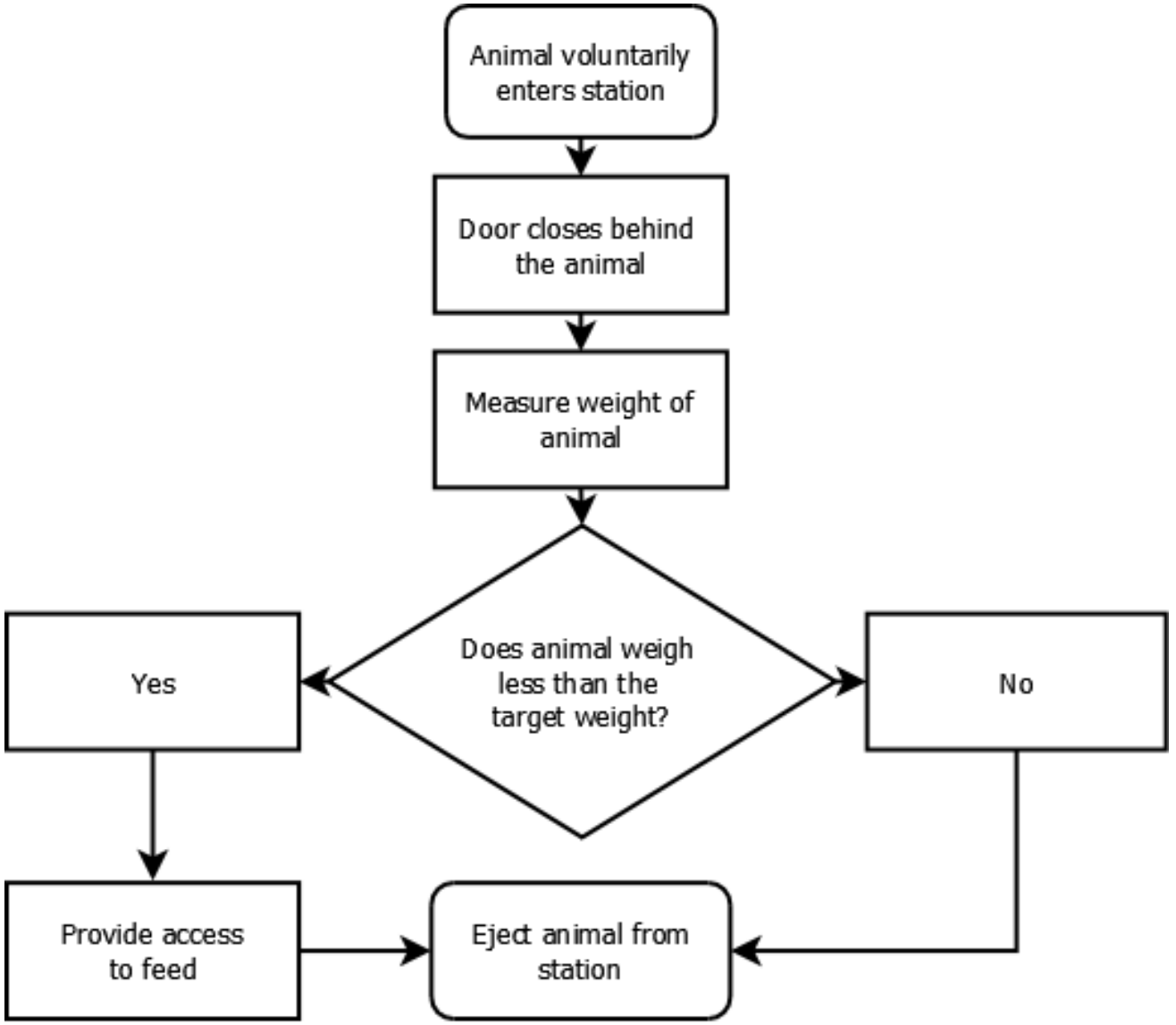


Precision Feeding

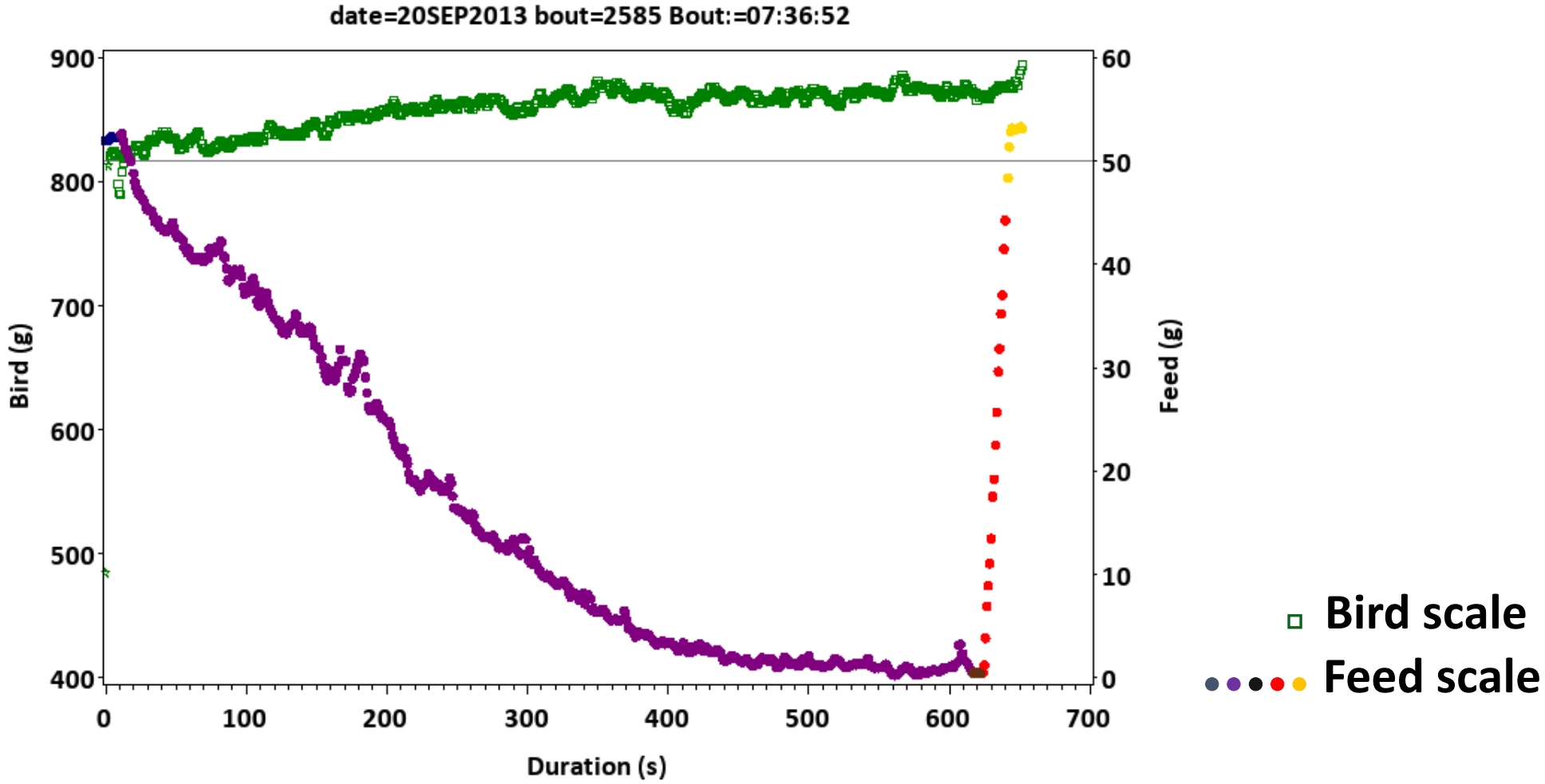
Providing the right amount of feed

to the right bird

at the right time



Real-time feed intake and BW data



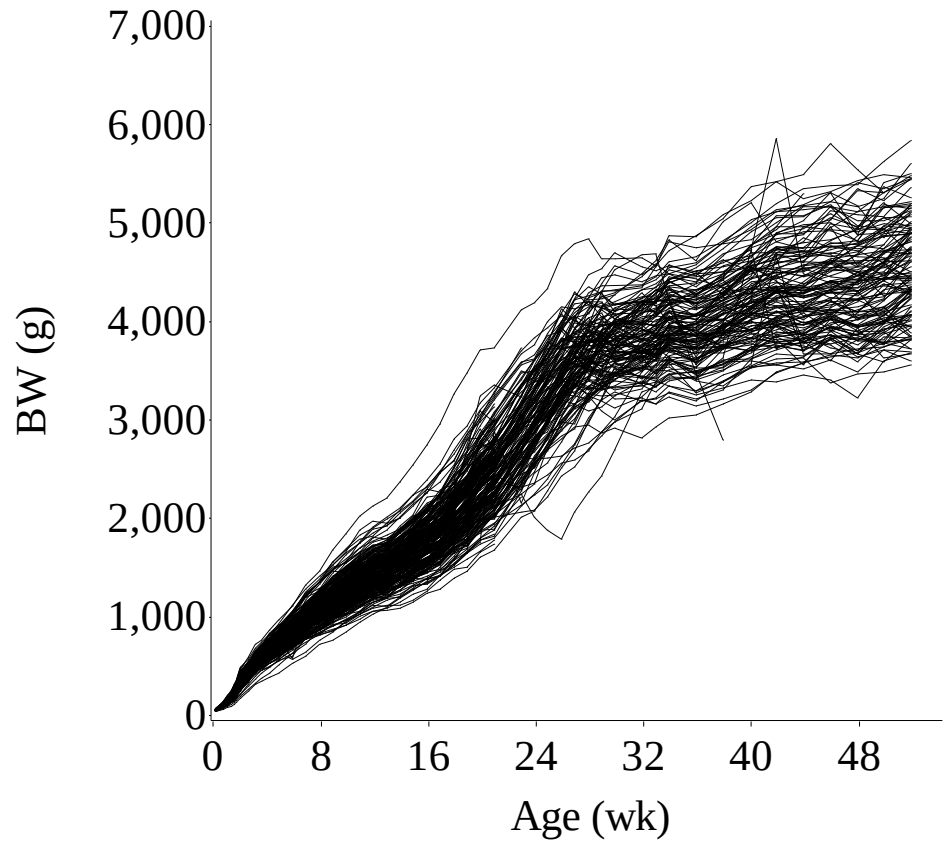
Data from one feeding bout

The female side of the story (ladies first)

- Cobb Grandparents (male line female)
- Ross 308 hens
- Ross 708 hens

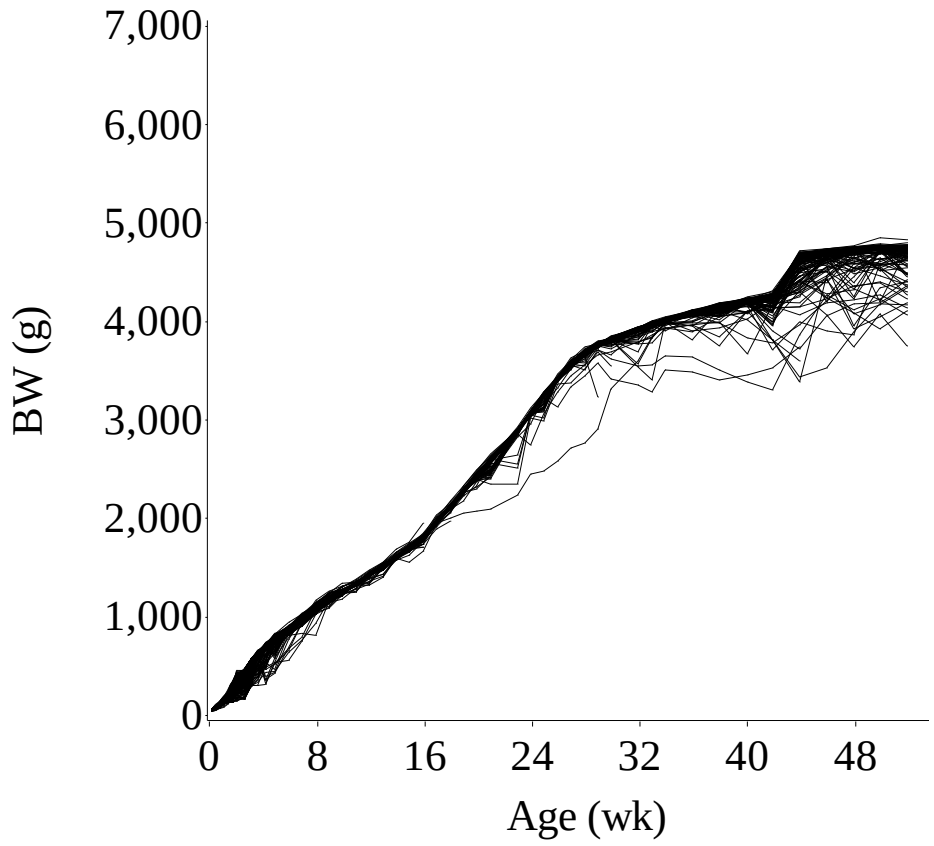
We can grow very uniform flocks

CON females



~50% uniformity at photostimulation (14% CV)

PF Females

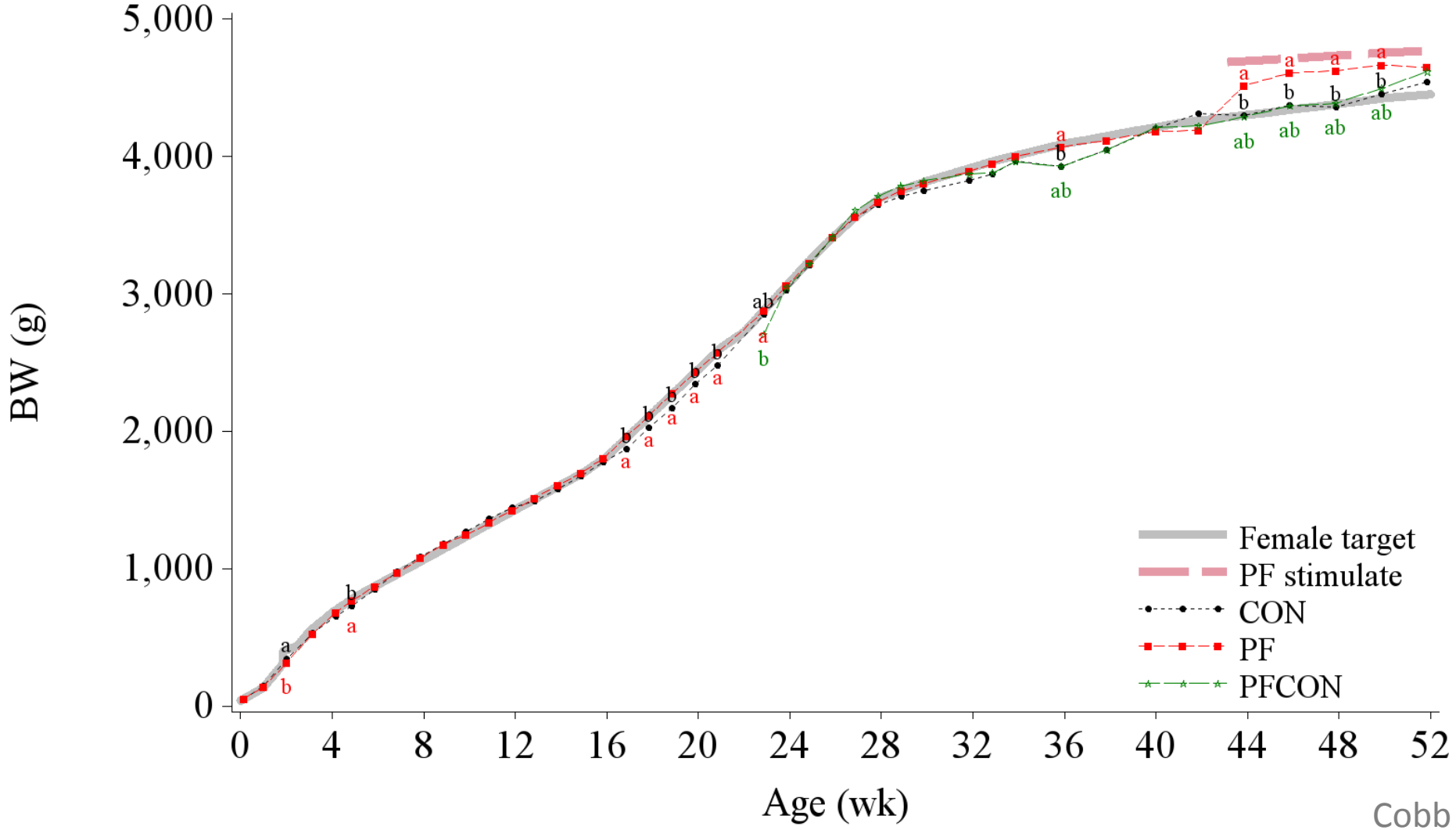


100% uniformity at photostimulation (<1% CV)

Uniformity: % of birds within ±10% of the mean

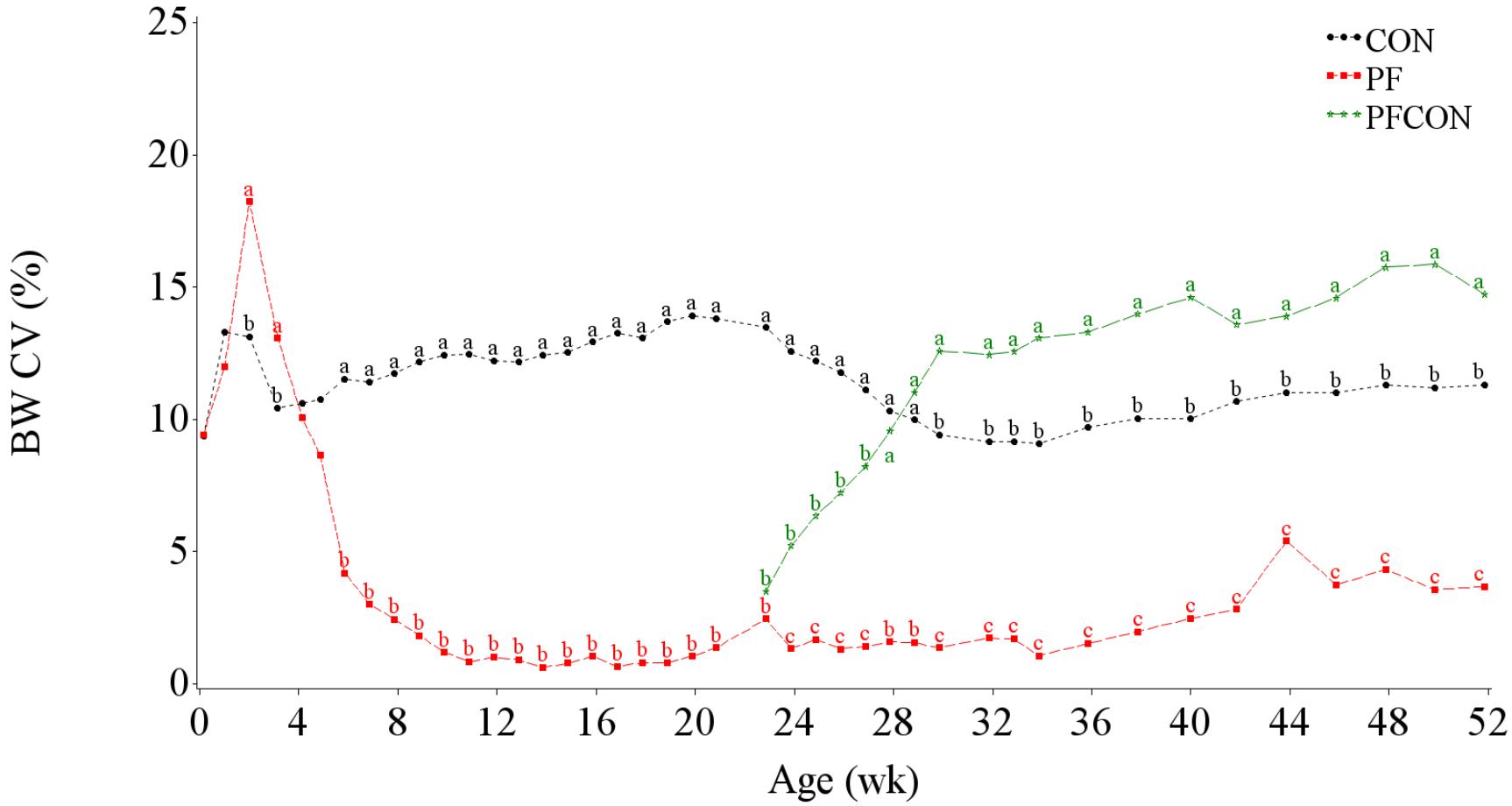
Cobb GP

Body weight (females)



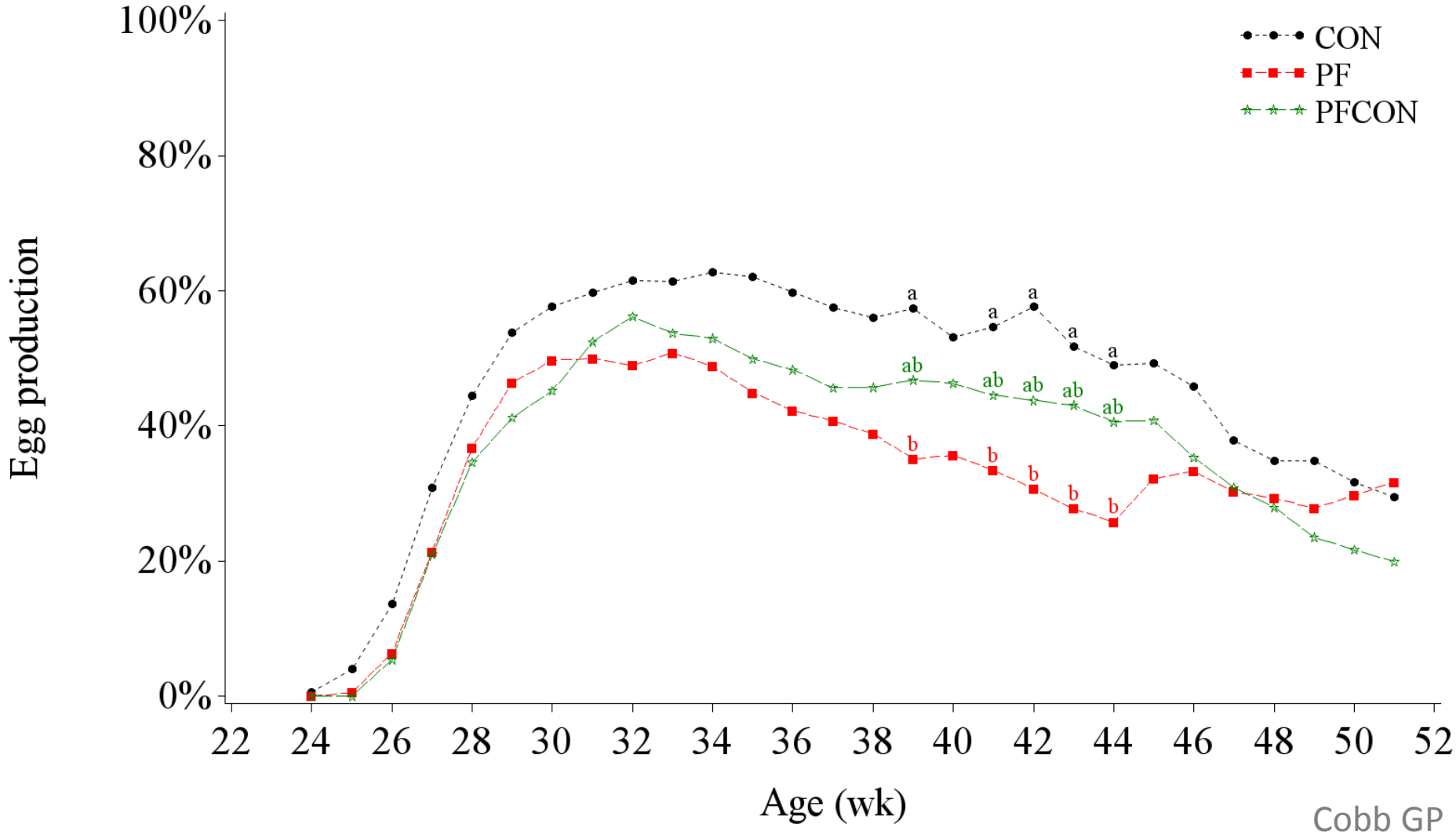
Cobb GP

Body weight variability (females)



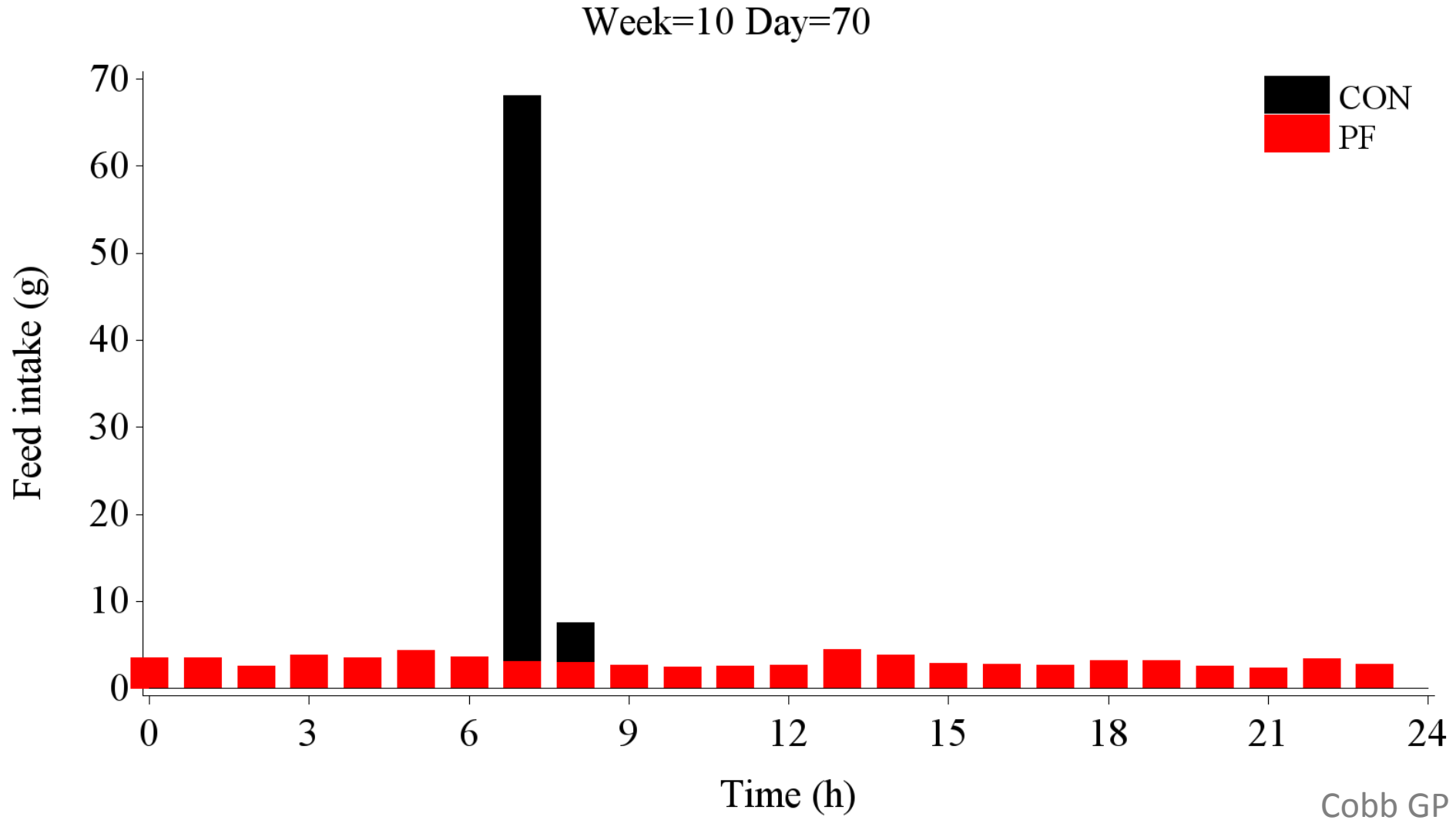
Cobb GP

Egg production



Cobb GP

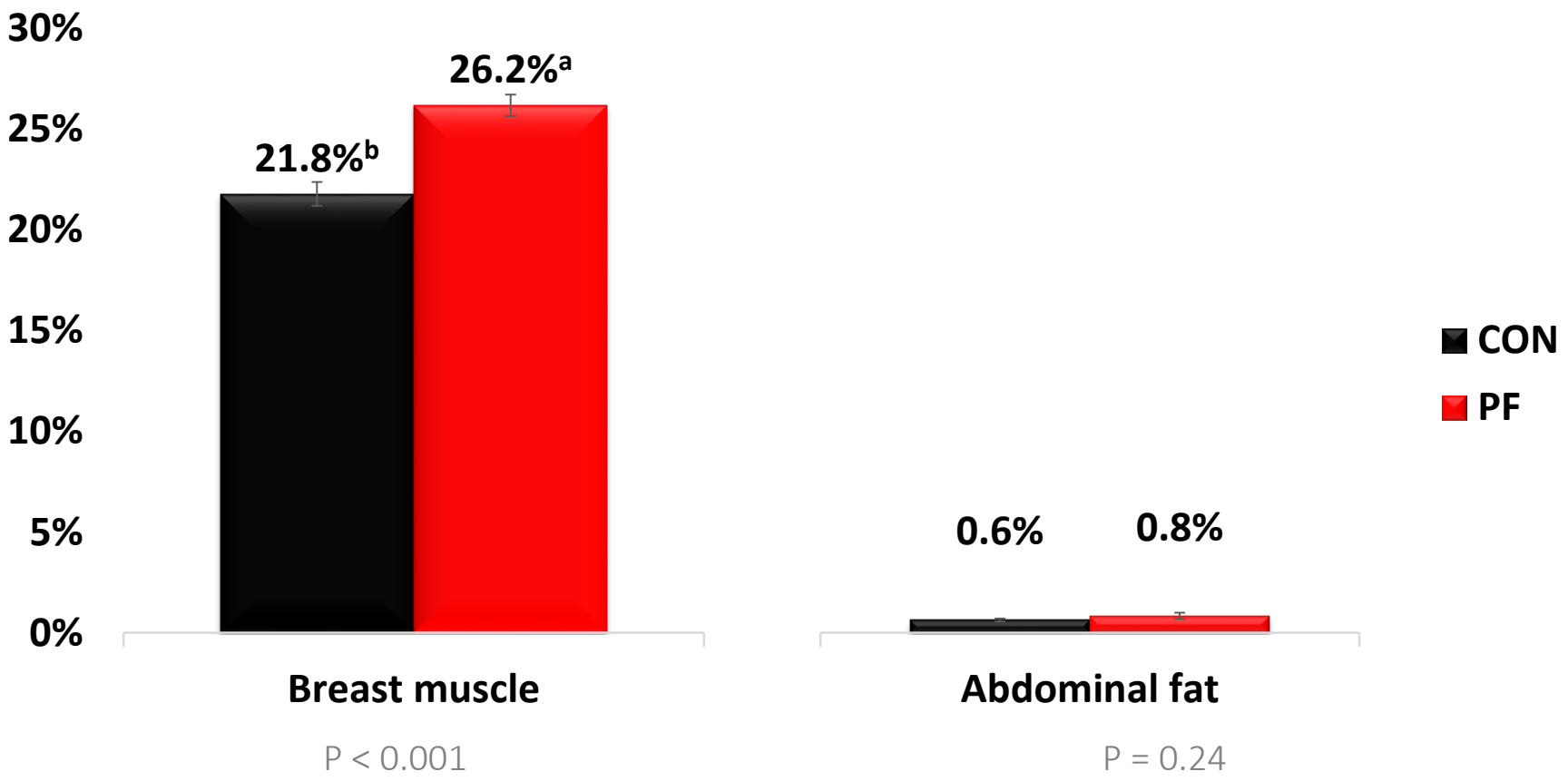
Diurnal feed intake pattern



Cobb GP

Body composition at photostimulation

At 22 wk, PF birds had more breast muscle… … and similar abdominal fat



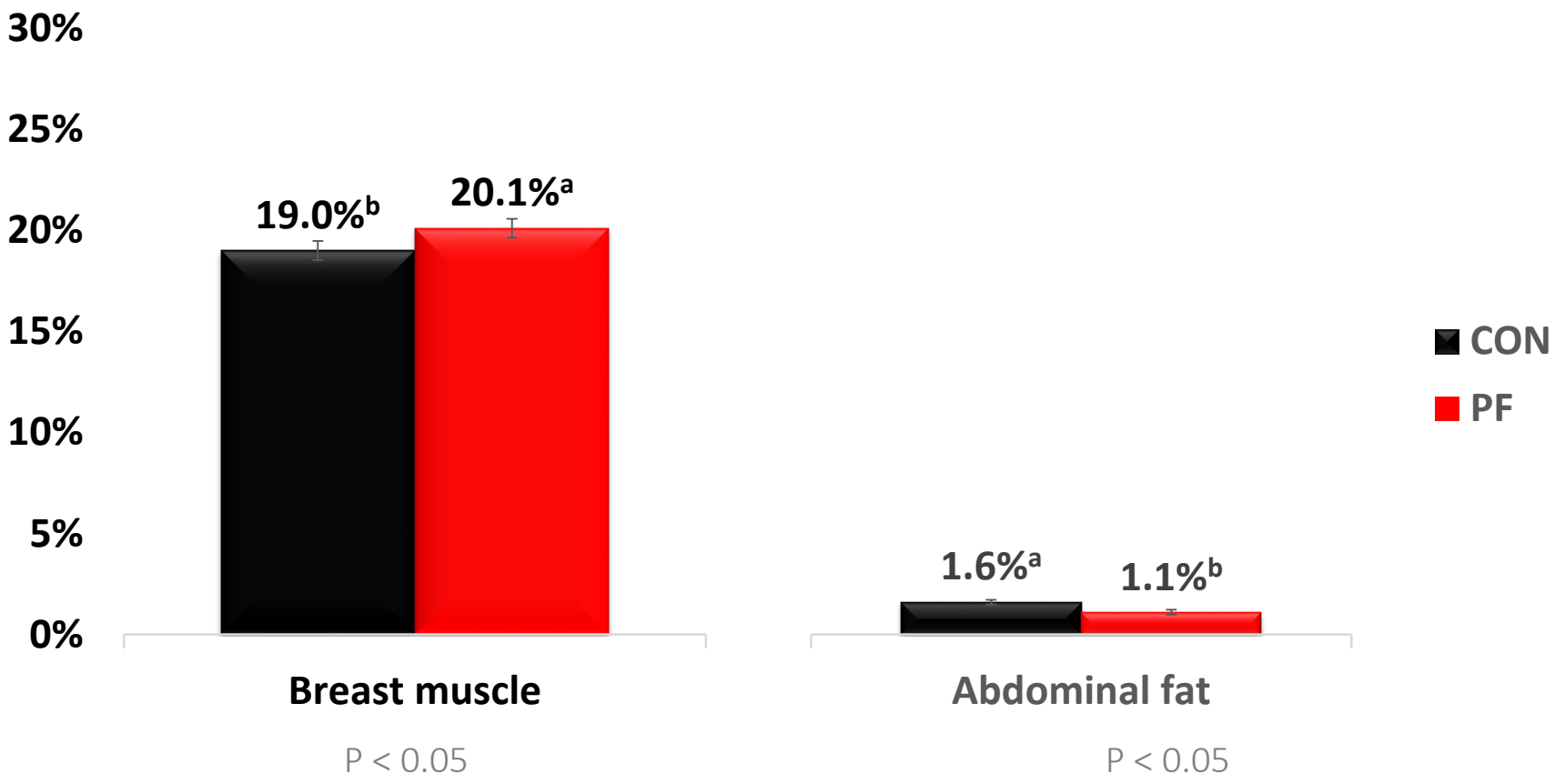
P < 0.001

P = 0.24

Cobb GP

Body composition at photostimulation

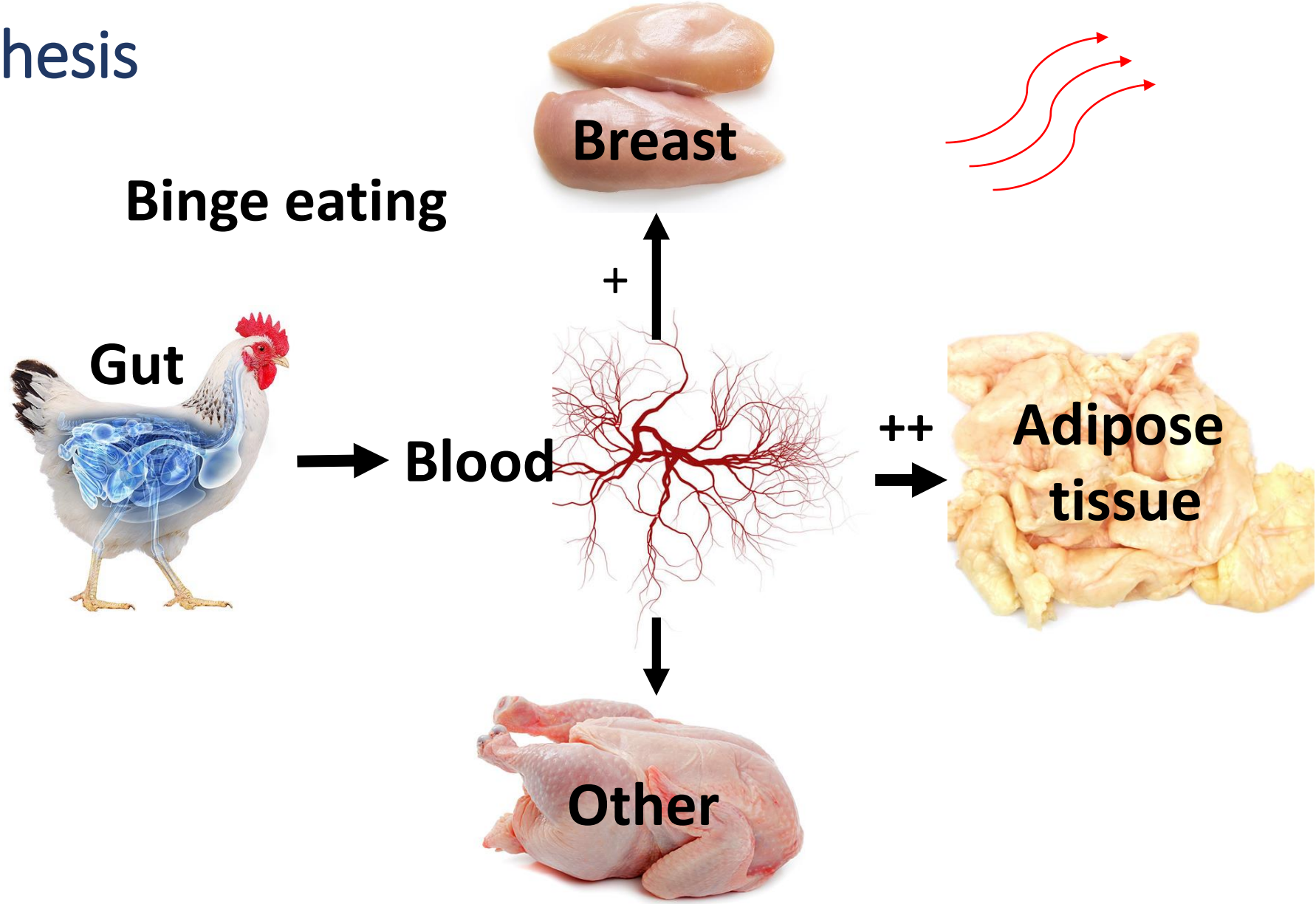
At 23 wk, PF birds had more breast muscle… … and less abdominal fat



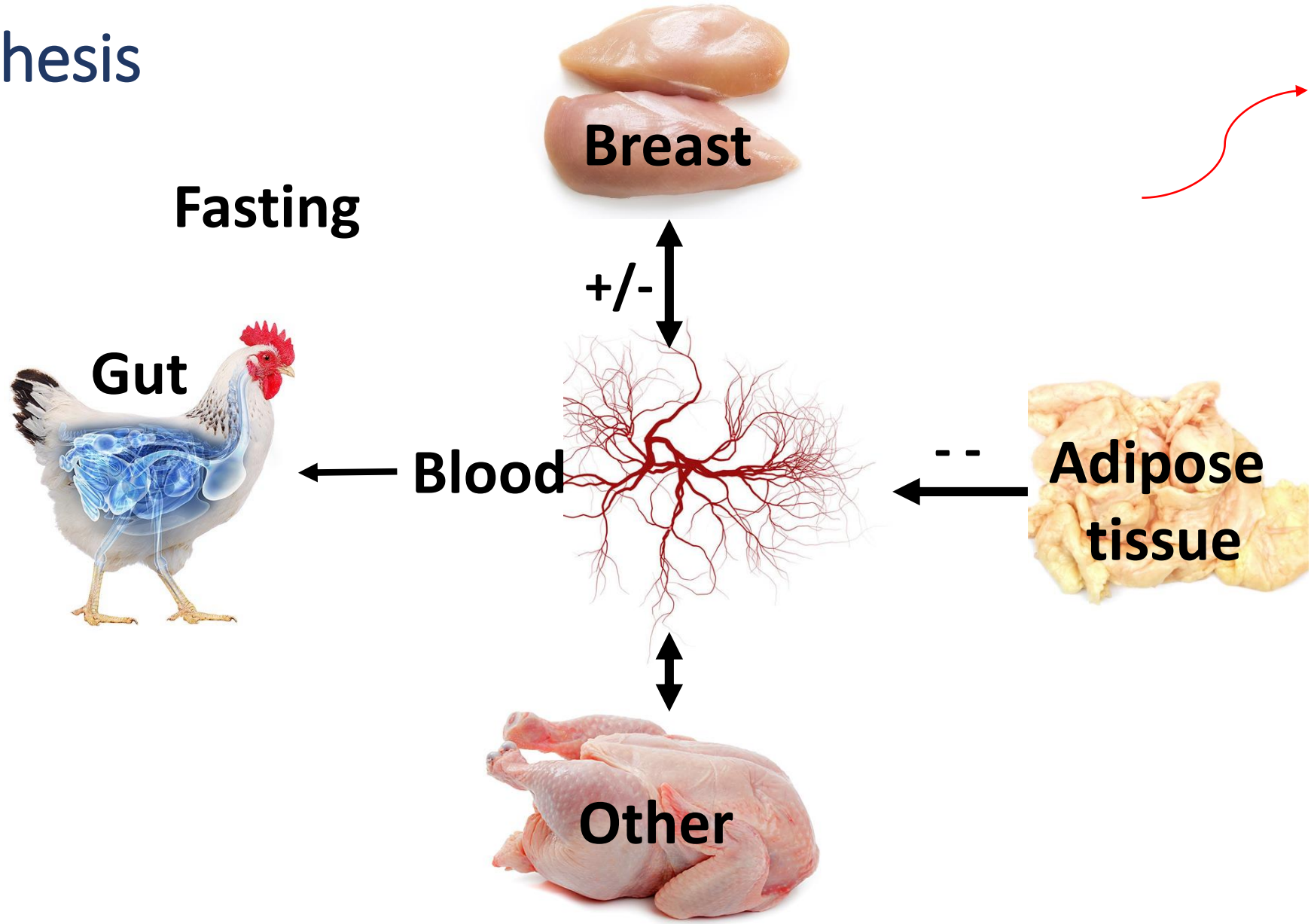
P < 0.05 P < 0.05

Ross 308

Hypothesis

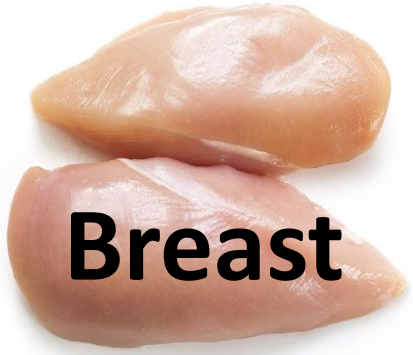


Hypothesis



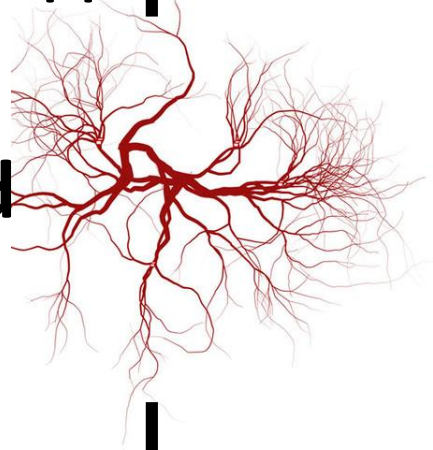
Hypothesis

Constant

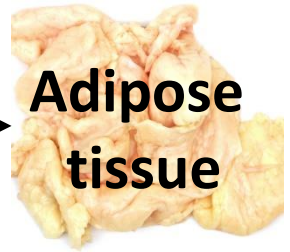


++

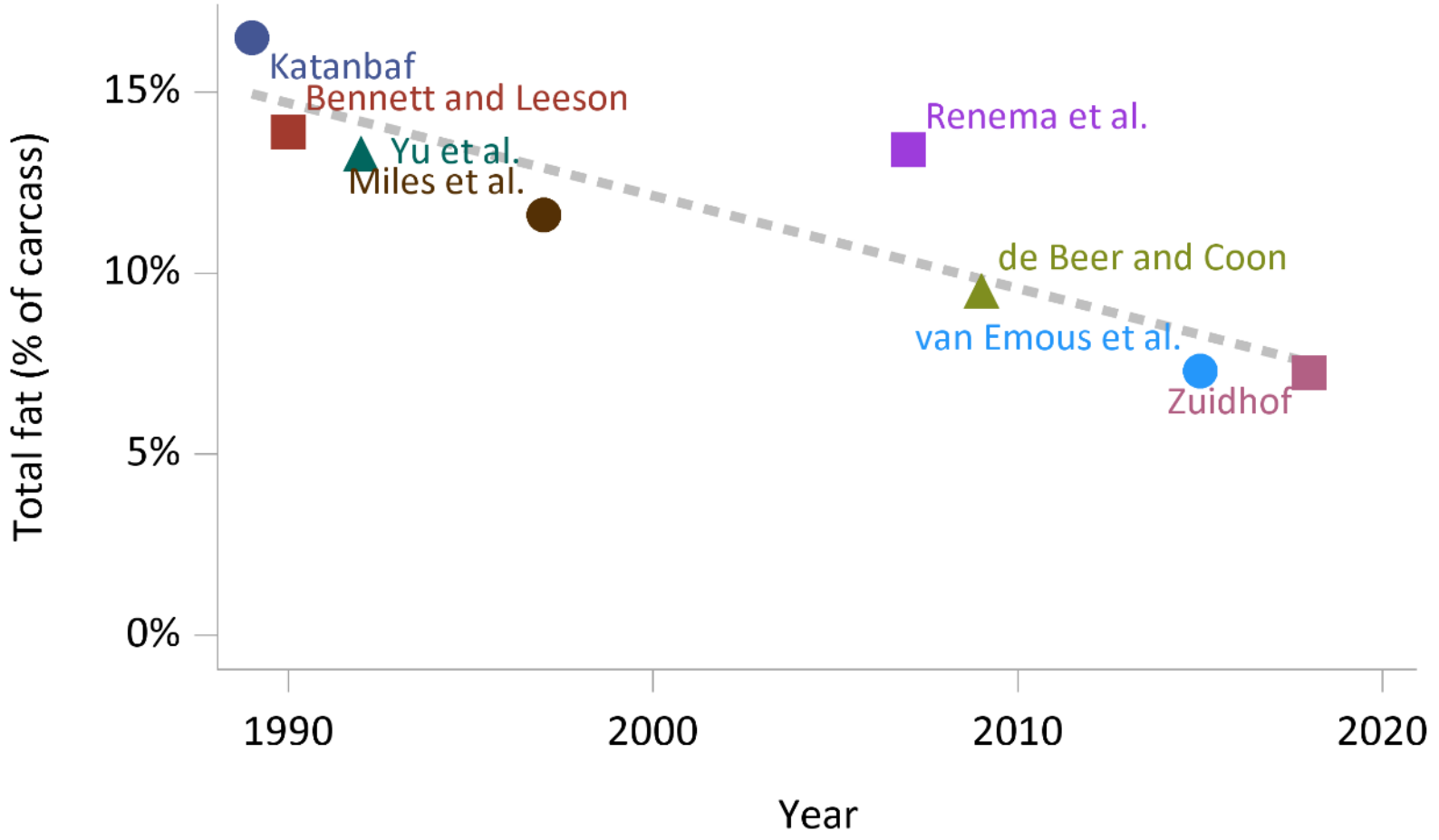
Blood



+



Change in broiler breeder fat over 3 decades

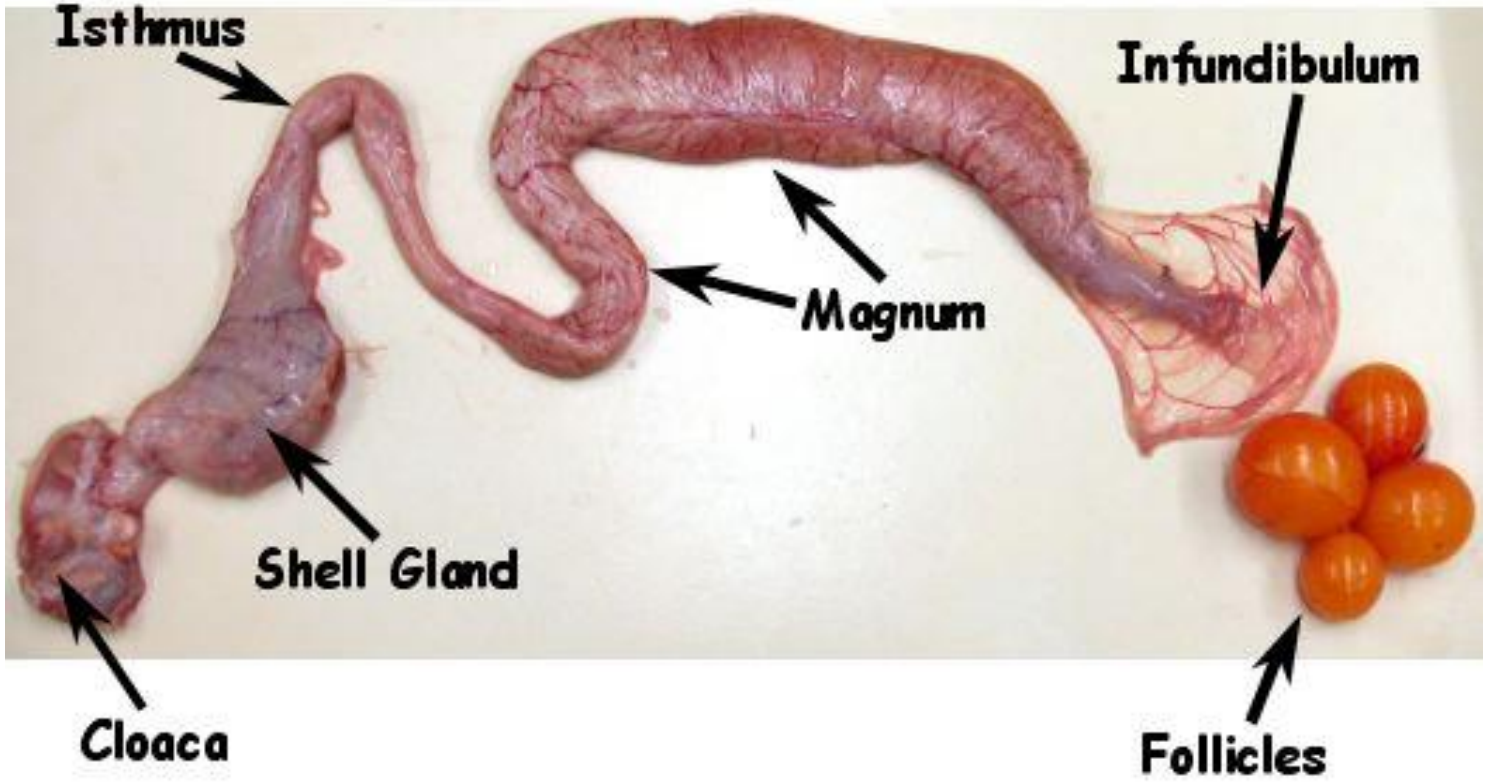


The start of my PhD project…

"I'm not even sure why we are doing this,
I don't expect to see any differences."

- Dr. Martin Zuidhof, around March 2016

The reproductive tract



The messaging system – control room

Hypothalamus

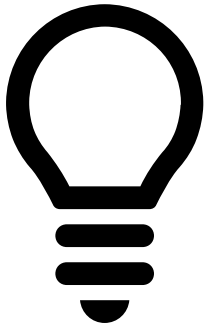
BREAK | **GAS PEDAL**

Pituitary

Estradiol and progesterone

FSH & LH

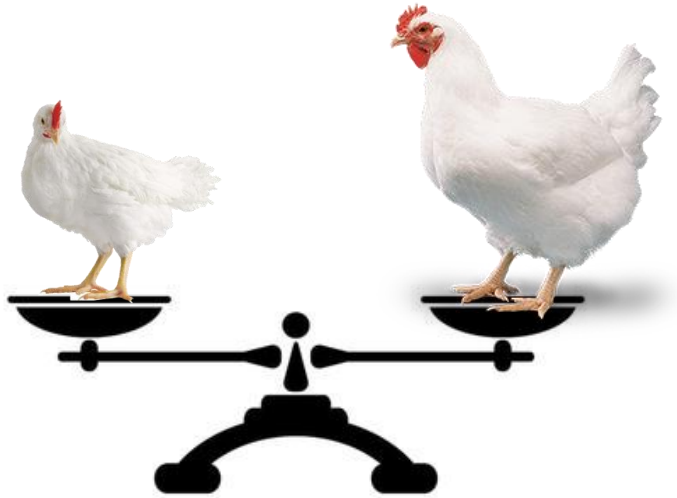
Ovary



Lighting

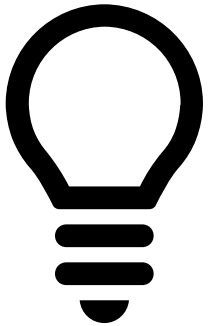
- Colour – wavelength
- Intensity – lux
- Duration – daylength

The experiment



Body weight

Standard
Heavy + 22% @21 wk

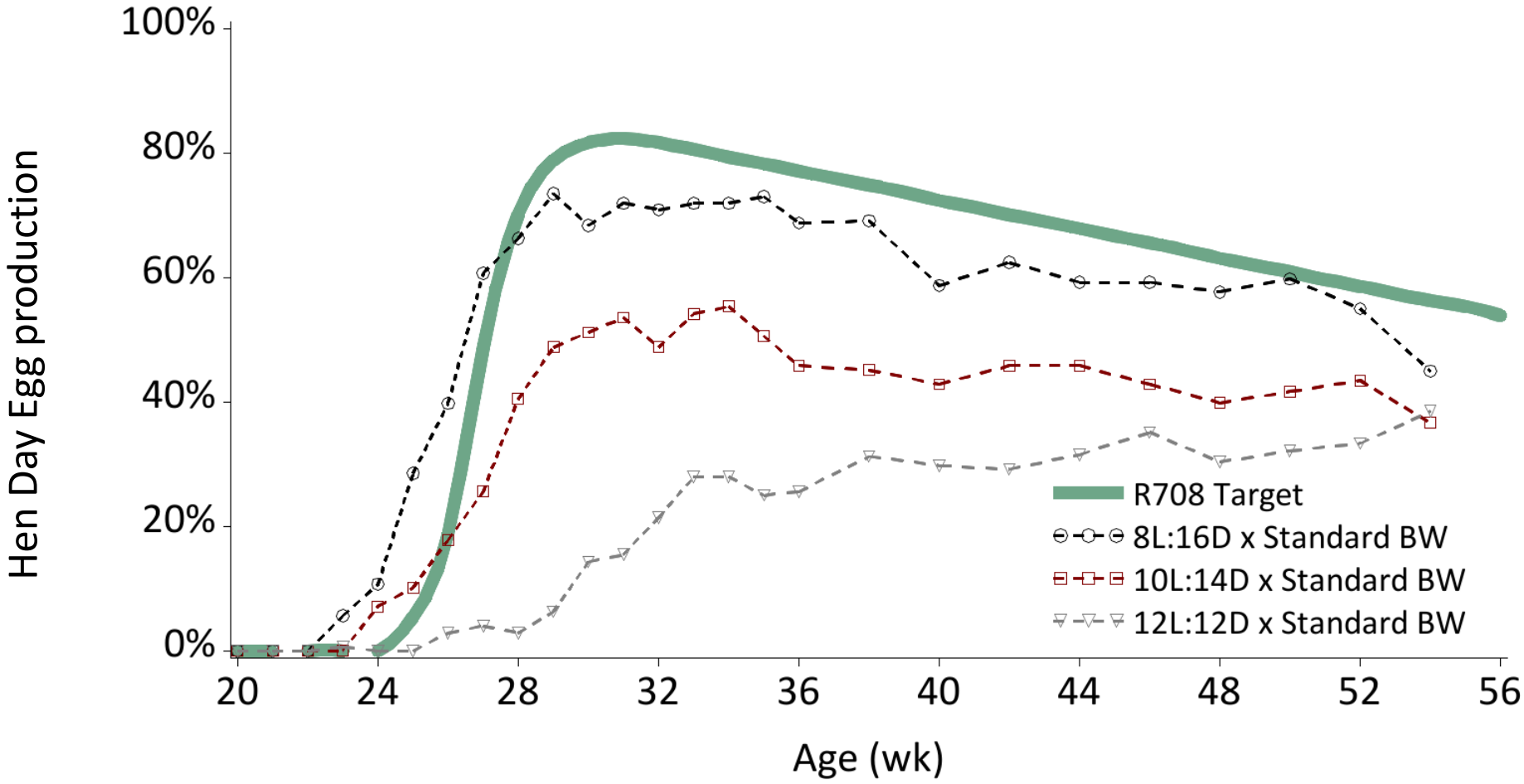


Daylength

8h
10h
12h

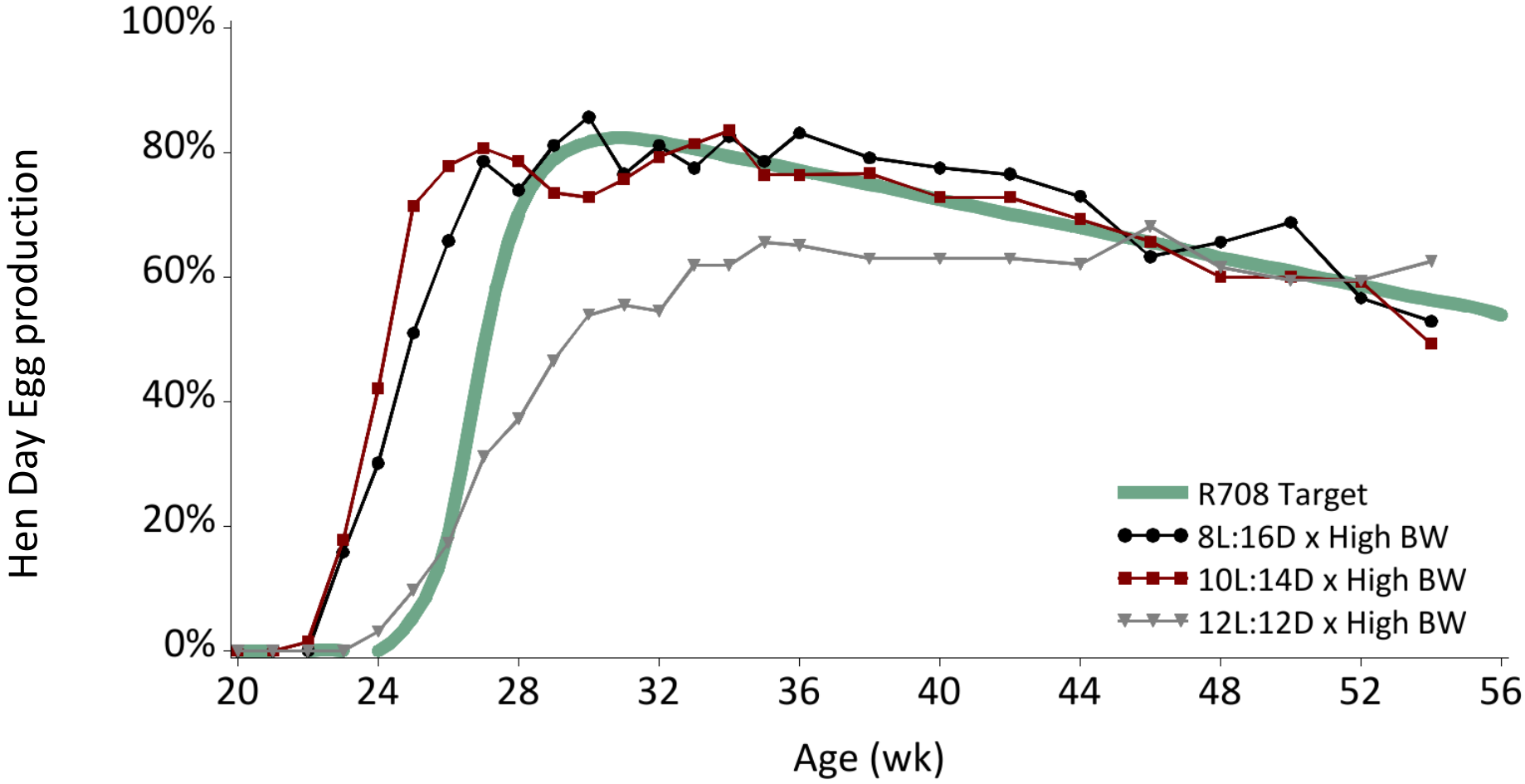
Colombia: 12h rearing daylength – excellent production results

Egg production on standard target BW



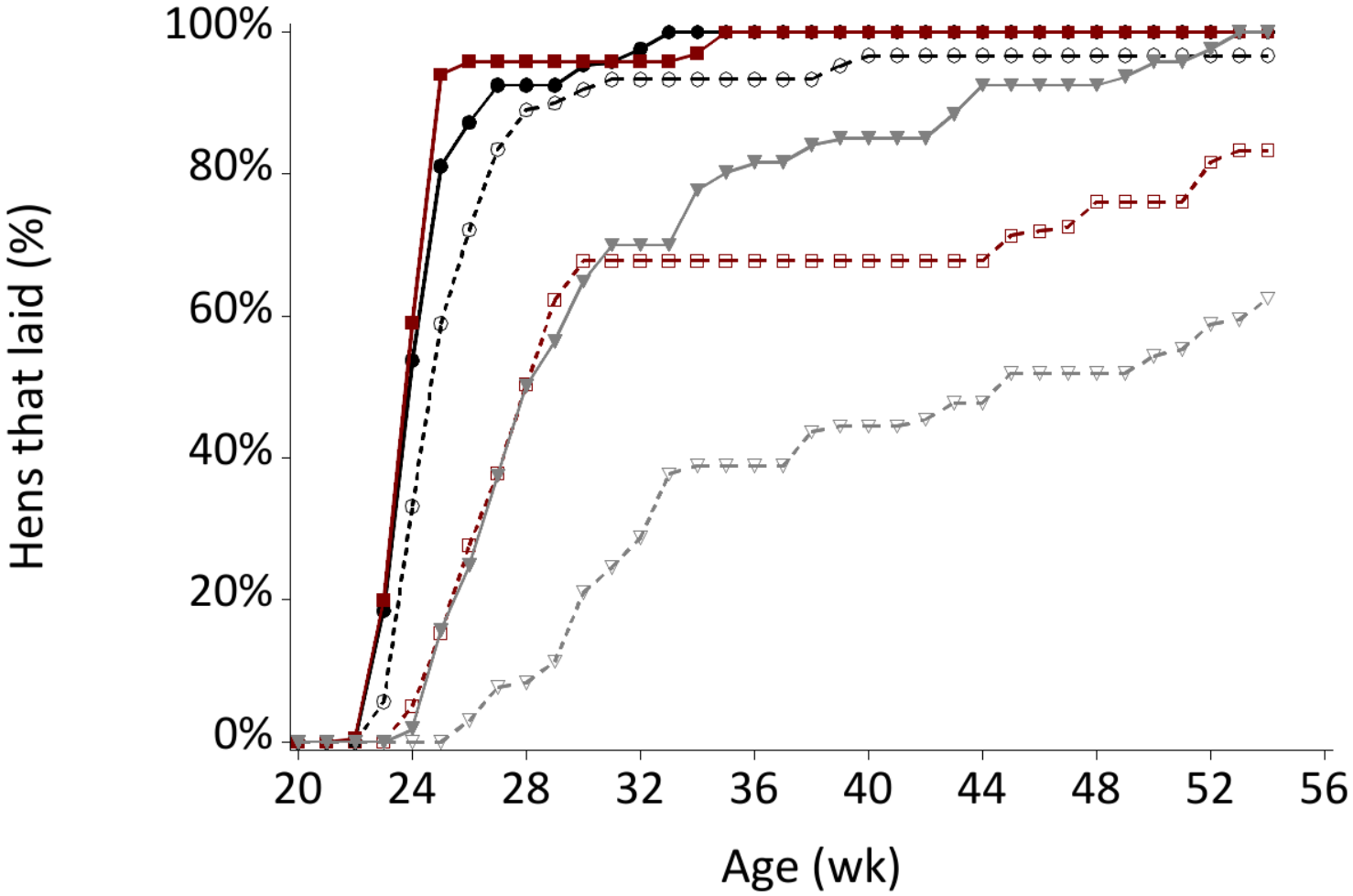
Ross 708

Egg production on high target BW



Ross 708

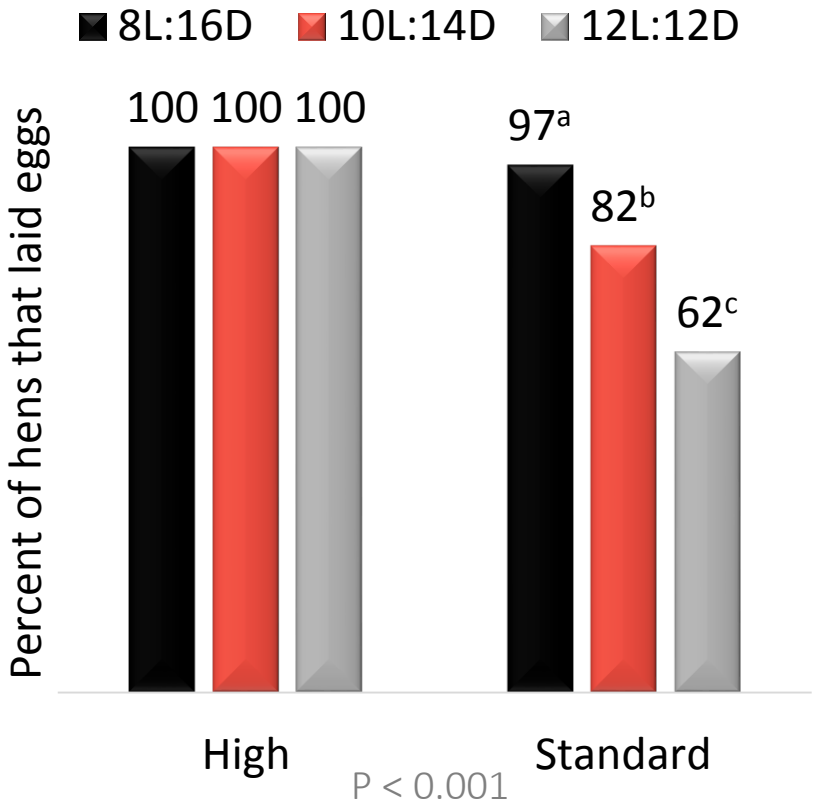
The start of lay



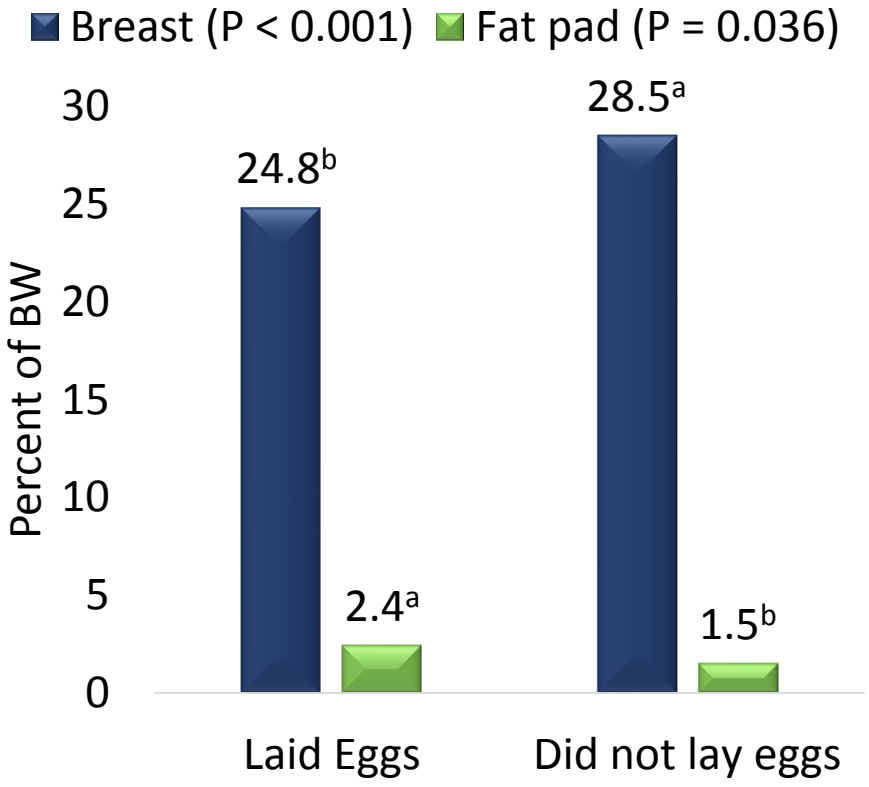
Ross 708

Ovularche (First Ovulation)

All High BW birds laid eggs…



…those that laid no eggs were leaner

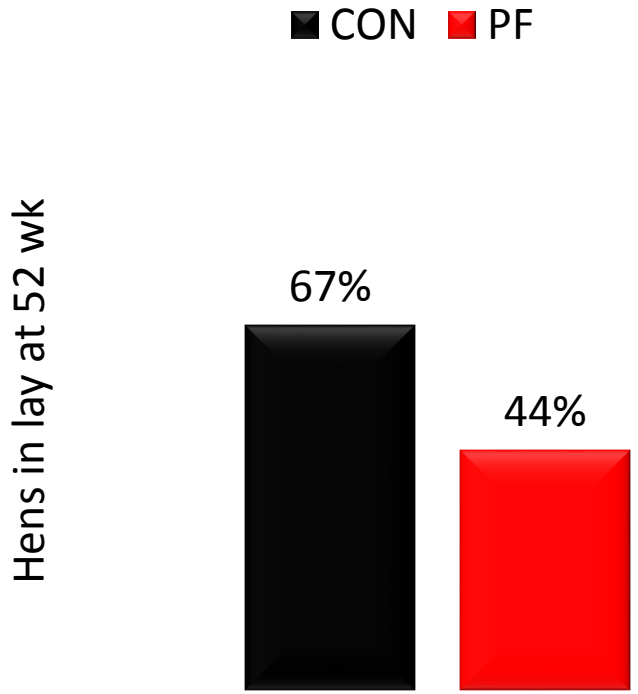


Light management is extremely important

Ross 708

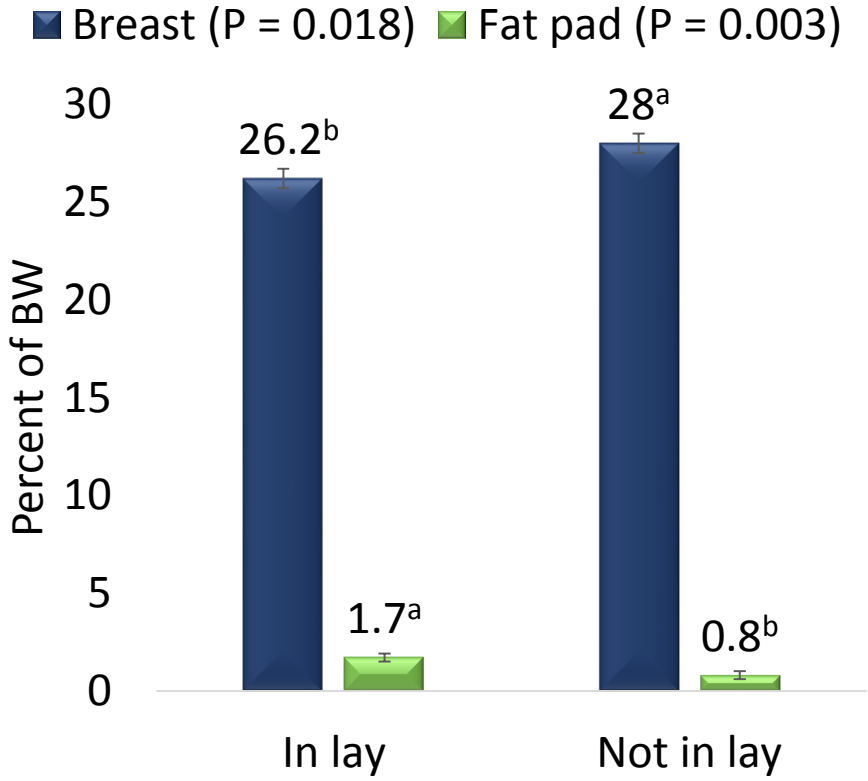
Body conformation of hens in lay

Hens in lay at 52 wk



P = 0.27

…those not laying were leaner



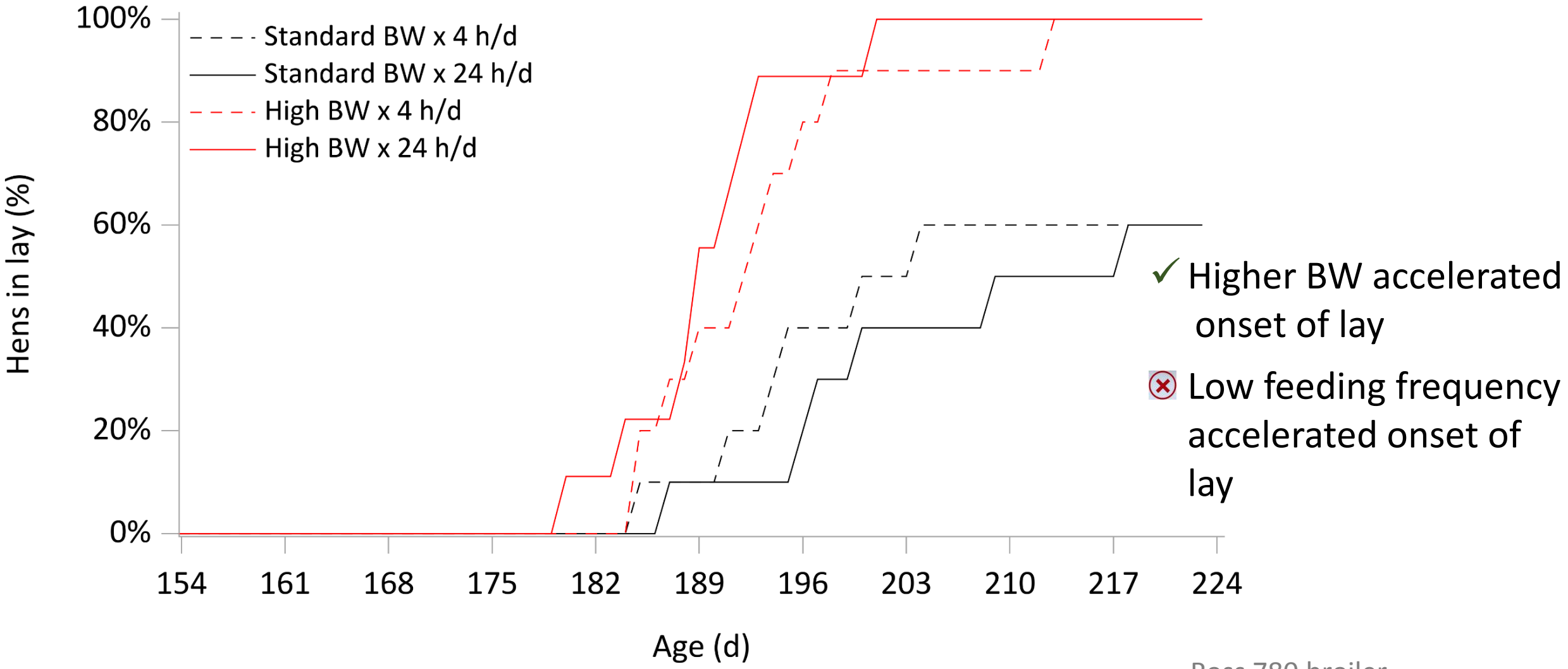
Cobb GP

After the experiment…

"Hmm… Let me look a little deeper into this…"

- Dr. Martin Zuidhof, around July 2017

The start of lay



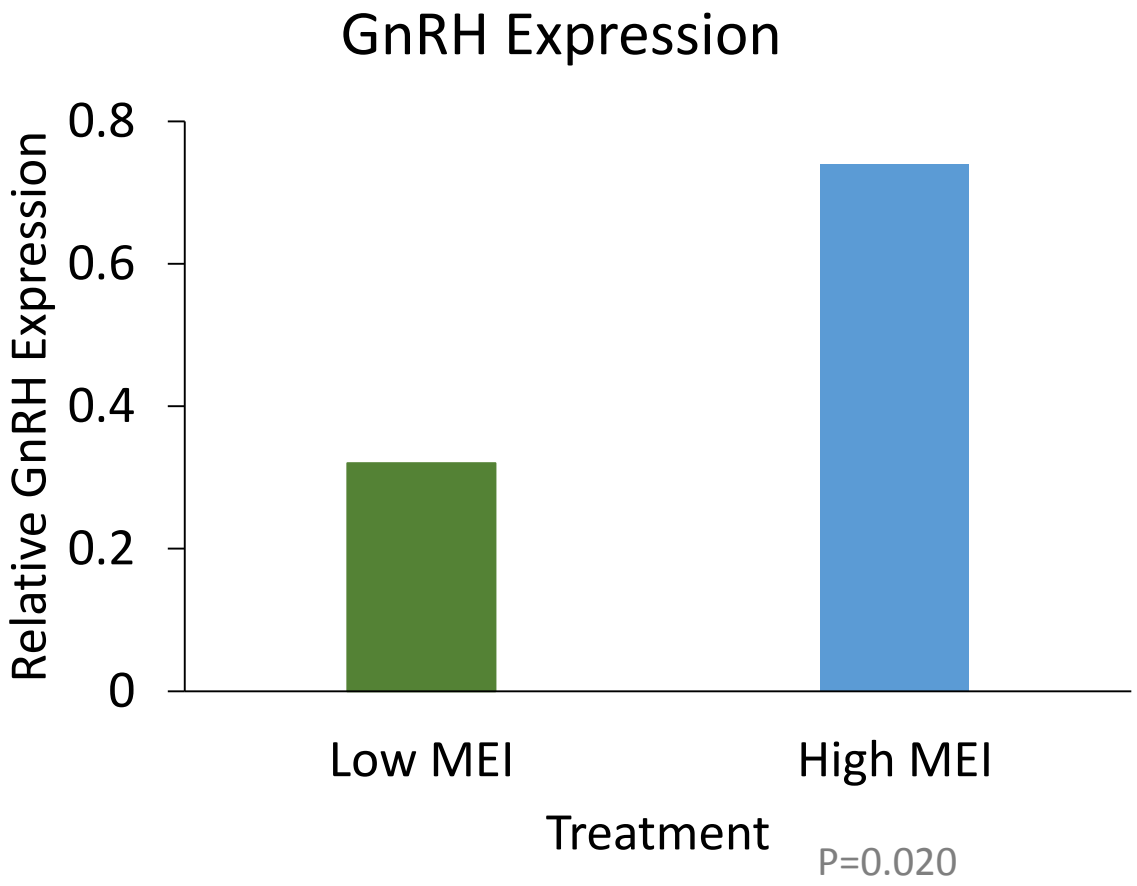
- ✓ Higher BW accelerated onset of lay
- ⊗ Low feeding frequency accelerated onset of lay

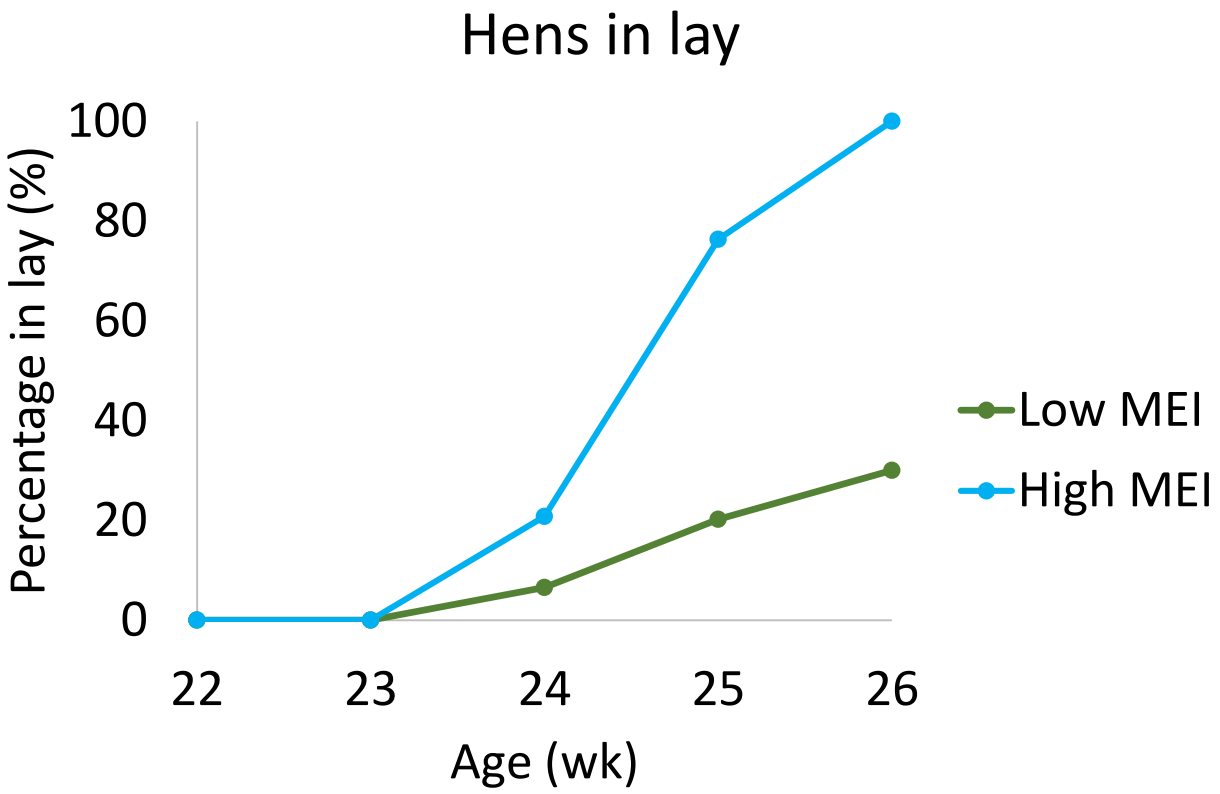
Ross 780 broiler

The messaging system – control room

The gas pedal

High metabolizable energy intake triggered sexual maturation



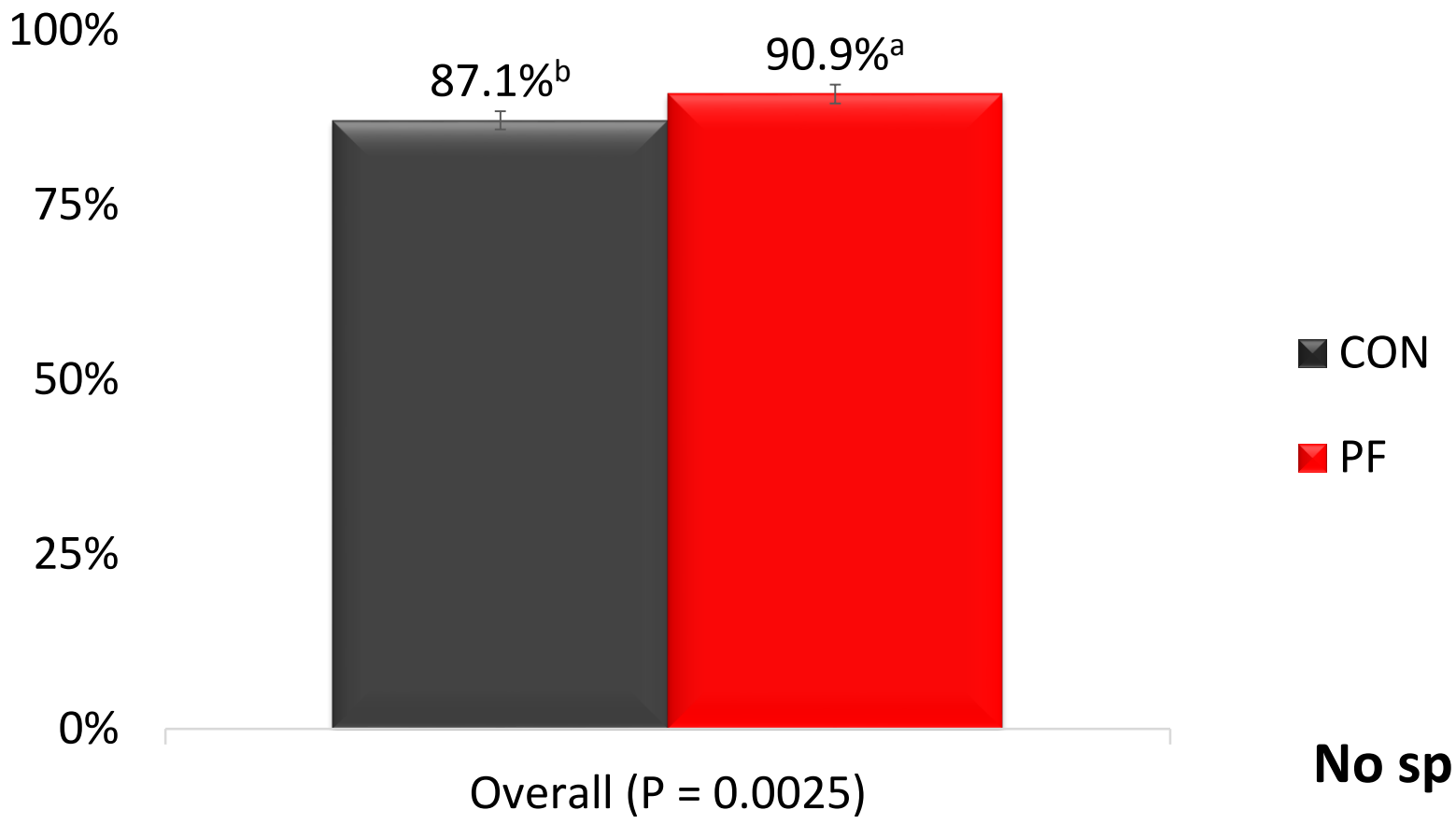


Ross 308, Sheila Hadinia

The good news...

- Fertility

Fertility 3.8% higher with Precision Feeding

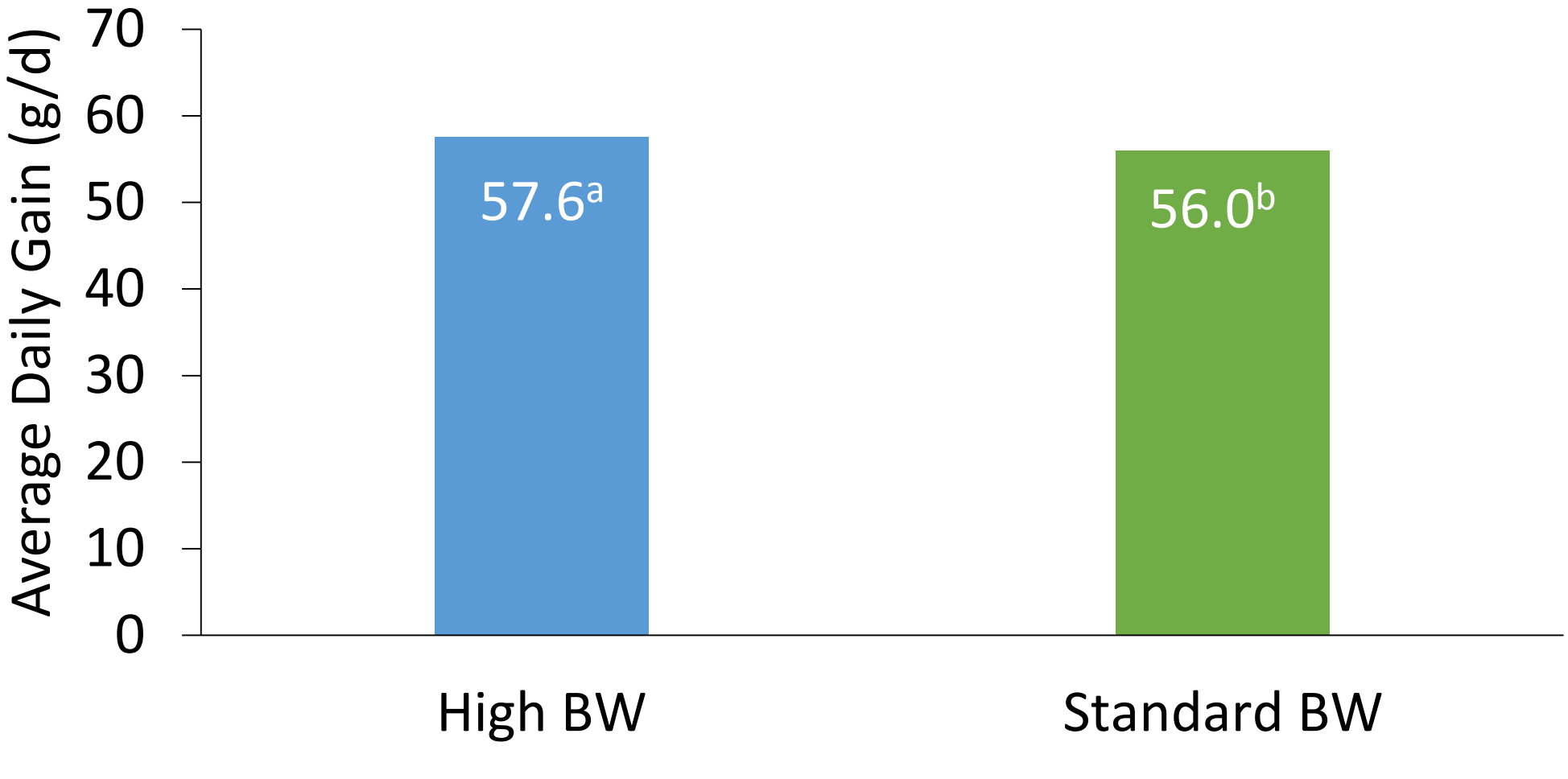


No spiking

Cobb GP

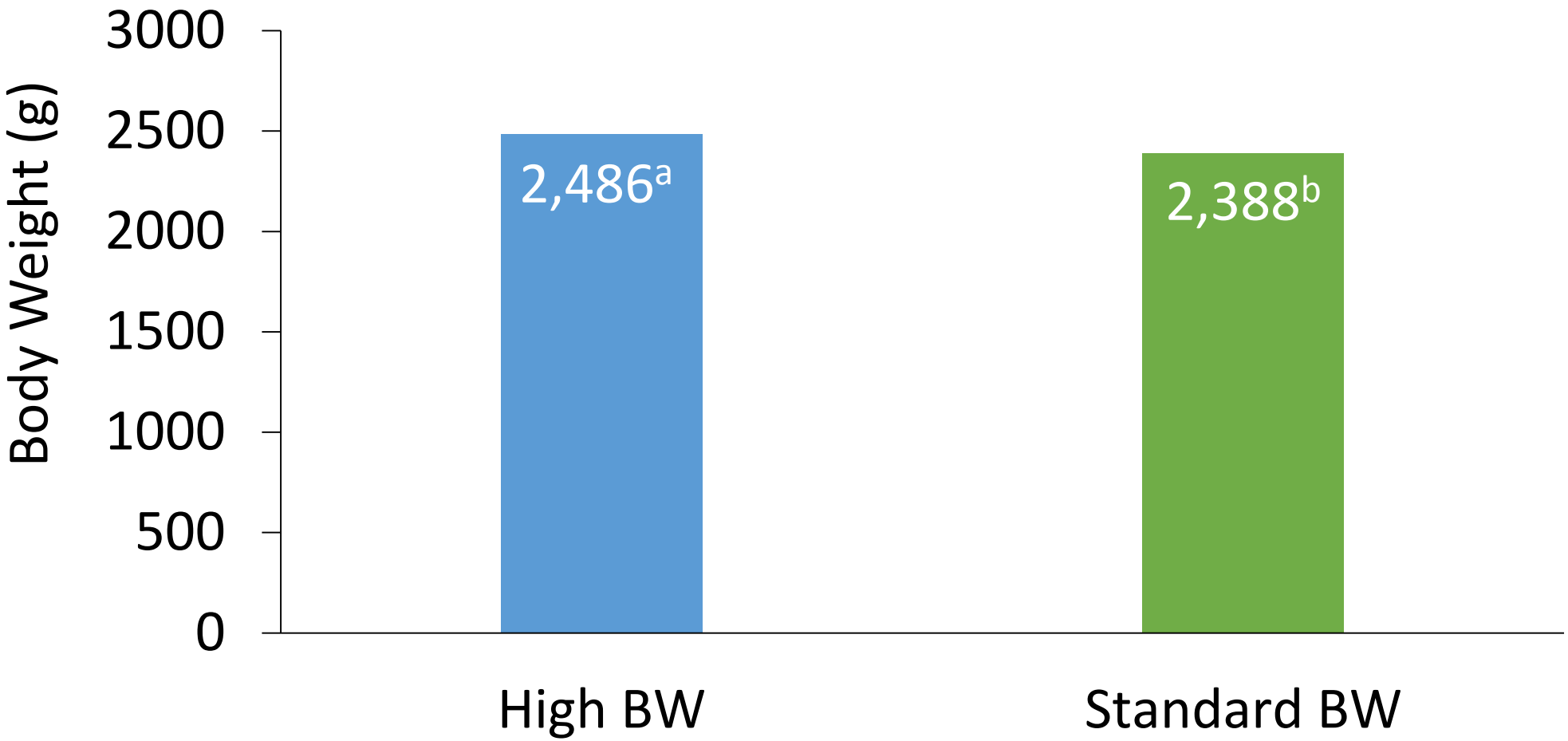
What about the next generation?

Offspring average daily gain



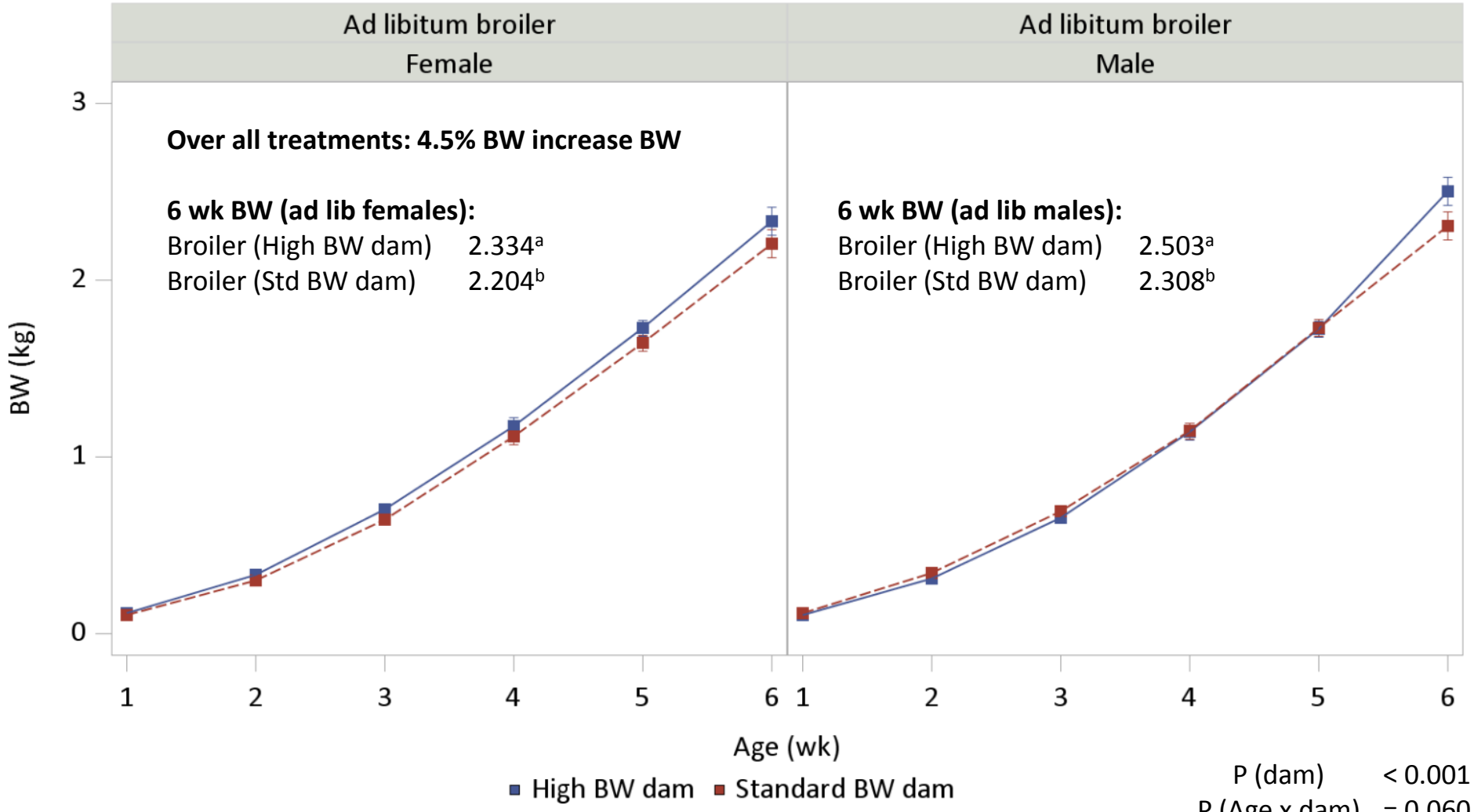
P = 0.035

Offspring body weight



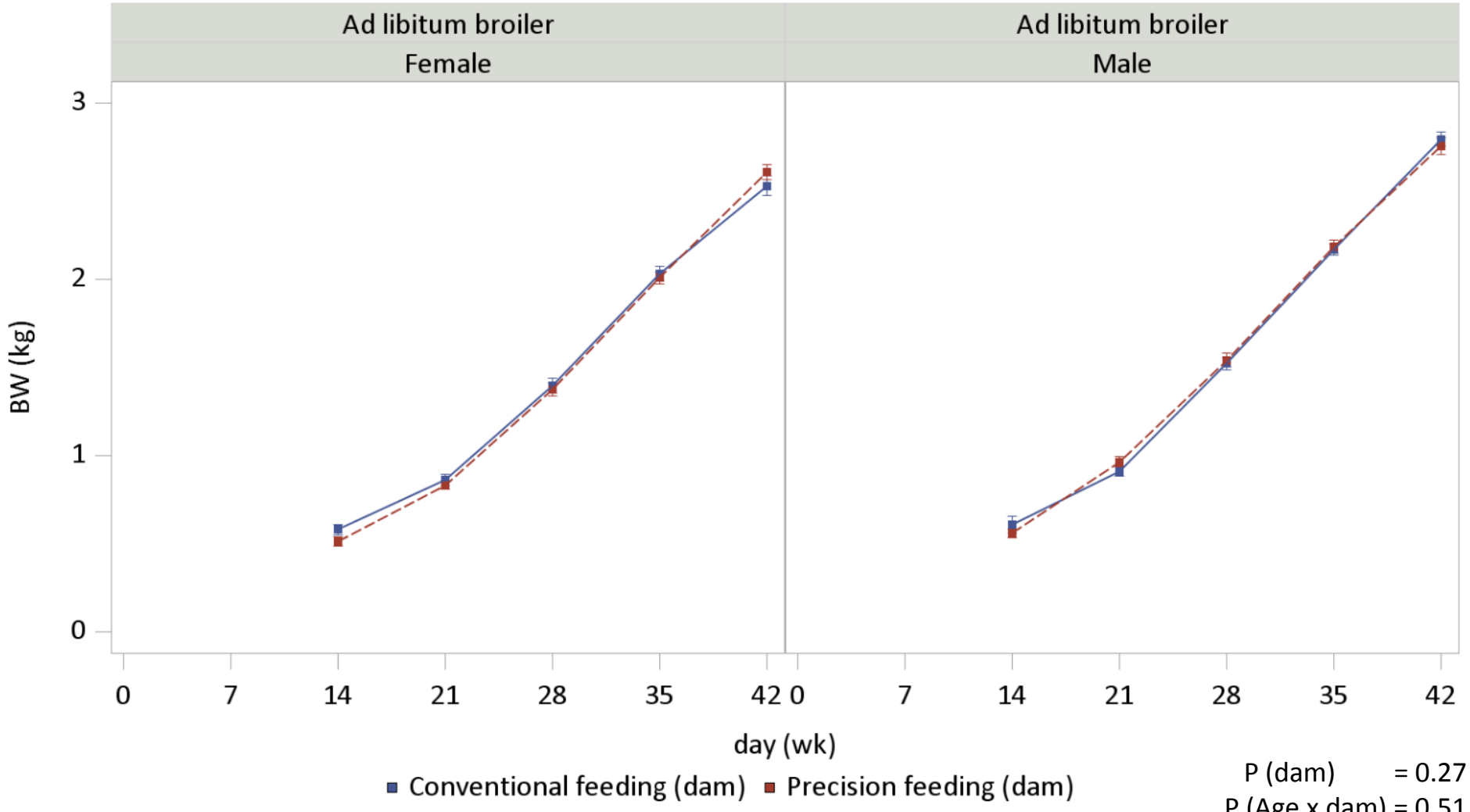
P = 0.046

Effect of Maternal BW on Broiler BW



P (dam) < 0.001
P (Age x dam) = 0.060

No effect of Precision Feeding on broiler BW



P (dam) = 0.27
P (Age x dam) = 0.51

What we need to focus on

- Are broiler breeder hens too lean?
- Is the recommended BW pushing birds towards a physiological limit?
- Where does the improvement in fertility come from, male or female?
- Will partially lifting feed restriction in breeders result in better results in broilers down the chain?

Take home messages

- Higher BW results in consistently good egg production, especially with precision feeding
- Heavier hens result in heavier offspring (broiler)
- Light management is extremely important
- Precision feeding improves fertility

Acknowledgements

Alberta Innovates Bio Solutions

SOFINA

Poultry Research Centre

and all the volunteers that helped during the experiments!

ALMA Alberta Livestock and Meat Agency Ltd.

KARNE MACHINE

Canadian Poultry Research Council / Le Conseil De Recherches Avicoles Du Canada

Canadian Hatching Egg Producers / Les Producteurs d'oeufs d'incubation du Canada

Cargill

DANISCO

DUPONT

TEDC

Alberta Agriculture and Forestry

EGG FARMERS OF CANADA Dedicated to Quality

Xanantec™

Poultry Industry Council

Bourses d'études supérieures du Canada Vanier Canada Graduate Scholarships

Agriculture & Food Council The Catalyst

Alberta Chicken Producers

Ontario Broiler Chicken Hatching Egg Producers Association

Ontario

Aviagen

Cobb

Egg Farmers of Alberta

Thies Electrical Distributing Co.

Alberta Hatching Egg Producers

Contact

- **Sasha van der Klein**

sv1@ualberta.ca

- **Dr. Martin Zuidhof**

mzuidhof@ualberta.ca

Does Precision Feeding make economic sense?

Scenario	Benefits	Net
Females	Chick production Alberta: 145 vs. 115 (>25%) • 30 extra chicks	$19.50/hen
Assuming 50 hens/station, break even cost* per station: $975		
Males	• 68.4 extra chicks per rooster • No replacement males • Feed: efficiency & no spiking	$42.30/rooster 37.62 2.80 1.88
Assuming 50 roosters/station, break even cost* per station: $2,115		

*What you could pay for a station and make back your money in one cycle

Expected benefits (males)

Benefit	Description	Value, $/rooster (chick)
Fertility	+3.8%	37.62 (0.0230)
Efficiency	+3 to 4%	0.85 (0.0005)
Reduced spiking	No extra cockerels (e.g. 40%)	2.80 (0.0017)
	No extra feed for spiking males	1.03 (0.0006)
Environment	Reduced N and P excretion	?
Gut health	Fed several times per day	?
Perception	Care for individual animals, reduced competition for feed	?

- Males perfectly uniform (1% CV)
- Males fed individually at a level that supports activity (libido)