A strategic feeding approach for cage-free laying hens

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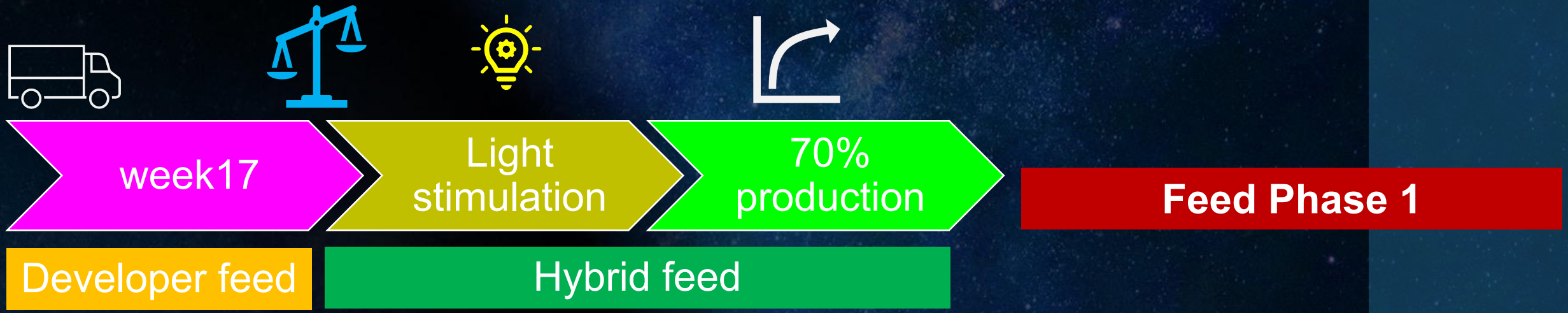
…where we left off…



How should be formulated the new feed?

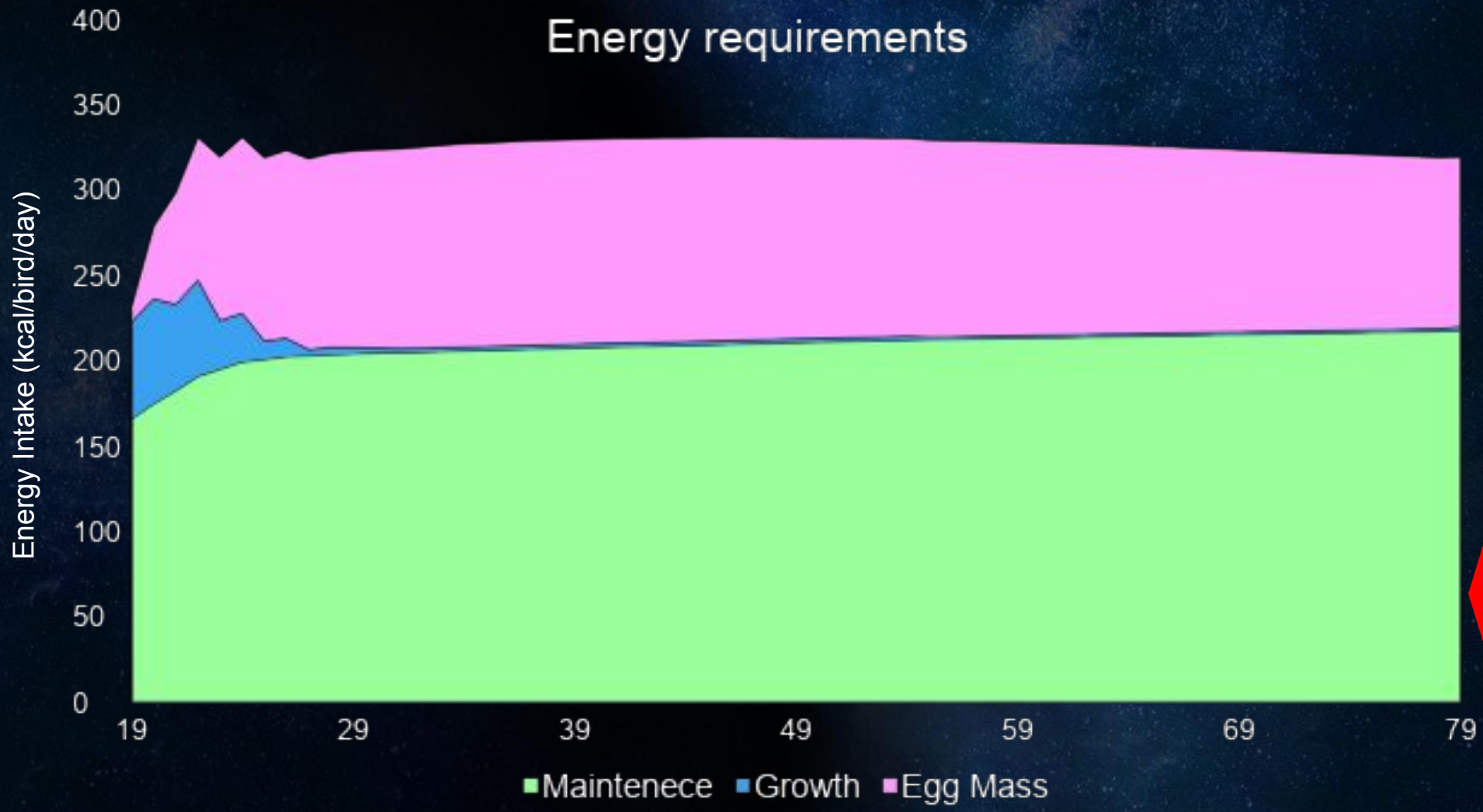
In function of the target feed intake

How is it possible to fix target feed intake?

“Hens eat to satisfy their energy requirements”

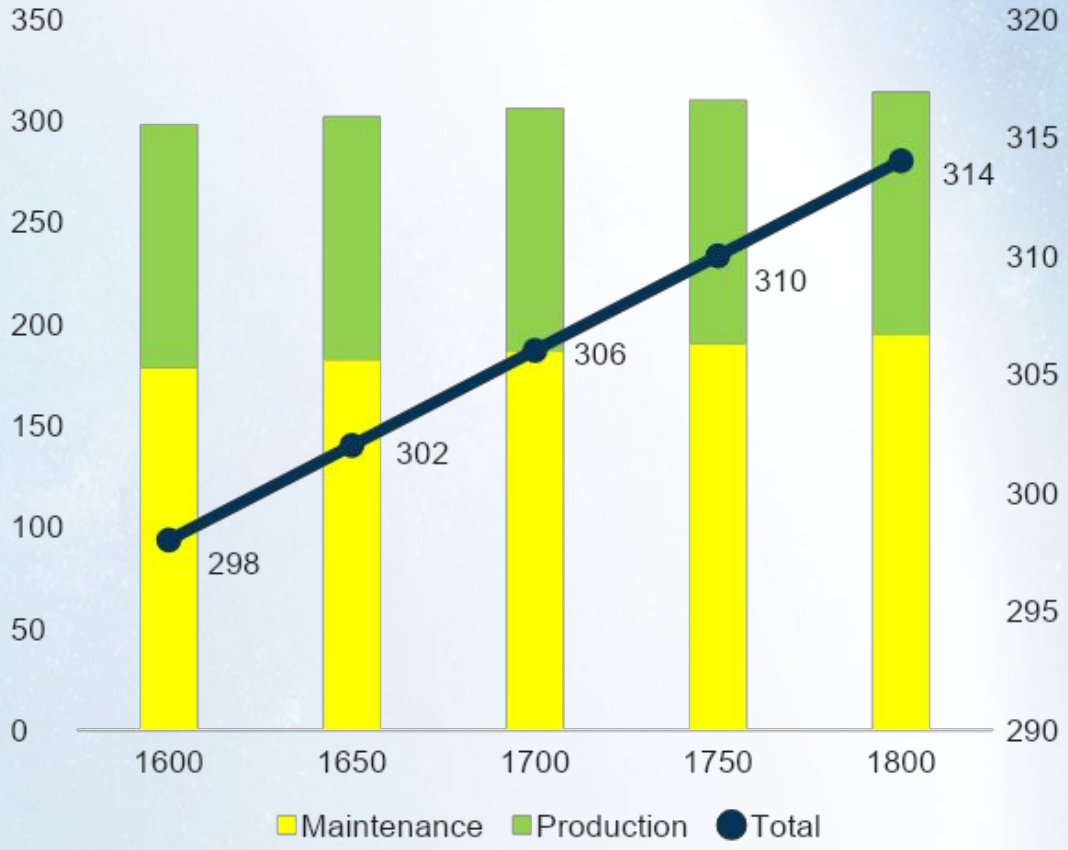
Fuente: Hill et al., 1956

Energy requirements

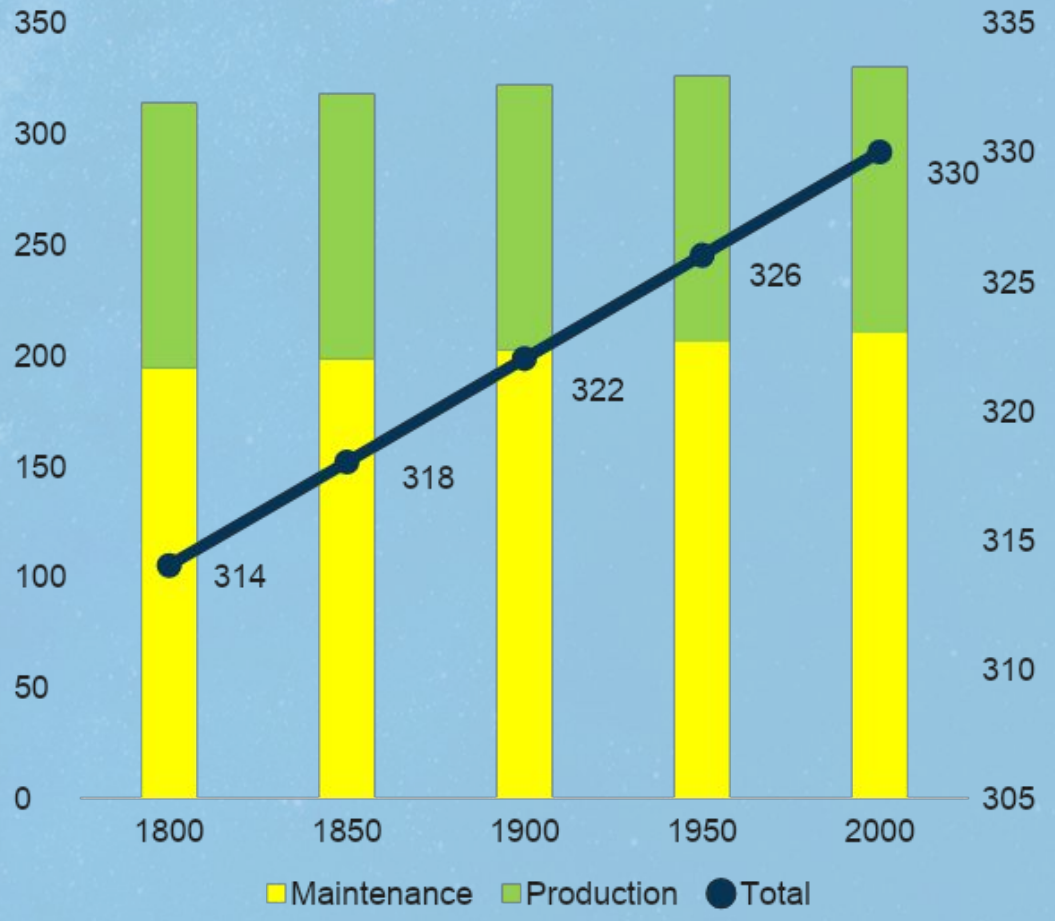


65% energy is for maintenance

WHITE BIRDS

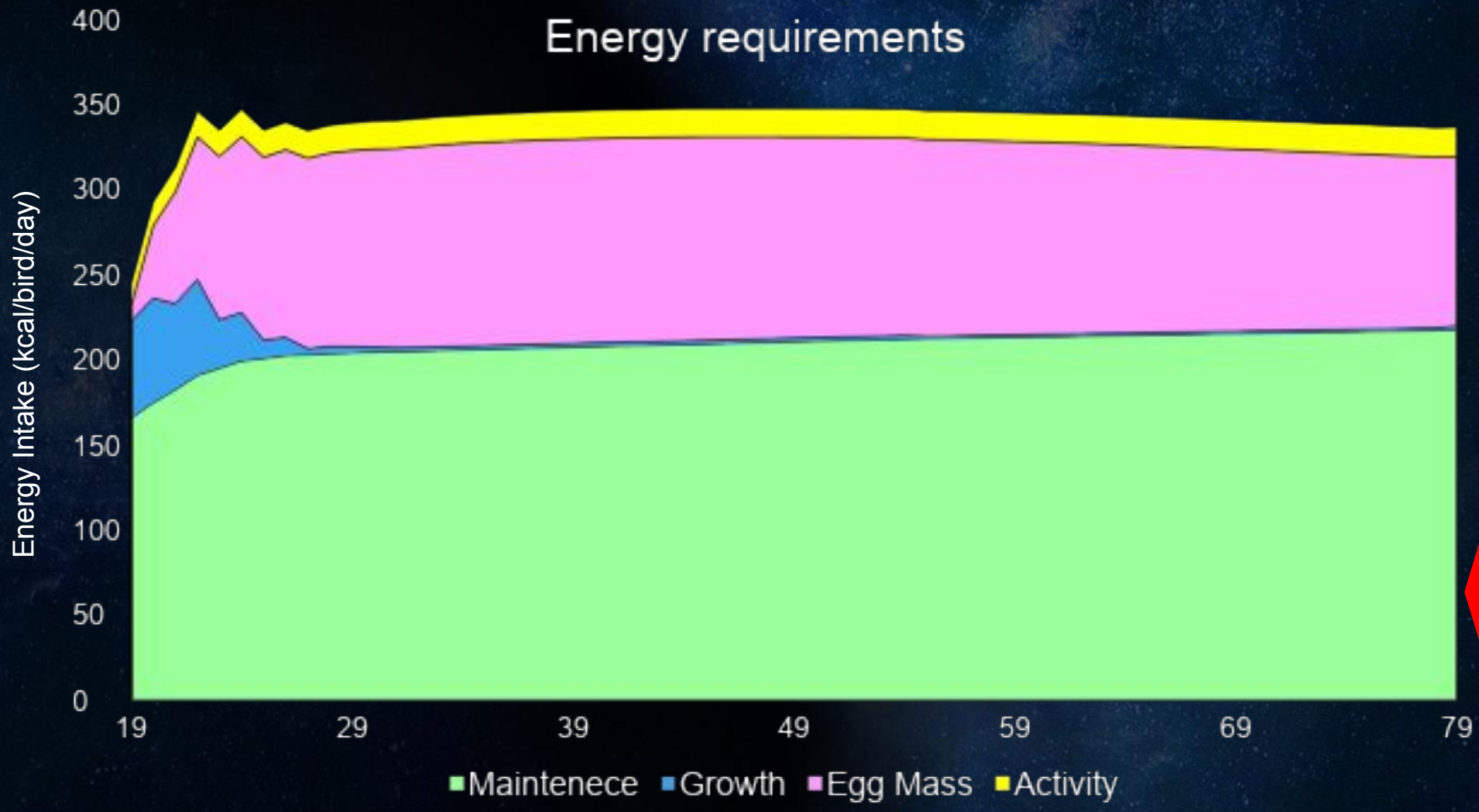


BROWN BIRDS



± 4 kcal/bird/day each 50 g BW

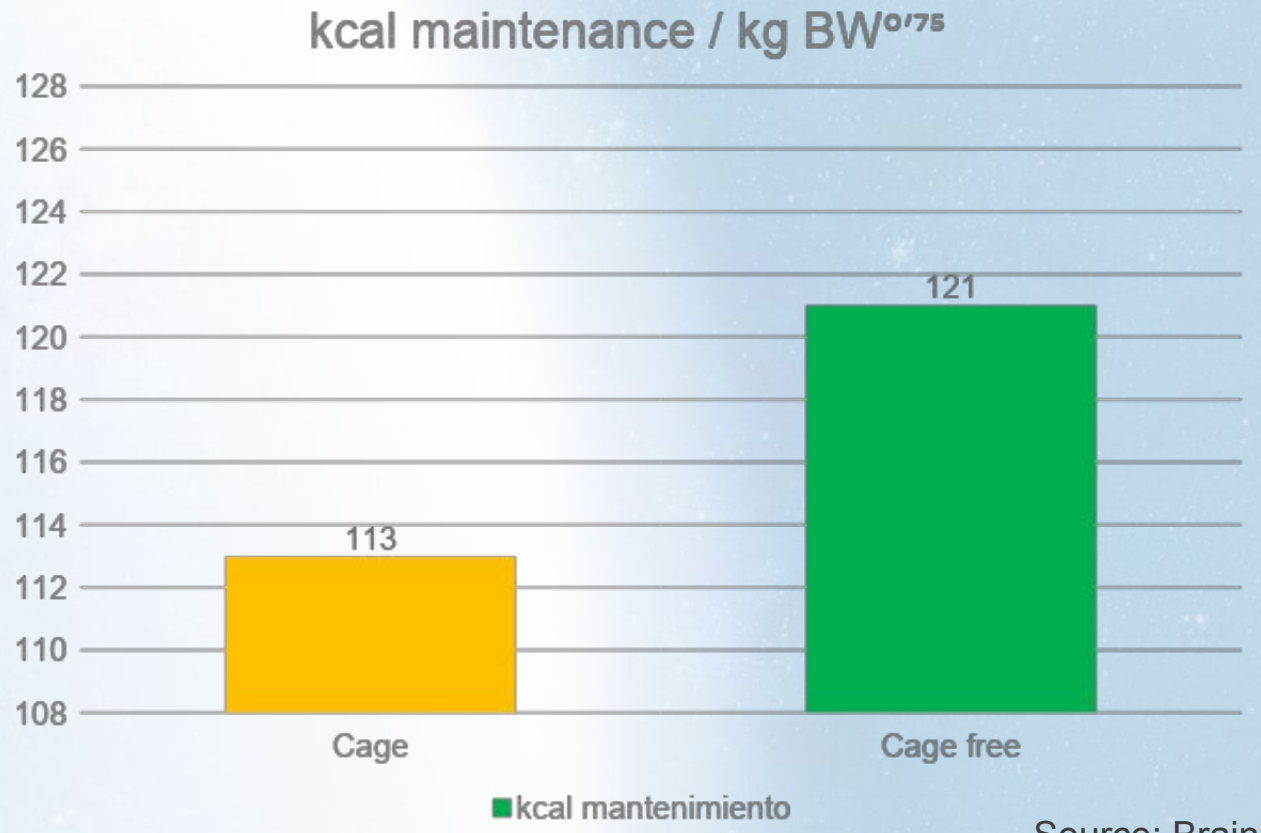
Energy requirements - Activity



65% energy is for maintenance

It will reduce the production if we don't compensate the activity needs.

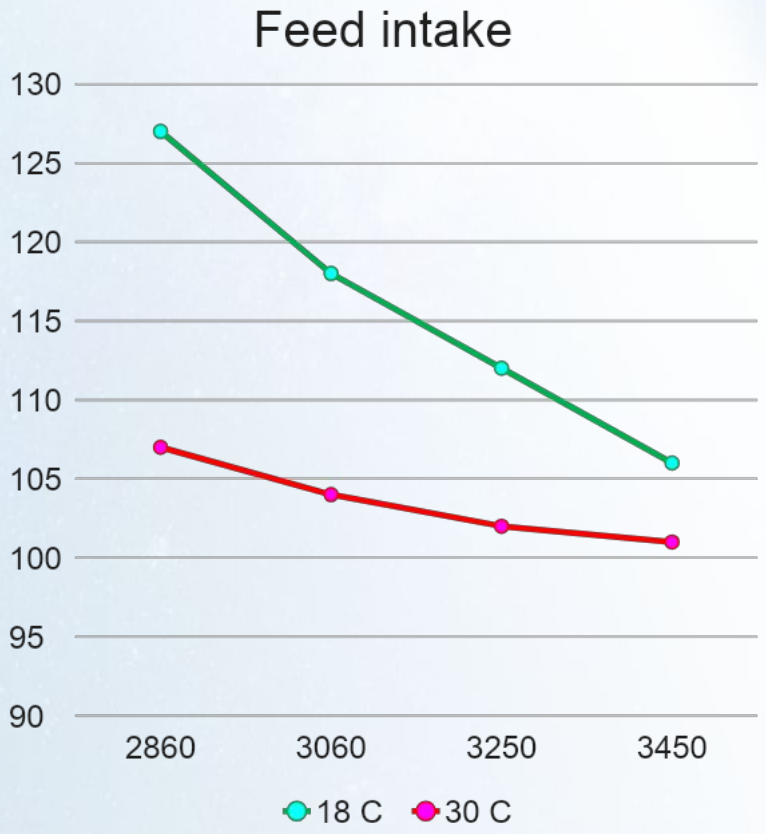
Maintenance requirement vs Activity

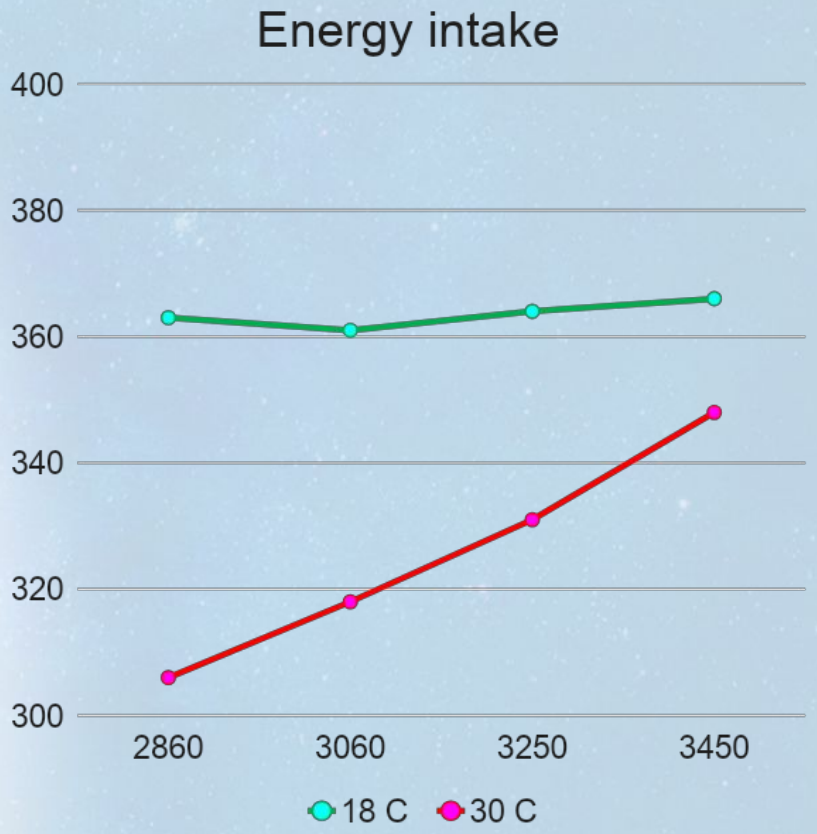


Source: Brainer et al., 2015

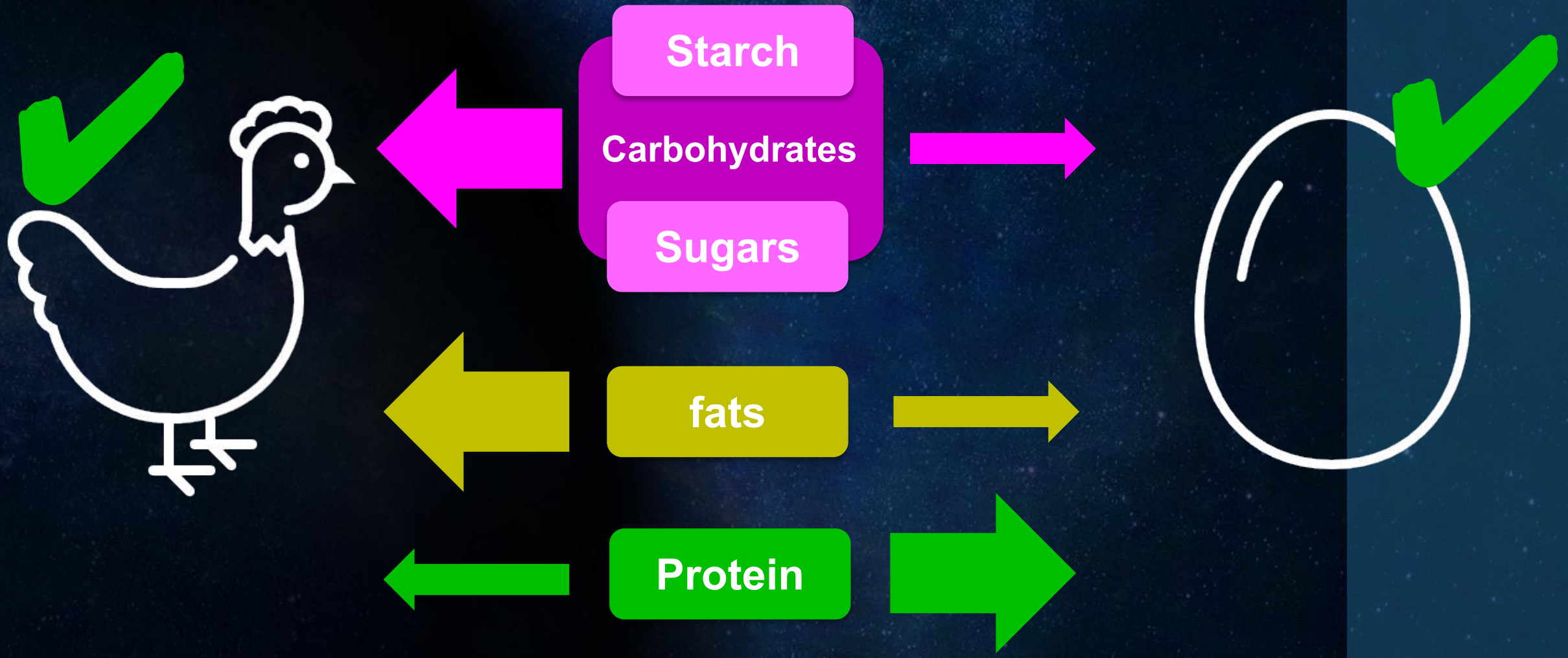
Energy is the driving force

Feed intake controls nutrient intake





Sources of energy in the feed



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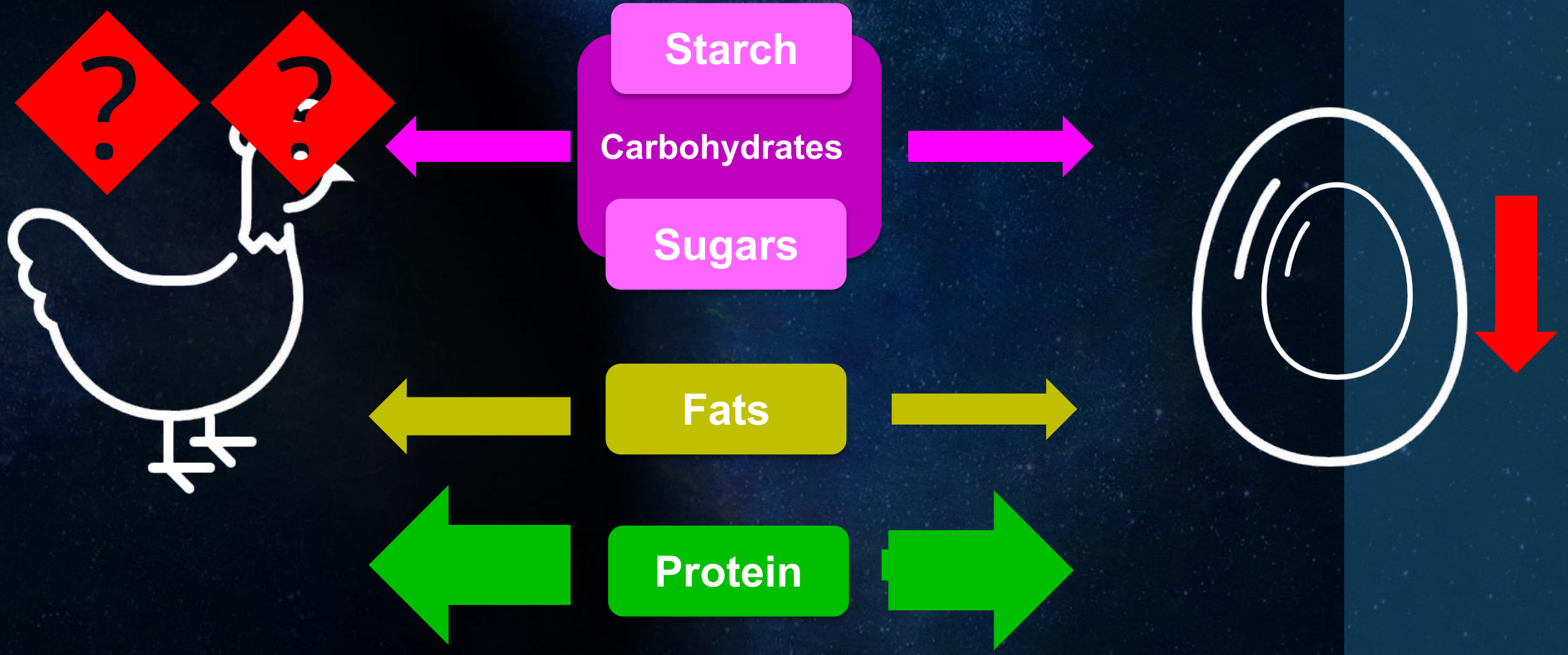
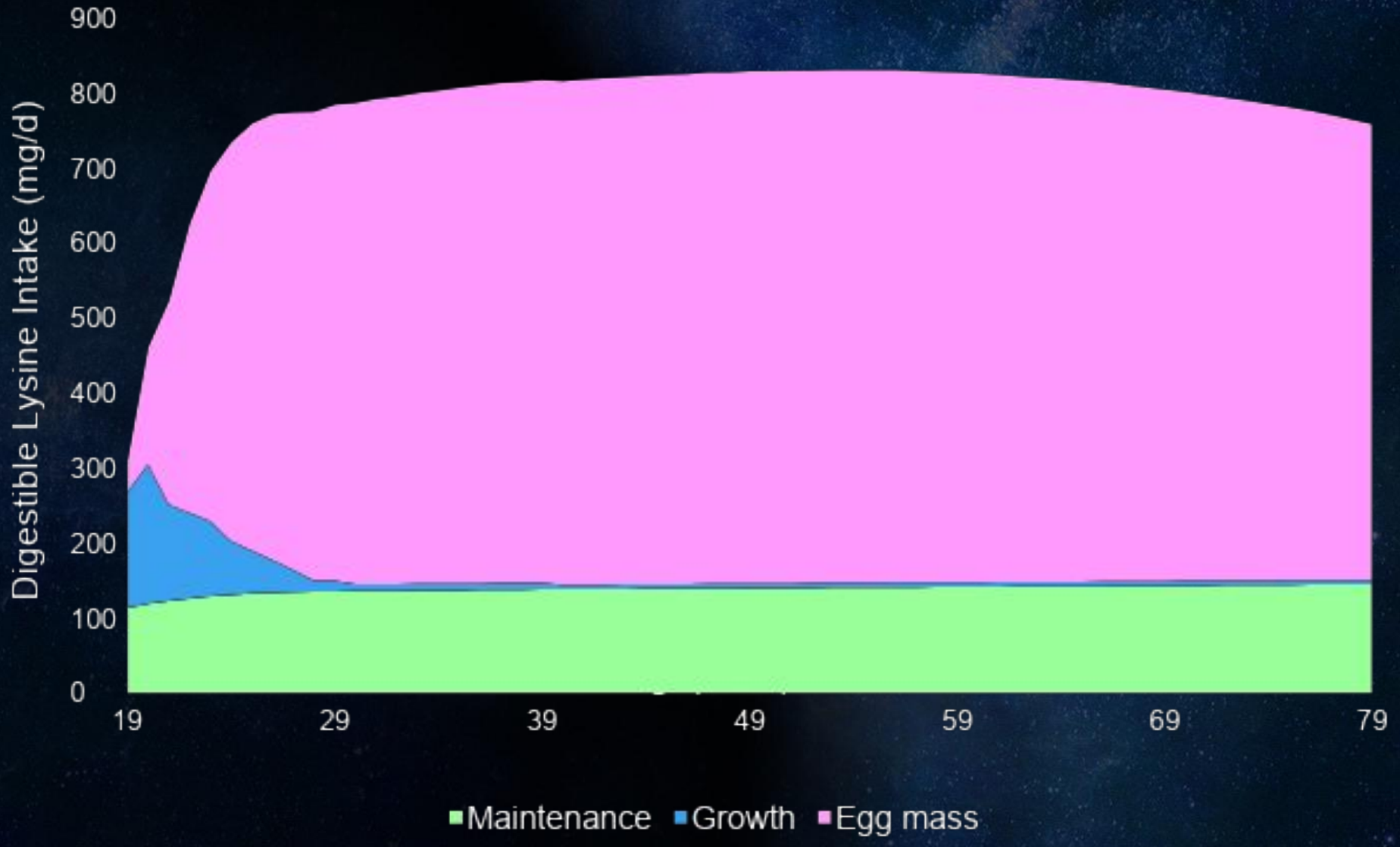


Aminoacids requirements



80% of AA are used for egg weight

Produce the egg size you need

Source: Scappaticcio et al., 2021

Nick chick and egg size

H&N R&d: quickly egg size development trial – part 1

- Housing
  - Number cages: 144
  - Number of birds: 720
  - Feeder space: 9.6 cm / bird (3.78 in)

- Feeding
  - Arrival: **developer feed.**
  - At light stimulation (1250g BW): **Hybrid feed**
  - At 21 weeks changed to **layer 1**
  - At 25 weeks start the **treatments**

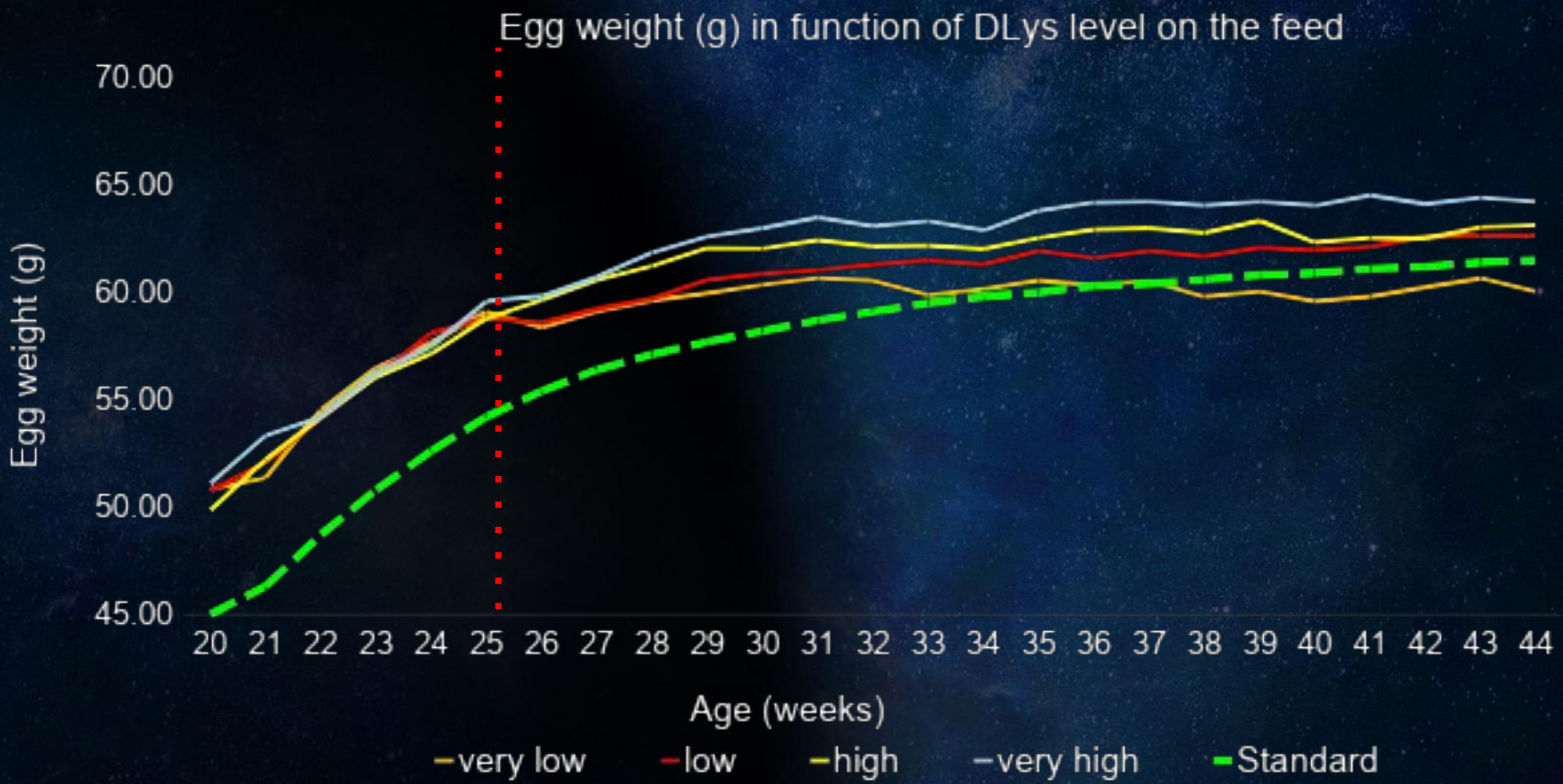
- Treatments
  - Energy: 2810 kcal / kg
  - Amino acids (Lys mg): 590 / 670 / 750 / 830

Light stimulation at:
1250 grams
Light hours at rearing: 12 hours
Stimulation: +2+1+1 / week

Diets used from 25 weeks of age…

Nutrients	Protein			
	Very low	Low	High	Very high
Crude Protein (%)	13.0	14.3	15.5	16.8
Dig. Lys (%)	0.56	0.64	0.71	0.79
Dig. Met (%)	0.32	0.38	0.44	0.50
Dig. M+C (%)	0.52	0.59	0.66	0.73
Dig. Thr (%)	0.42	0.46	0.51	0.55
Dig. Trp (%)	0.13	0.14	0.16	0.18
Dig. Arg (%)	0.73	0.82	0.90	0.99
Dig. Val (%)	0.53	0.58	0.63	0.68
Dig. Ileu (%)	0.46	0.51	0.56	0.62
ME (Kcal/Kg)	2,810	2,810	2,810	2,810
Crude Fiber (%)	2.77	2.70	2.50	2.44
Fat (%)	4.68	4.60	4.60	4.55
Linoleic acid (%)	2.45	2.40	2.40	2.36
Calcium (%)	3.85	3.85	3.85	3.85
Av. P. (%)	0.36	0.36	0.36	0.36

…from 25 weeks of age



Standard performance

Hybrid feed
2,700 kcal
0.80% DLys

Phase 1
2,810 kcal
0.76% DLys

TTO 1 – 2,810 kcal + very high DLys 0.79

TTO 2 – 2,810 kcal + High DLys 0.71%

TTO 3 – 2,810 kcal + Low DLys 0.64%

TTO 4 – 2,810 kcal + very Low DLys 0.56%

TTO 1 – 2,810kcal + very high DLys 0.79

TTO 4 – 2,810 kcal + very lowDLys 0.56%

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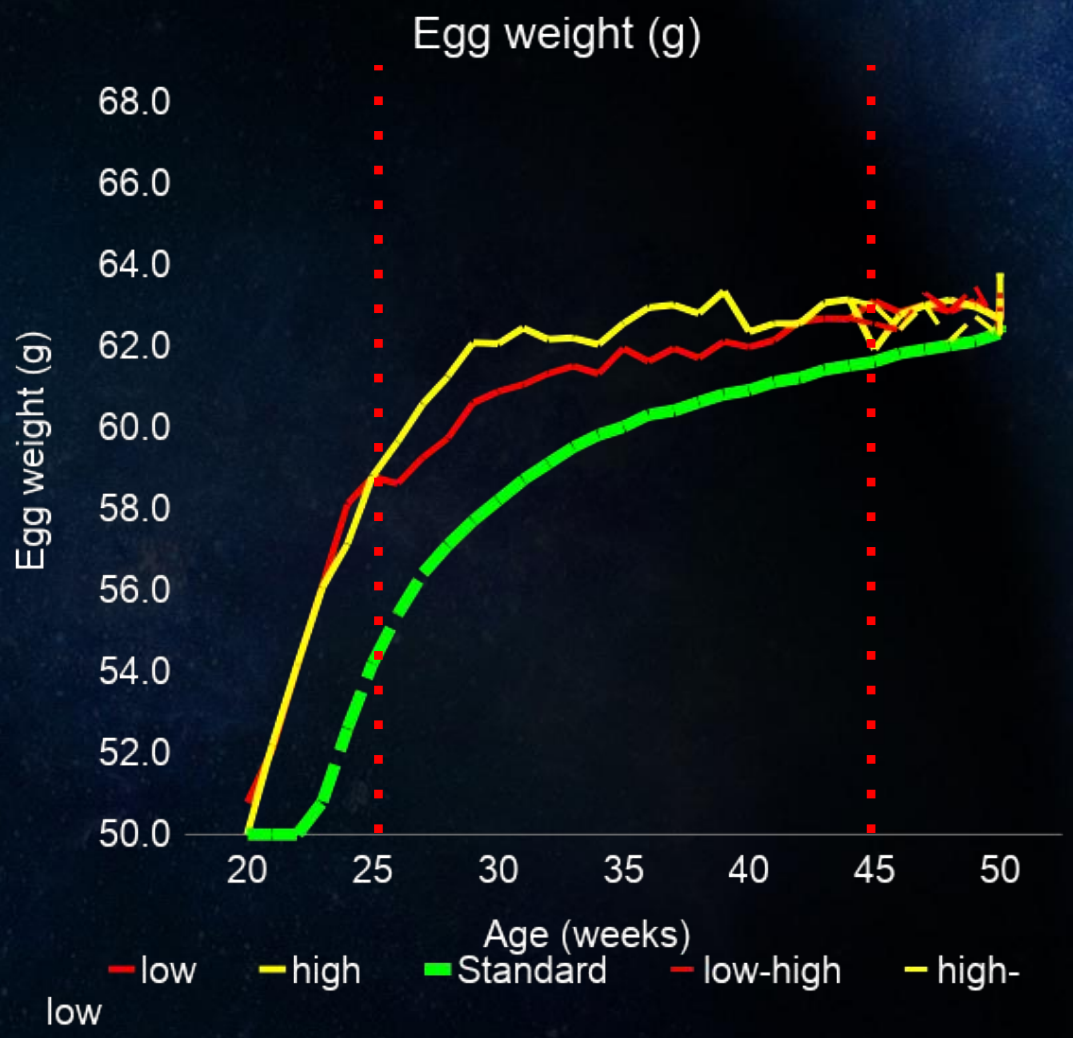
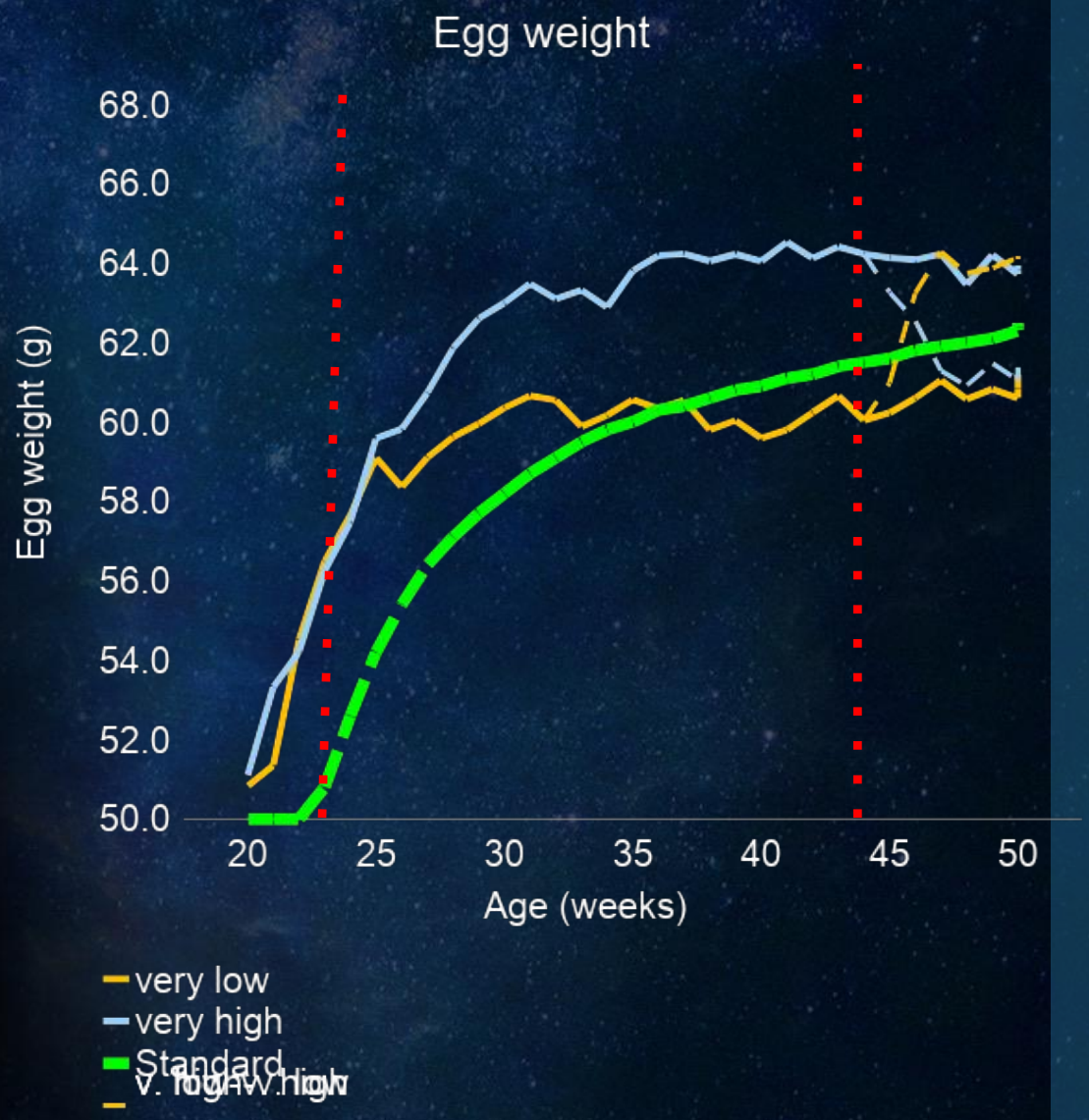
TTO 1 – 2,810kcal + very high DLys 0.79

17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52

Age (weeks)

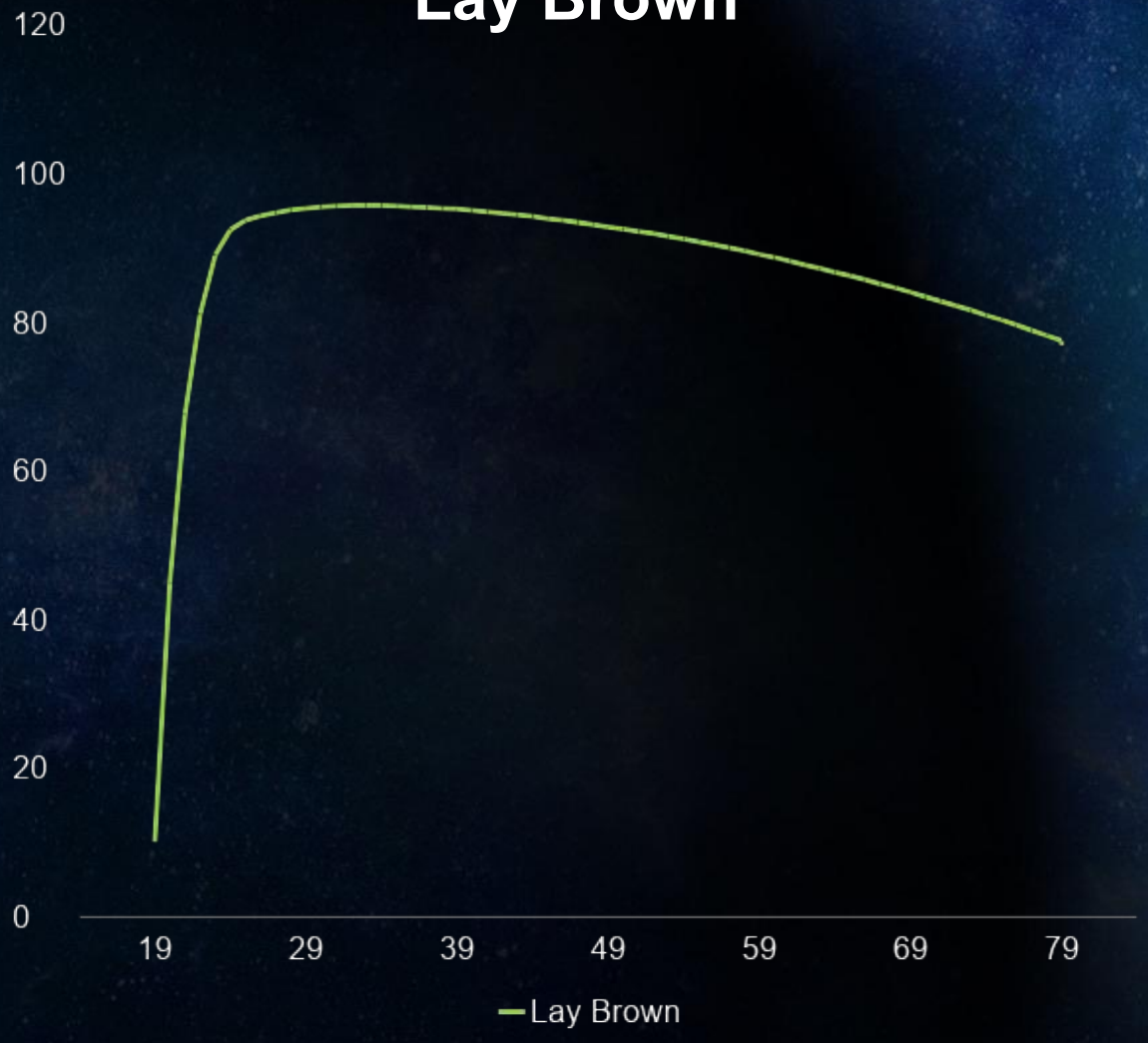
…form 44 weeks of age



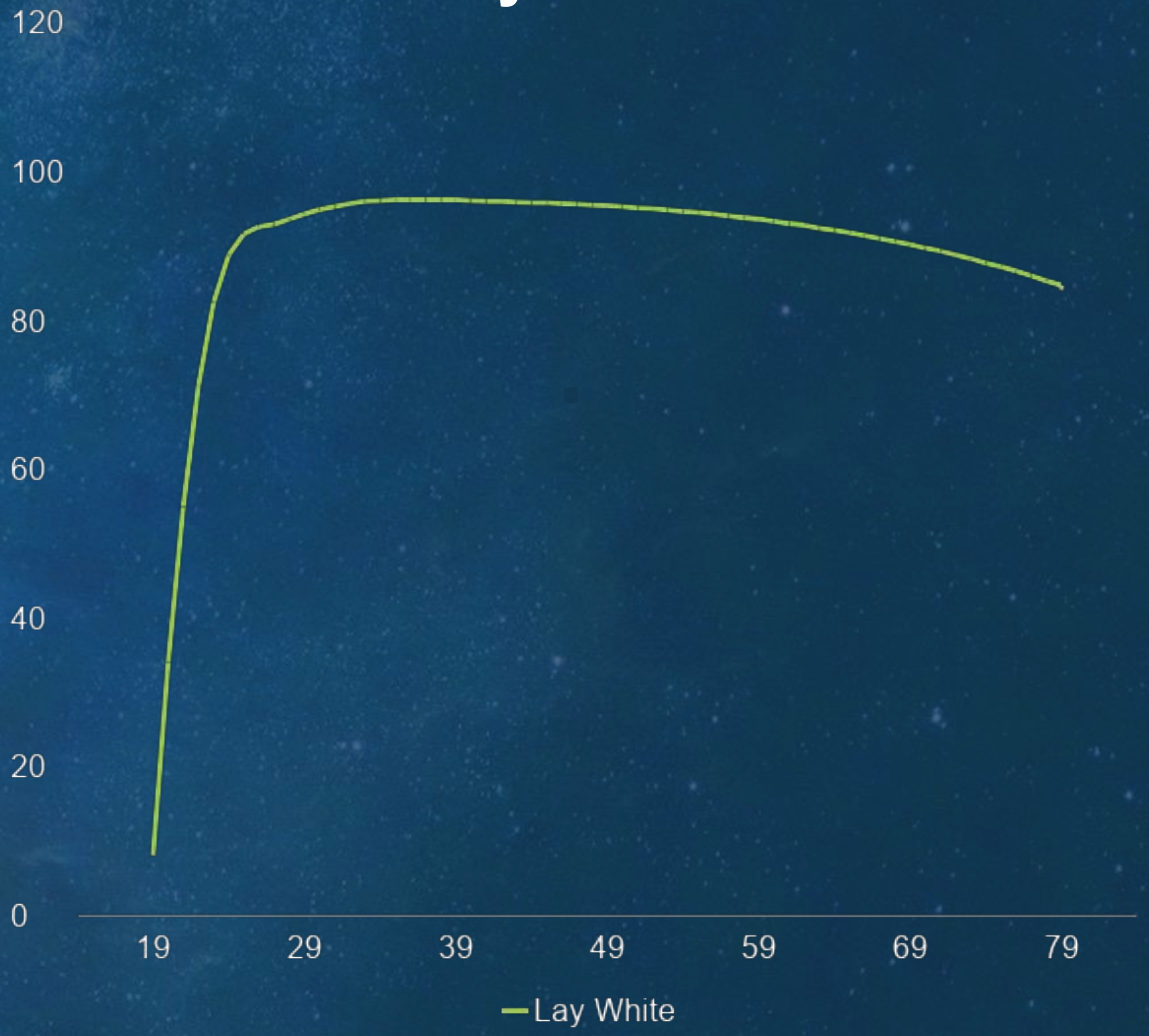


Egg production

Lay Brown

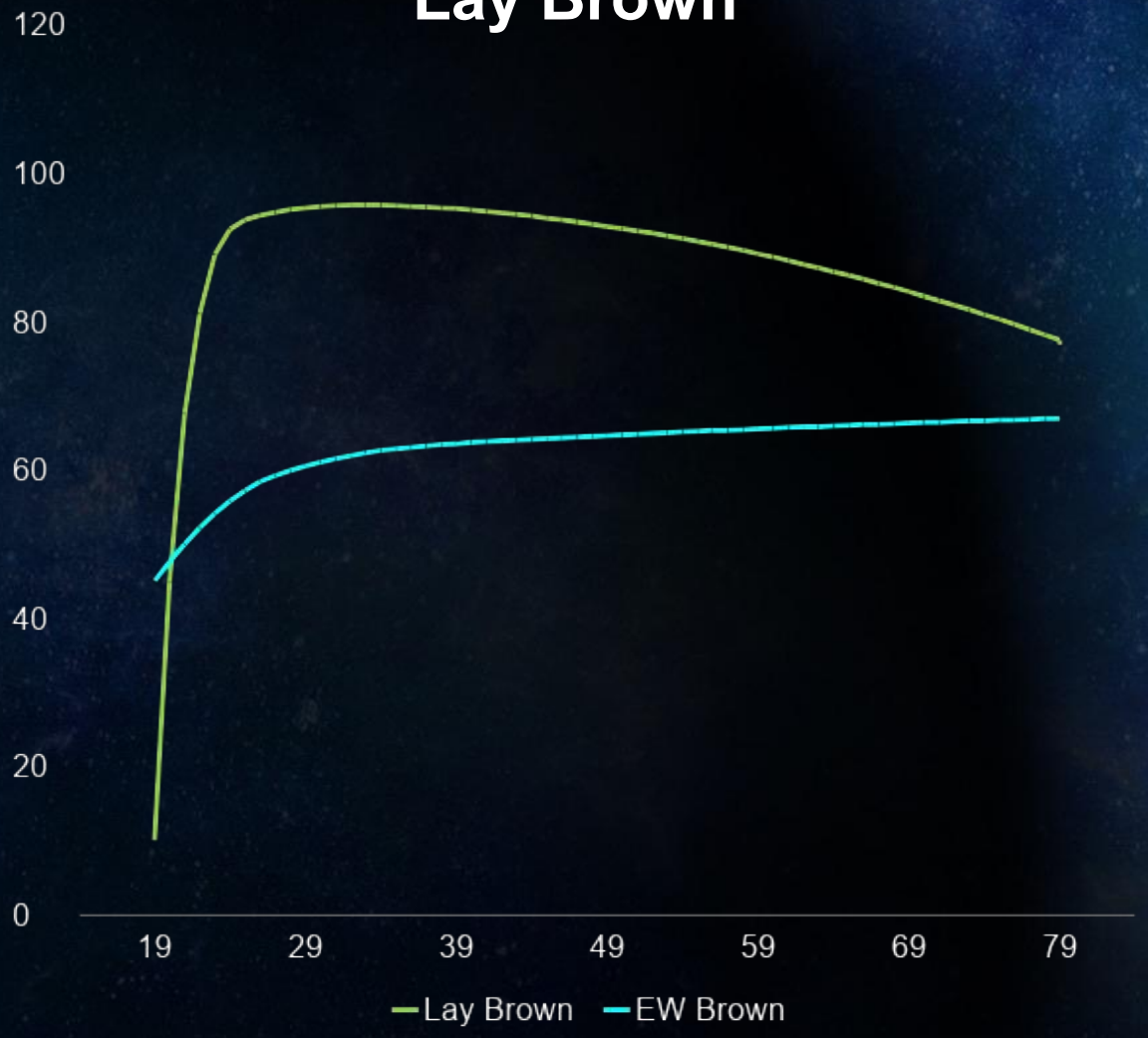


Lay White

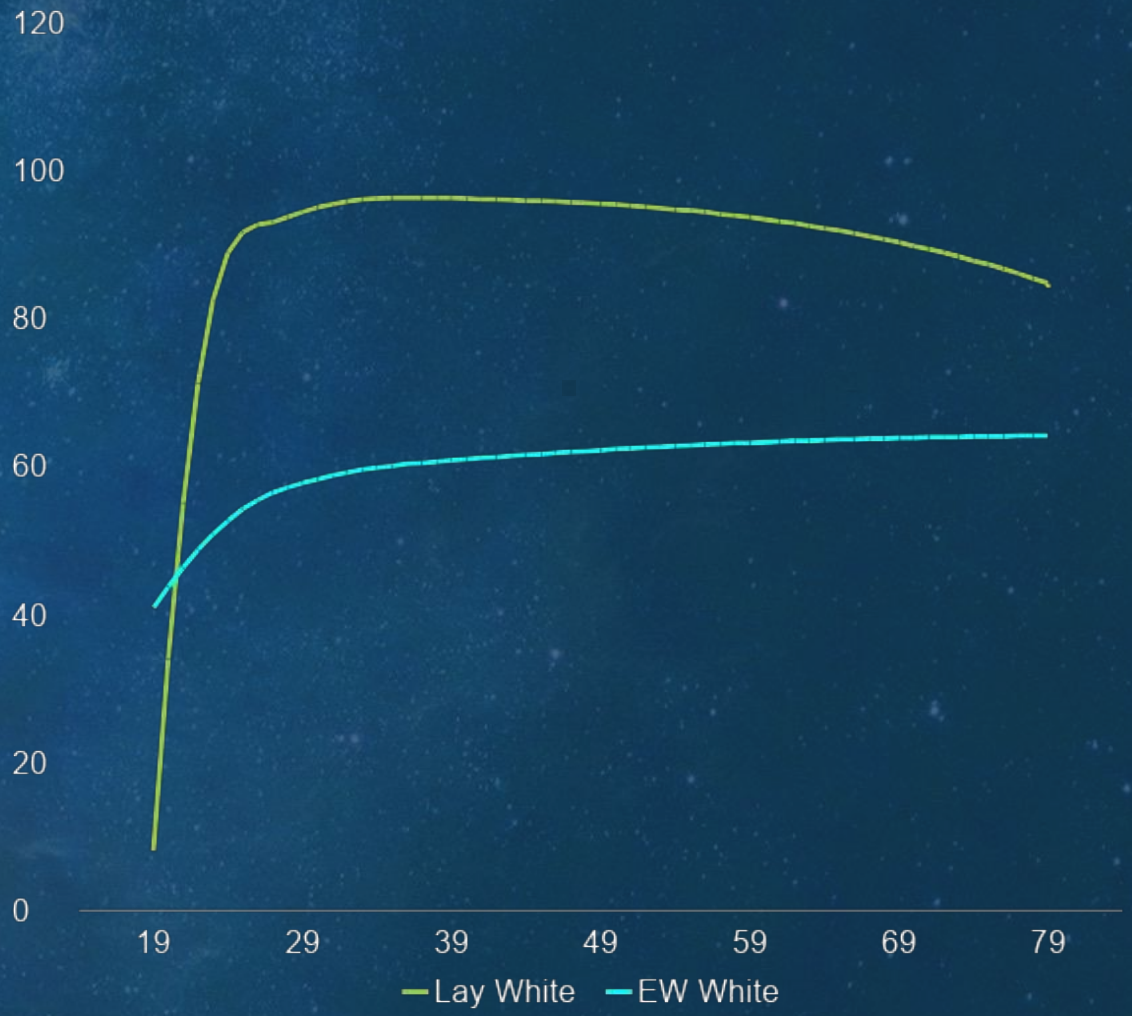


Egg weight

Lay Brown

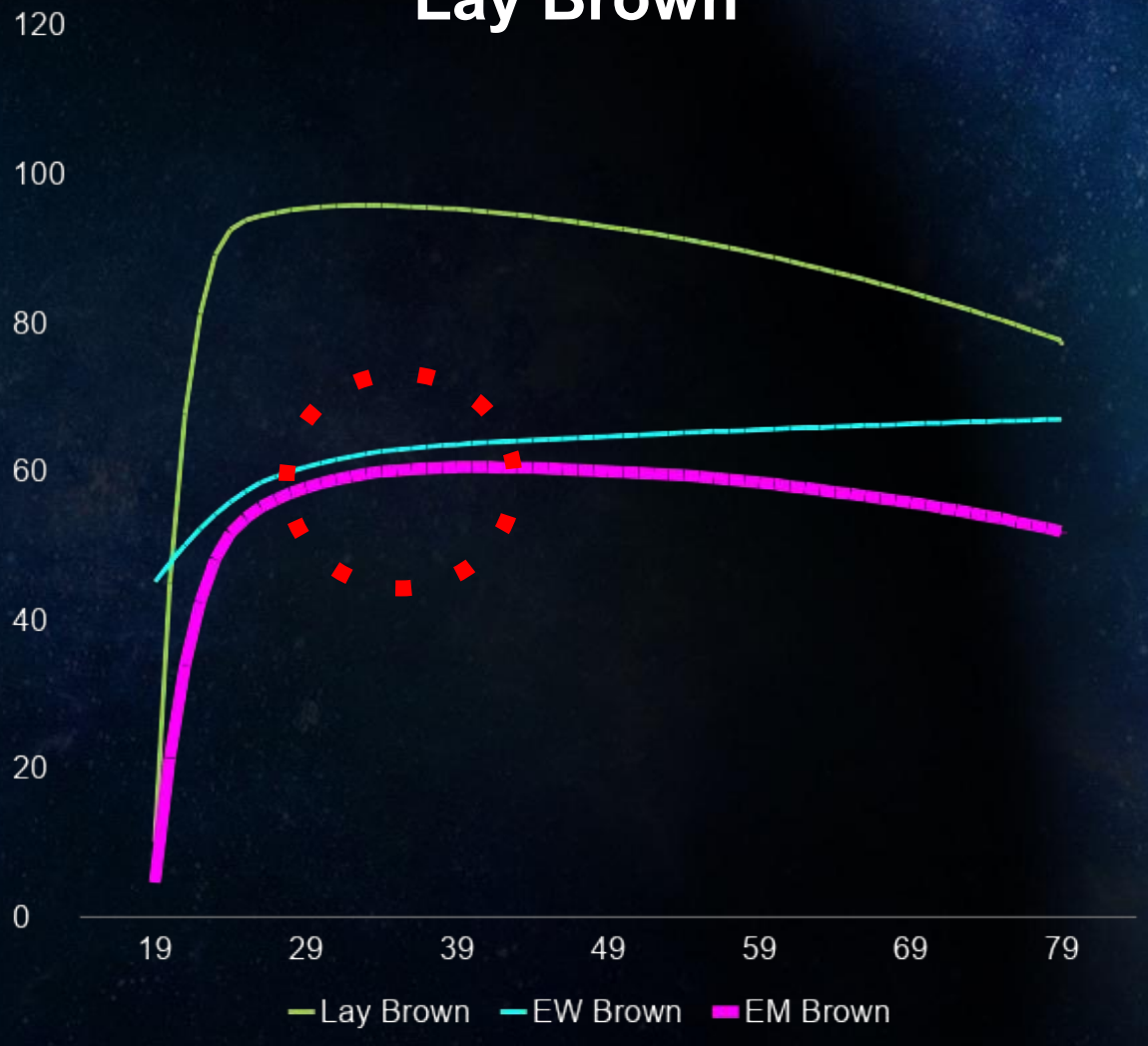


Lay White

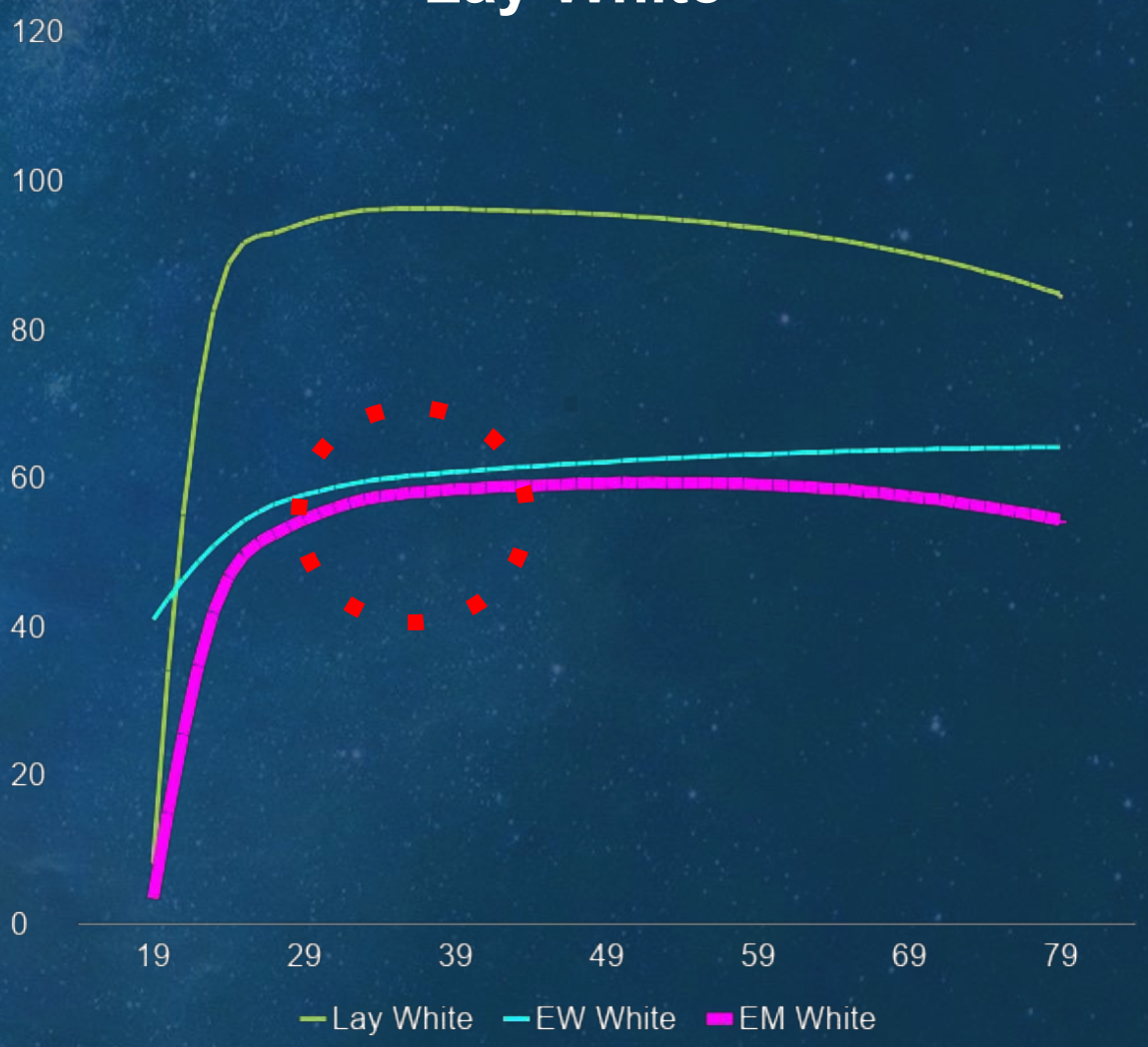


Daily Egg mass

Lay Brown



Lay White



Key amino acids in cage free

Prevention

- M+C: need to be sure we have them. Key in oxidative stress:
  - Effects: mortality and feathering
  - Oxidative stress triggers:
    - High metabolic rate / Disease challenge / Hot / cold temperature / Ammonia
- Tryptophan: key amino acid for keeping bird calm.
  - Correlation between level of Trp and Serotonine in poultry
  - Serotonine lack linked to agressive behavior

Ideal protein

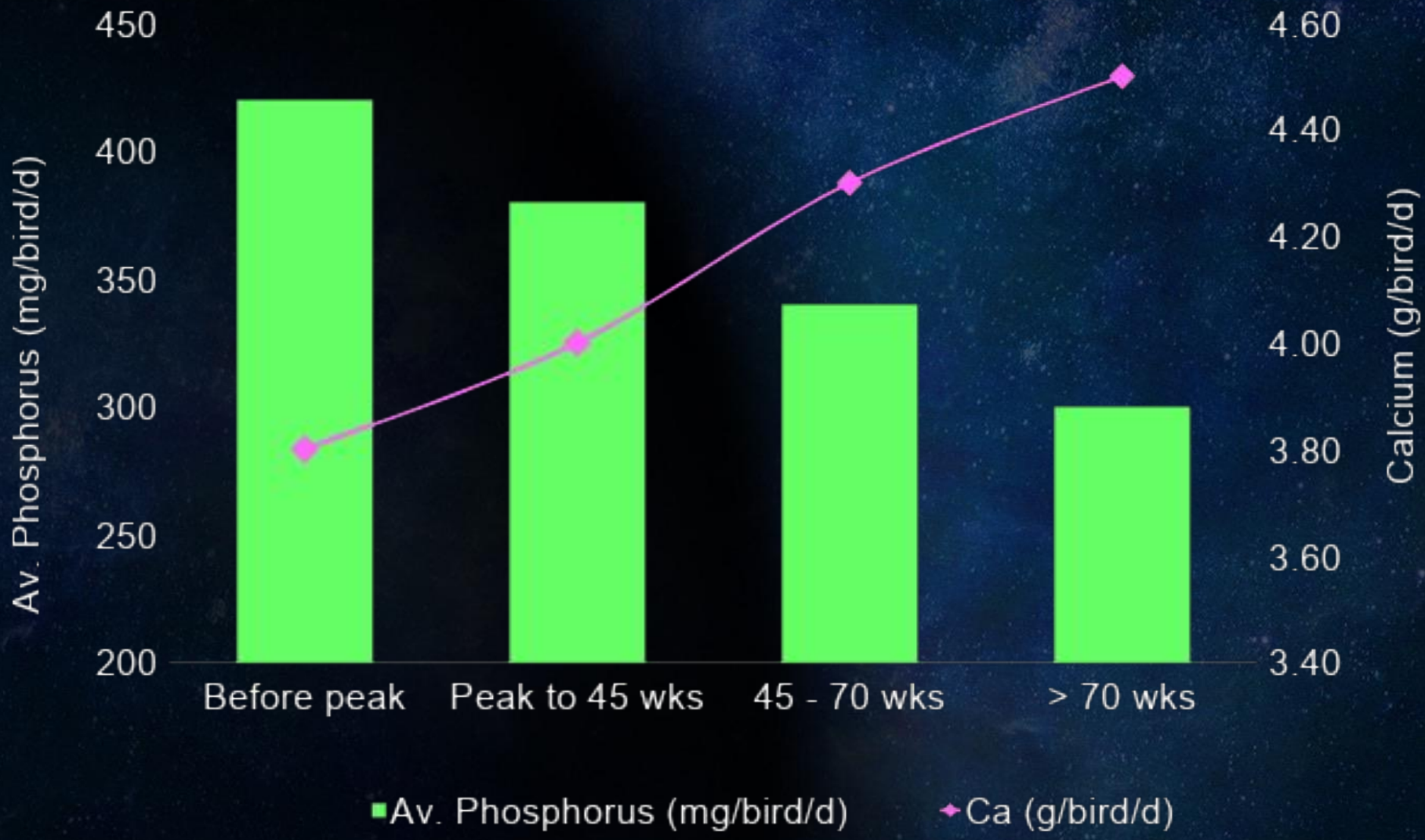
Cage

Amino acid	%
Lys	100
Met + Cys	90
Trp	20
Val	88

Cage Free

Amino acid	%
Lys	100
Met + Cys	92
Trp	24
Val	88

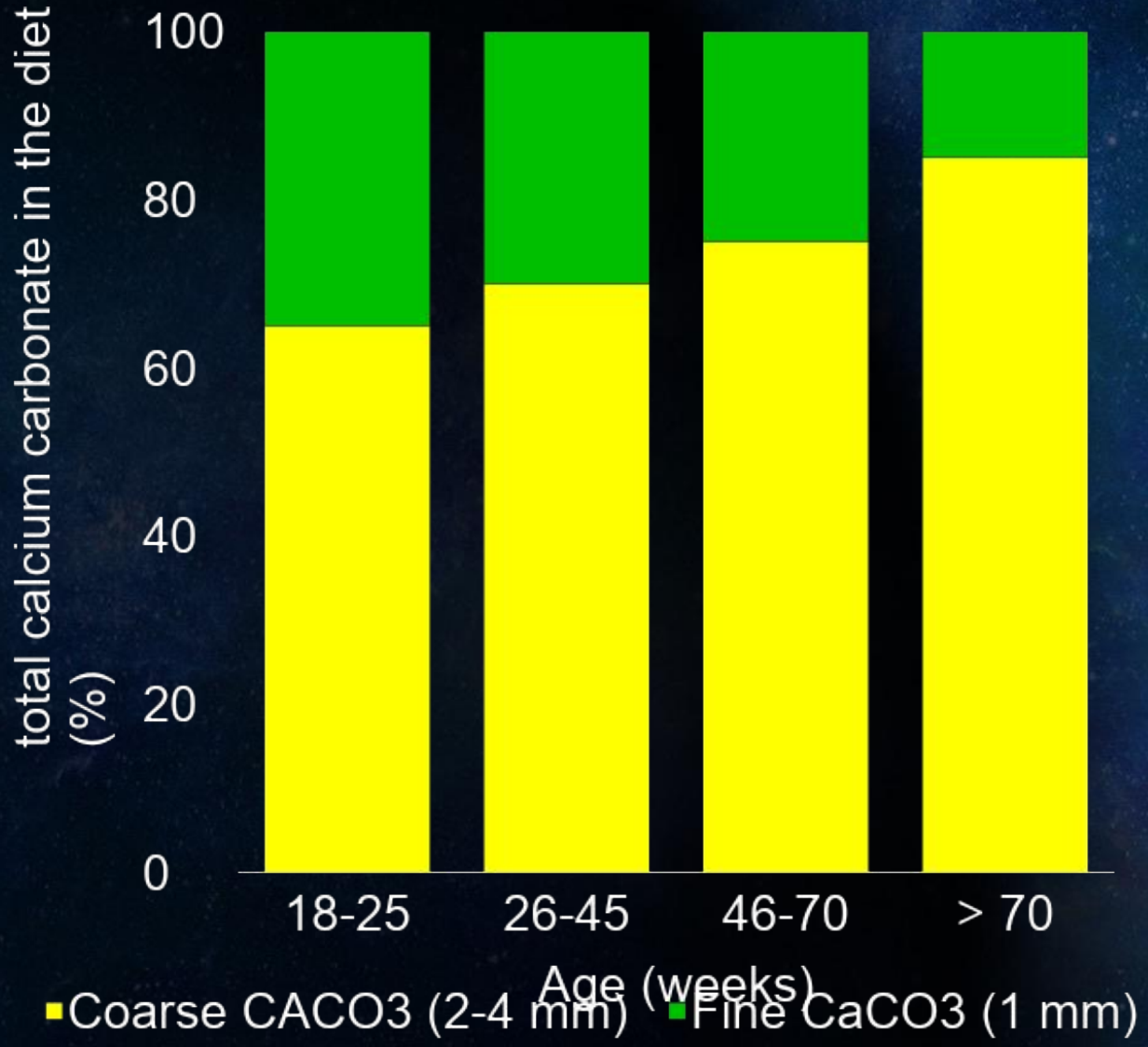
Calcium and Phosphorus



70%

Coarse carbonate

Calcium and age – coarse carbonate inclusion



1. Longer retention in gizzard
   - > Ca during night
   - < Use of medullary bone
2. Increase phytase's activity
3. Improve fluidity of feed

Premix –oxidative stress

Exposure: The birds will be expose to new challenge related (physical activity, exposure to dust, and social interactions)

Vitamins: focus on E and C

- **Vitamin E:** involved in antioxidant system, it needs higher levels than in cage, closer to the PS levels.

- **Vitamin C:** it could be optional but in summertime it should be added in the premix

Minerals: The organic trace minerals have shown better performance in managing oxidative stress in long term production

Gut health: the hens will be in contact with more contaminants than in cage, therefore we need to have in place a program to control any gut health challenge

Feeding program

	Layer 1	Layer 2	Layer 3
Age (weeks)	25-45	46-70	> 70
Feed Intake target (gr)	**120**	**120**	**120**
ME (kcal/kg)	2,750	2,750	2,750
Dig. Lys	0.692	0.692	0.667
Dig. Met	0.346	0.346	0.333
Dig. Met+Cys	0.623	0.623	0.600
Dig. Thr	0.484	0.484	0.467
Dig. Trp	0.152	0.152	0.147
Na	0.15	0.15	0.14
Cl	0.15	0.15	0.14
Ca	3.30	3.50	3.75
Dig. P	0.32	0.28	0.25

Is BW changing?

Check the egg mass

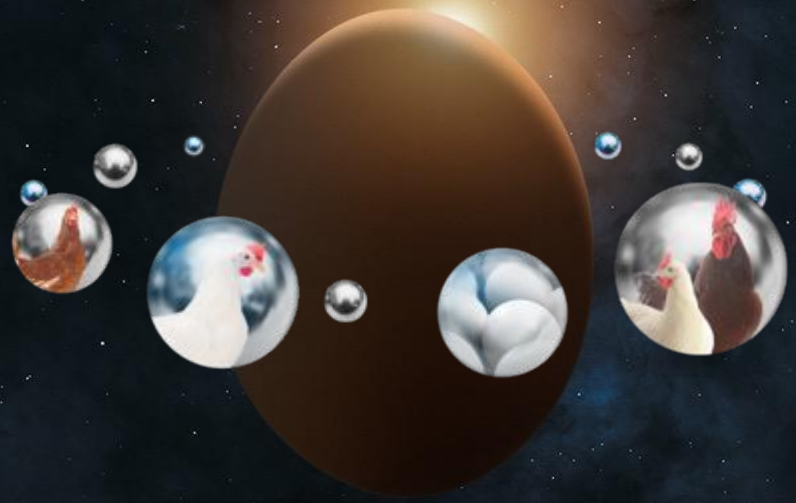
Age

Adapt to the market

Summary – laying phase

- Feed behaviour is even more important in cage free.
- The body weight, egg mass and activity are the factors to define the needs.
- All the layer hen needs a feed intake target.
- Feeding program doesn’t change much:
  - ✔ Energy depends on BW
  - ✔ Amino acids on egg mass
  - ✔ Ca and P on age.

Thank you for your attention



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