Nutrition in production

Ahmet Akpulat & Xabier Arbe
Technical Service Nutrition

Profit unit

House vs bird

Why extending production?

	Farm A	Farm B
DOC cost	1.00	1.00
Longevity	85	90
EHH	391.9	414.9
Housing cost / bird	15	15
Feed cost rearing	355	355
Feed cost production	350	350
Feed intake	115	115
Total feed intake	57.16	61.18
Kg feed / egg	0.146	0.147
Cost of production / egg	**0.0714**	**0.0711**
Cost production / dozen	0.857	0.853

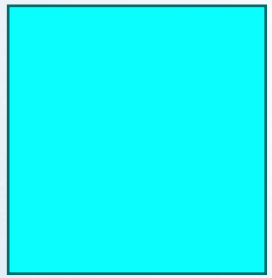
Feed or chick price

What happens if we increase 5%?

	Farm A	Farm B
DOC cost	1.00	1.05
Longevity	85	85
EHH	391.9	391.9
Housing cost / bird	15	15
Feed cost rearing	355	355
Feed cost production	350	350
Feed intake	115	115
Total feed intake	57.16	57.16
Kg feed / egg	0.146	0.146
Cost of production / egg	0.0714	0.0716
Cost production / dozen	0.857	0.859
		0.2%

	Farm A	Farm B
DOC cost	1.00	1.00
Longevity	85	85
EHH	391.9	391.9
Housing cost / bird	15	15
Feed cost rearing	355	355
Feed cost production	350	368
Feed intake	115	115
Total feed intake	57.16	57.16
Kg feed / egg	0.146	0.146
Cost of production / egg	0.0714	0.0740
Cost production / dozen	0.857	0.888
		3.6%

Unit profit



Cost 90 euro / cage

Birds	Cost	Investment / birds	Invest / bird	Eggs / hen housed	Eggs / year	Number eggs / year	Cost cage /egg		
6	90	15	0.750	400	245	1468	0.0005		
7	90	12.86	0.643	400	245	1713	0.0004	-0.0001	-27%
8	90	11.25	0.563	400	245	1958	0.0003	-0.0002	-44%

500,000 eggs per day:

You save 100 euro / day

You save 36,500 euro / day

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…where we left off…

week17 → Light stimulation → 70% production

desarrollo | Alimento hibrido

layer 1

formulated based on target intake

How can we regulate bird feed consumption?

"*Birds eat primarily to meet their energy needs.*"

Hill et al., 1956

Target intake

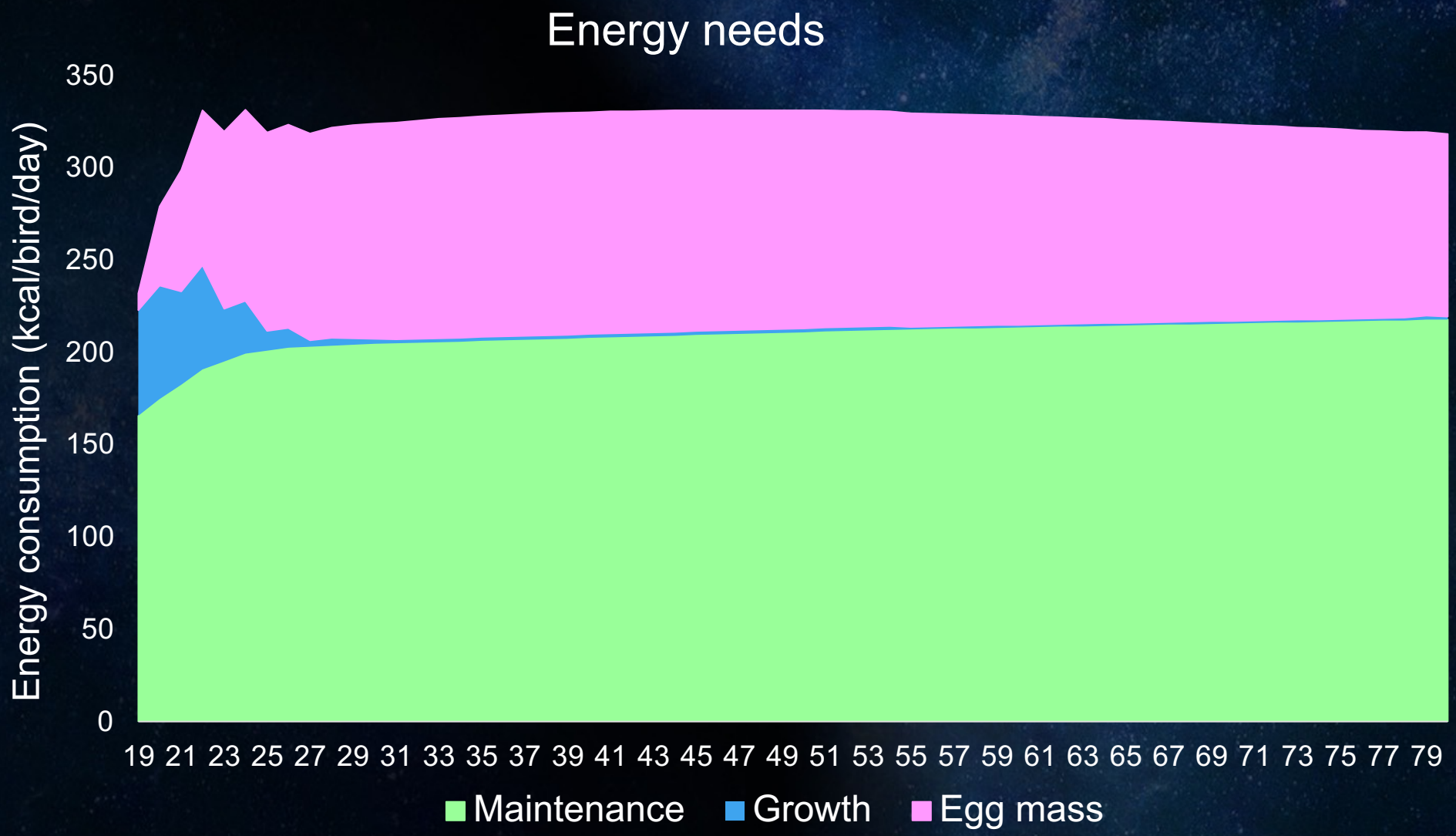
Layer feed isn’t broiler feed

	USA	Turkiye
Nick chick	105	115

	Philippines	Turkiye	Netherlands
Super Nick	110	115	120

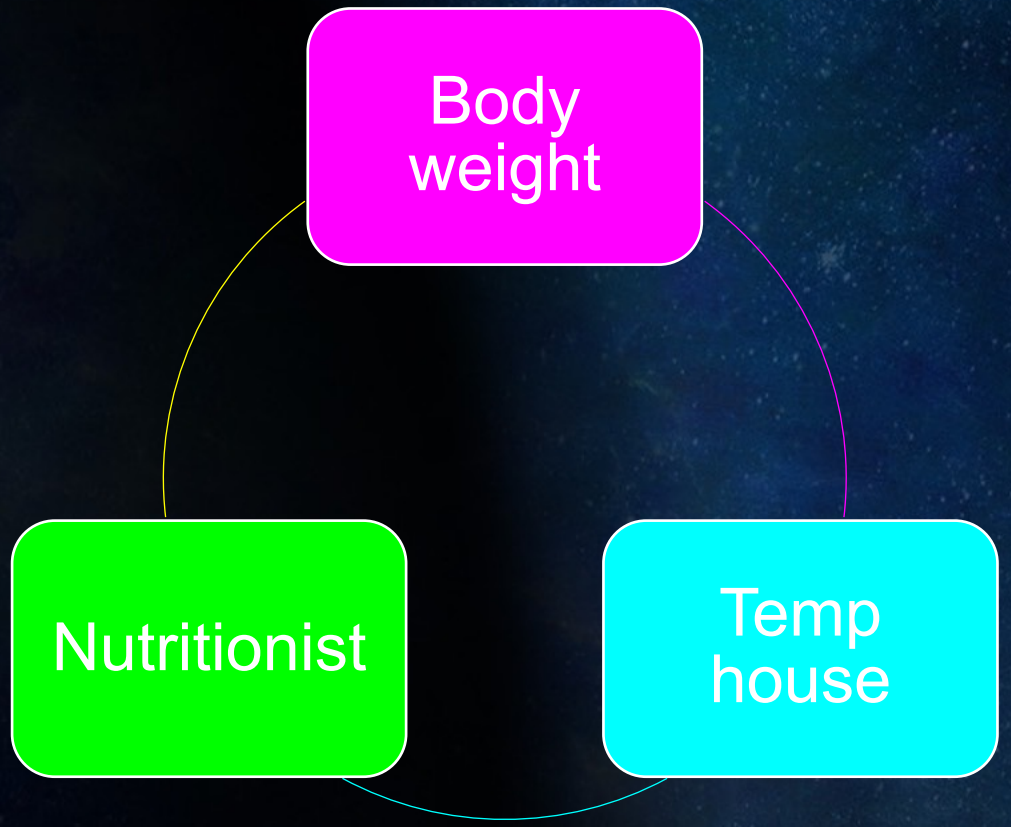
	Thailand	Turkiye	Netherlands
Brown Nick	110	115	125

Using energy from diet

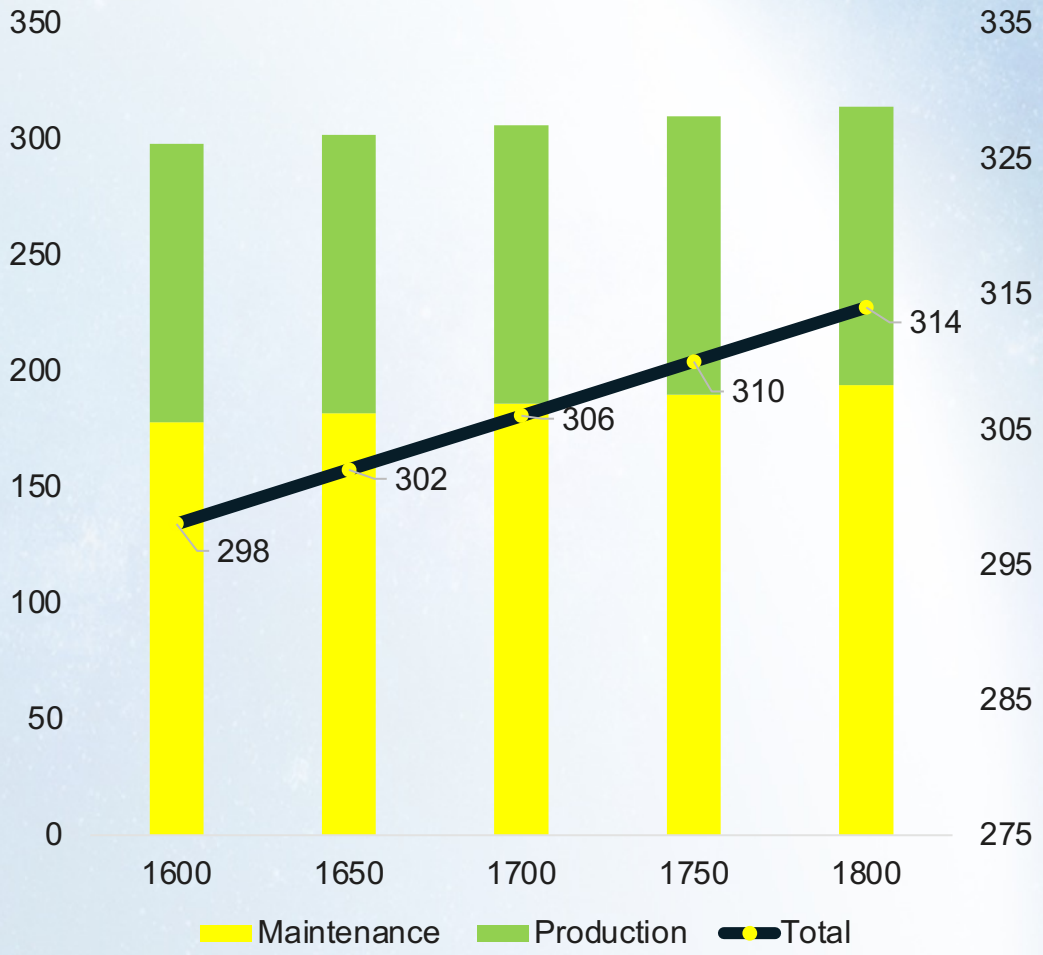


65% of energy is for maintenance.Production reduction if we do not compensate for the needs

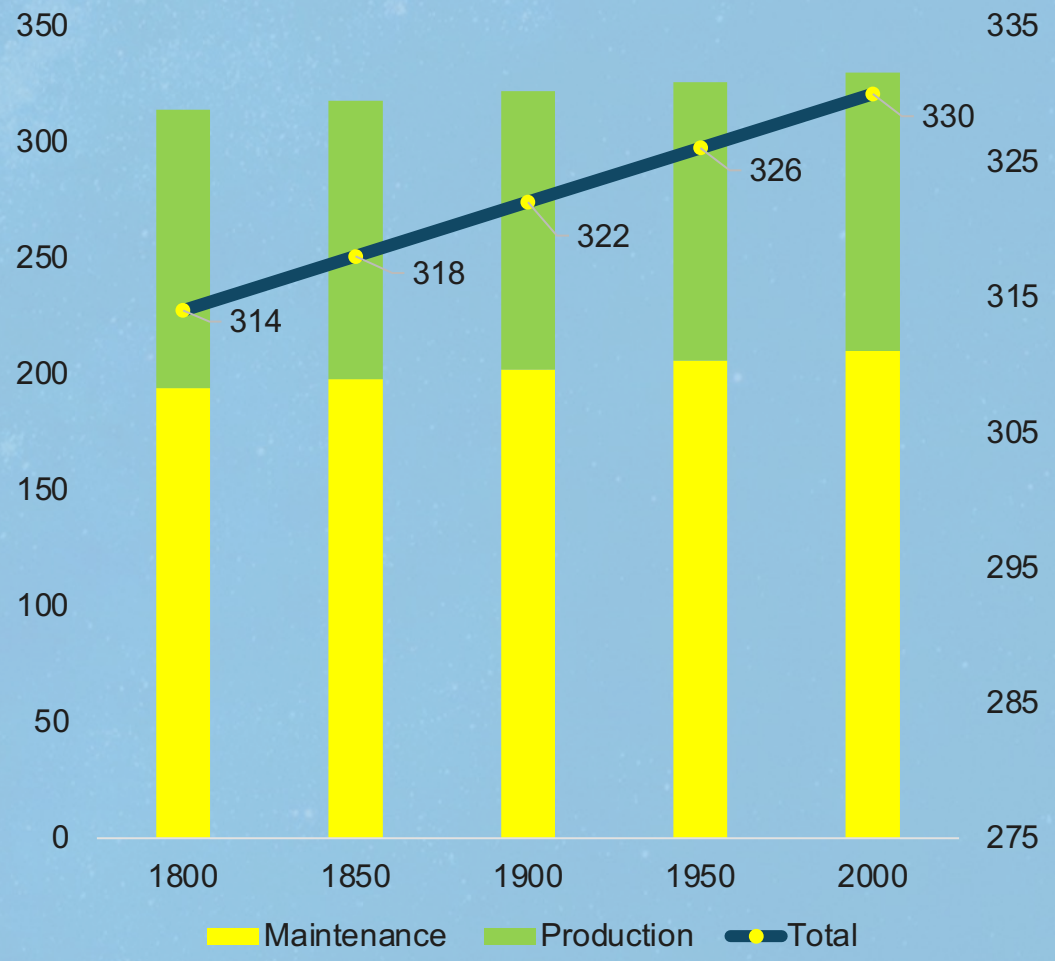
Energy needs vs target feed intake



White layers



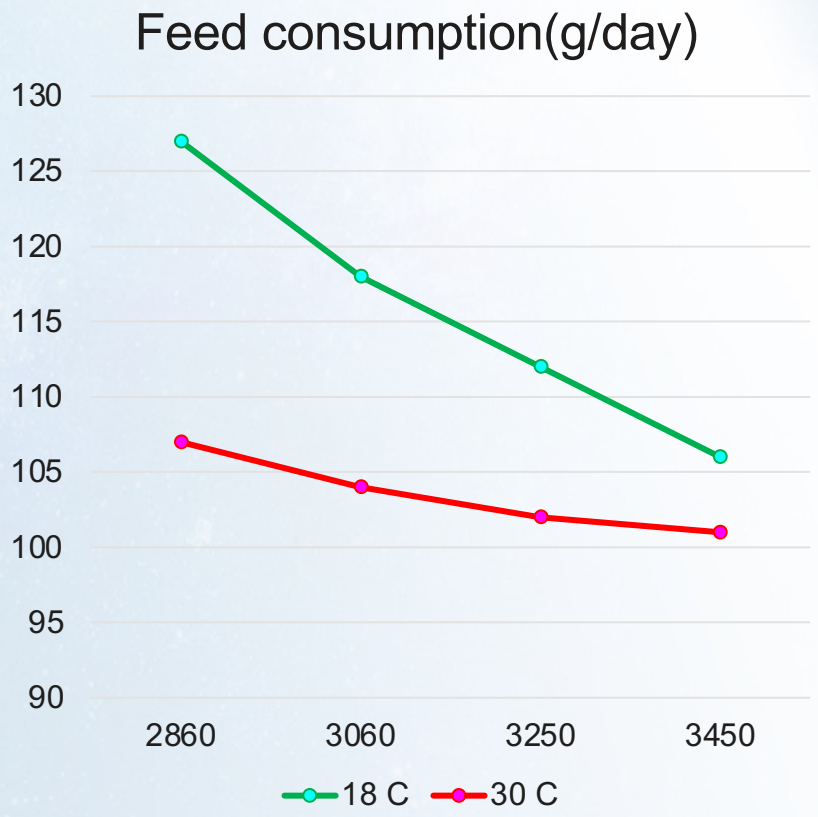
Brown layers

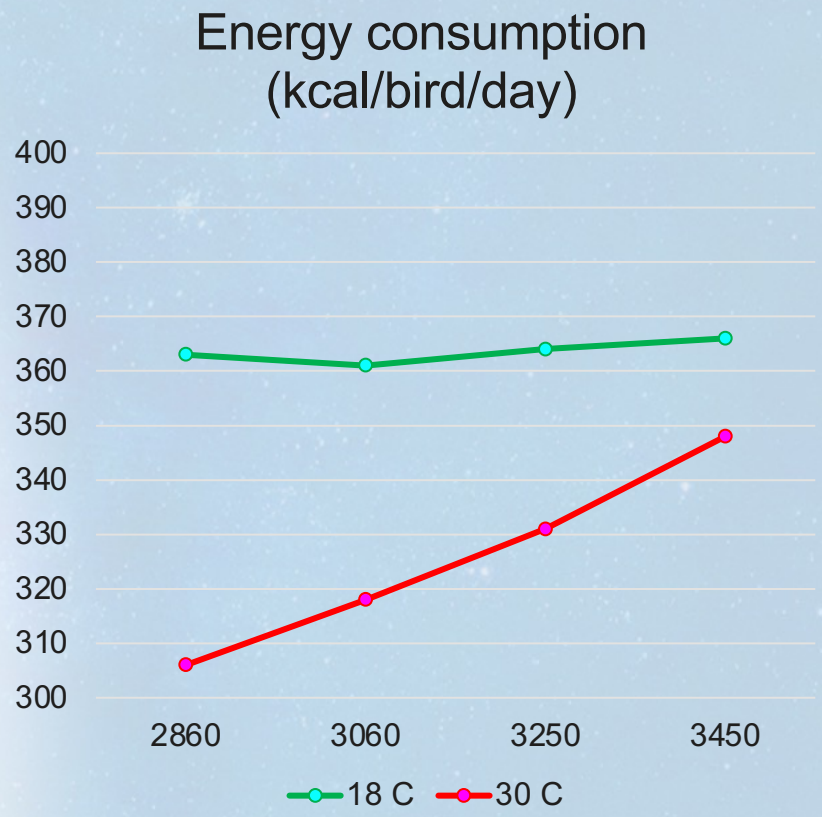


± 4 kcal/bird/day for every 50 g live weight

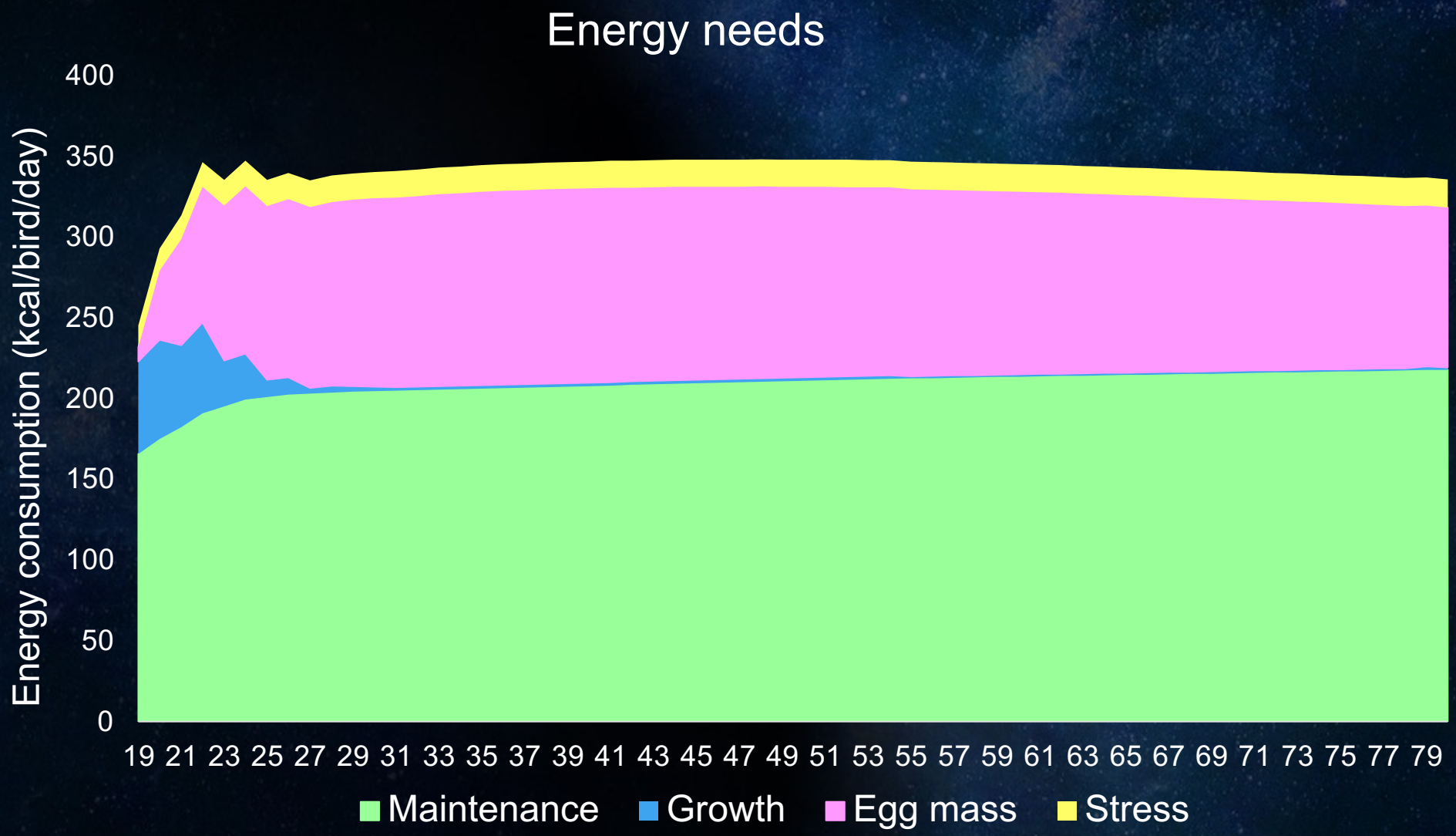
Energy

Feed intake controls nutrient intake



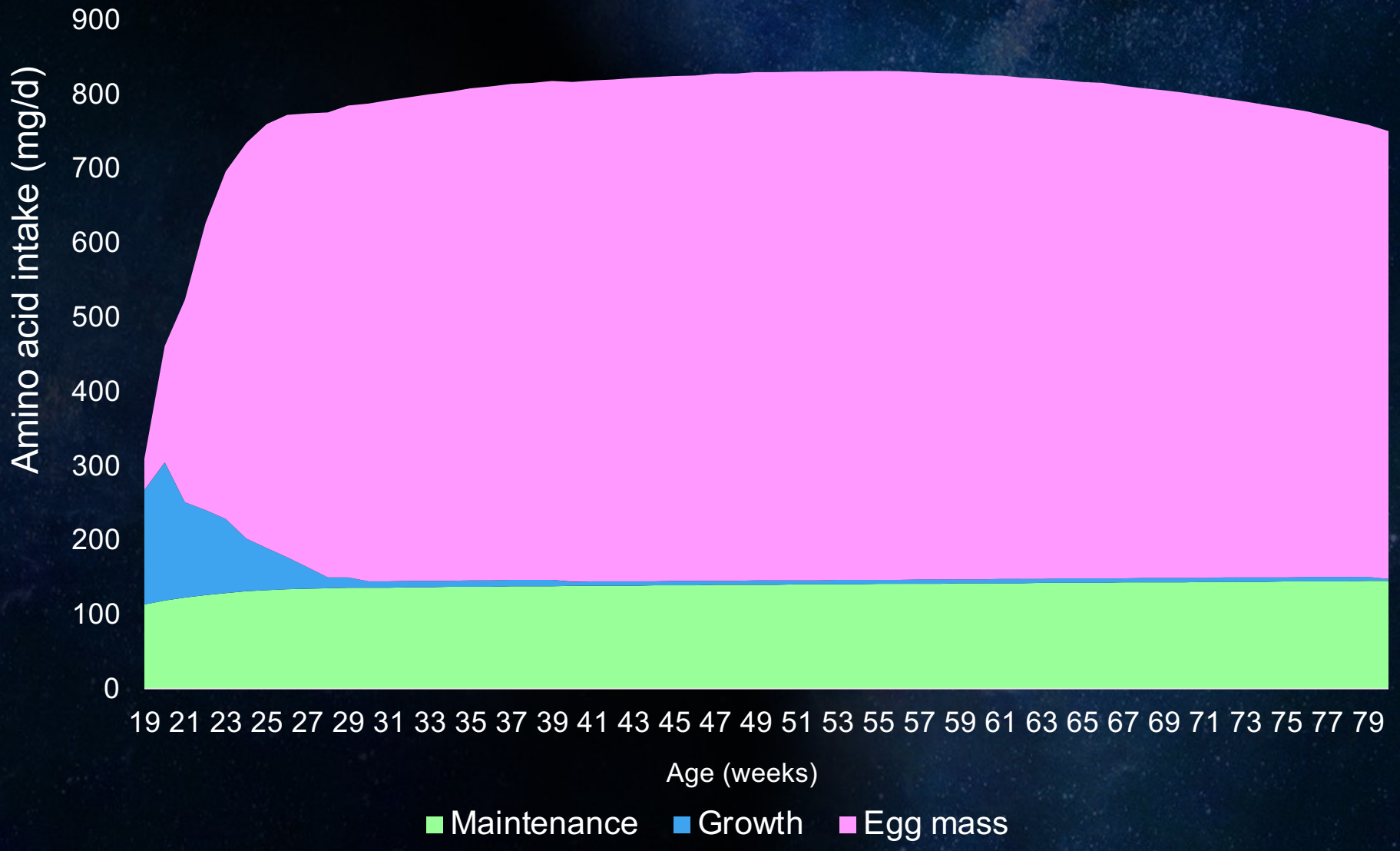


Using energy from diet



65% of energy is for maintenance.Production reduction if we do not compensate for the needs

Amino acid needs



80% of AA are allocated to egg weight

R&D amino acids

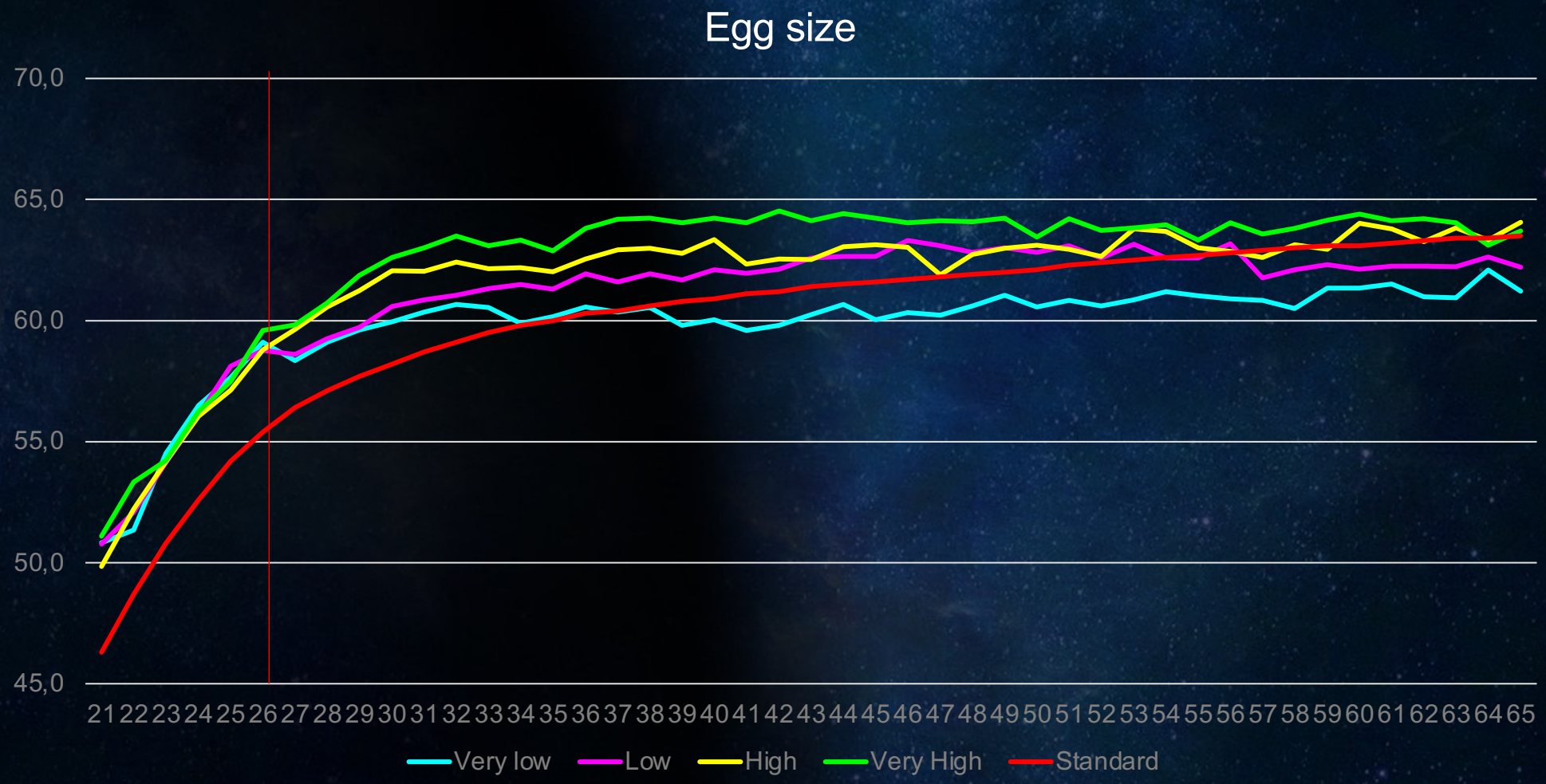
Egg size modification

Diets

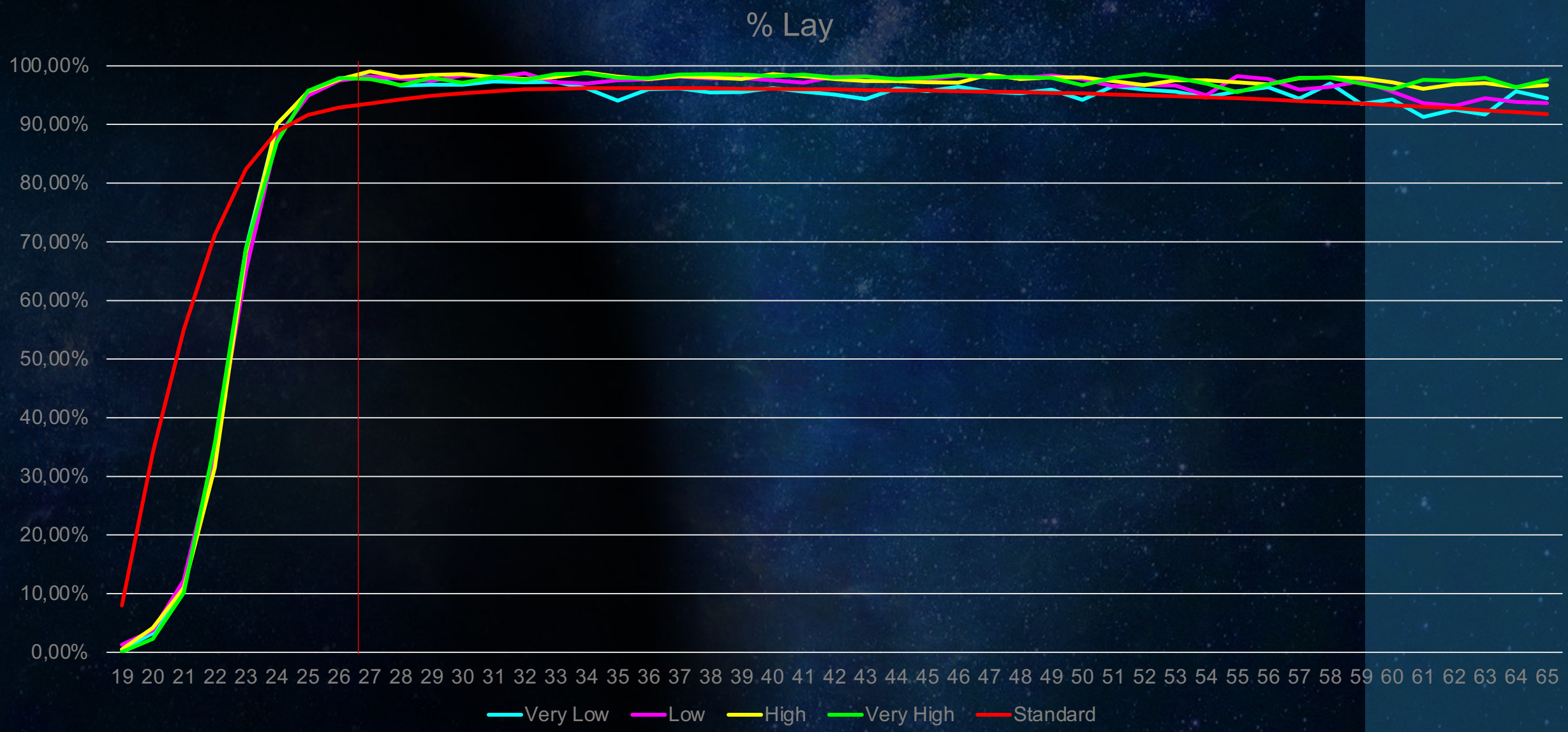
	Very low	Low	High	Very high
Crude protein (%)	11.16	12.38	13.61	14.83
ME birds (Kcal/Kg)	2,810	2,810	2,810	2,810
Starch (%)	45.2	44	42.7	41.5
Sugars (%)	3.12	3.31	3.50	3.69
Crude fiber (%)	2.3	2.21	2.12	2.03
Neutral detergent fiber (%)	10.64	9.87	9.1	8.33
Ash (%)	11.7	11.8	11.9	12
Fat (%)	4.66	4.60	4.53	4.47
Linoleic acid (%)	2.47	2.440	2.410	2.38
Digestible Lys poultry (%)	0.56	0.64	0.71	0.79
Digestible Met poultry (%)	0.35	0.33	0.37	0.525
Digestible M+C poultry (%)	0.52	0.59	0.66	0.73
Digestible Thr poultry (%)	0.405	0.46	0.51	0.57
Digestible Trp poultry (%)	0.135	0.15	0.17	0.19
Digestible Arg poultry (%)	0.60	0.52	0.585	0.93
Digestible Val poultry (%)	0.51	0.57	0.64	0.71
Digestible Ileu poultry (%)	0.46	0.68	0.76	0.65
Calcium (%)	4.1	4.1	4.1	4.1
Total Phosphorus (%)	0.59	0.58	0.58	0.58
Phytic Phosphorus (%)	0.24	0.22	0.22	0.22
Available Phosphorus (%)	0.33	0.33	0.33	0.33
Digestible Phosphorus poultry (%)	0.17	0.18	0.18	0.18
PRICE (EURO/TN)				

Egg size

No change

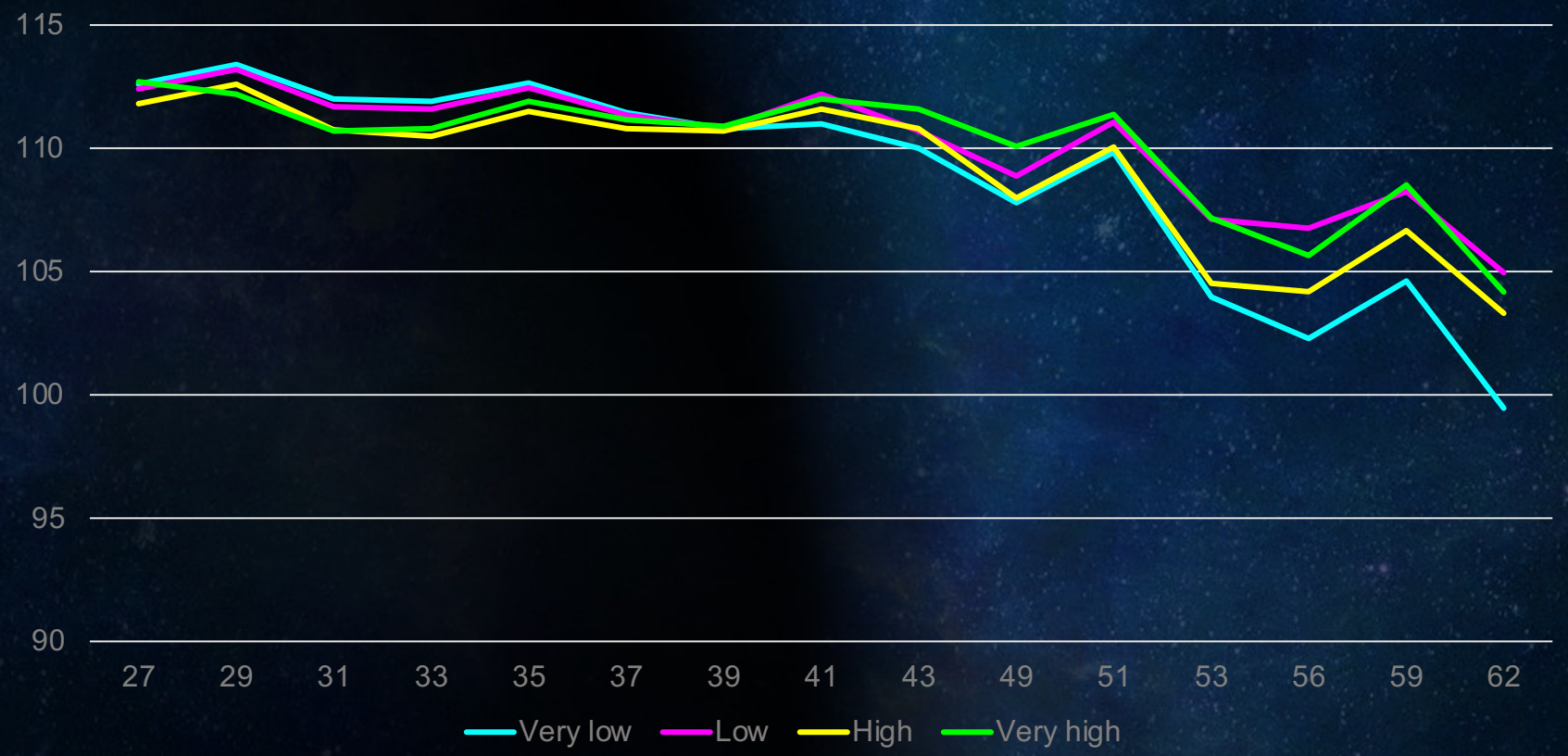


% lay


% Lay
100,00%
90,00%
80,00%
70,00%
60,00%
50,00%
40,00%
30,00%
20,00%
10,00%
0,00%
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 53 54 55 56 57 58 59 60 61 62 63 64 65
Very Low
Low
High
Very High
Standard

Feed intake

Gr / bird



Change of feed at 46 weeks

Treatments

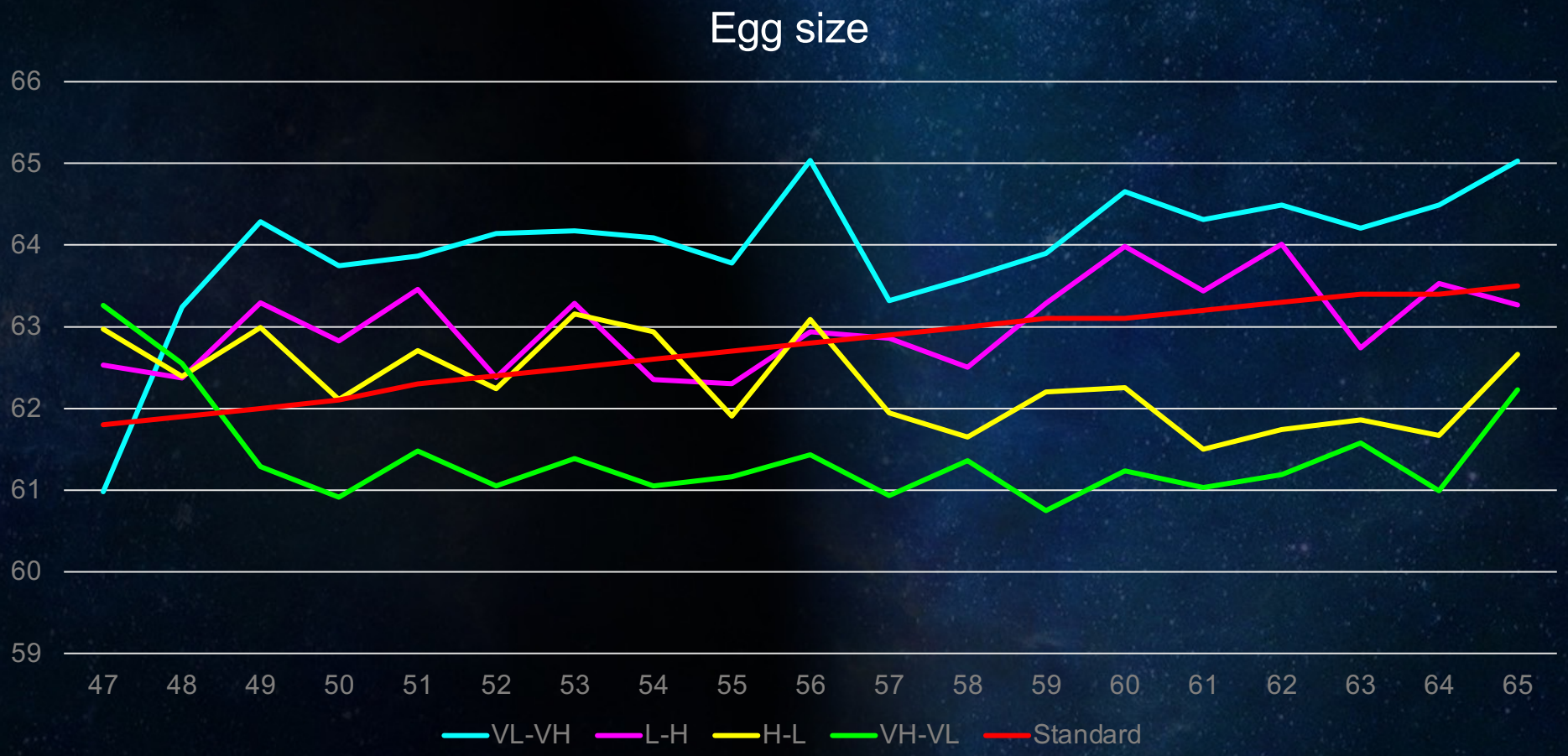
- Very Low: VL
- Low: L
- High: H
- Very High: VH

Changed treatment of 50% of the replicates

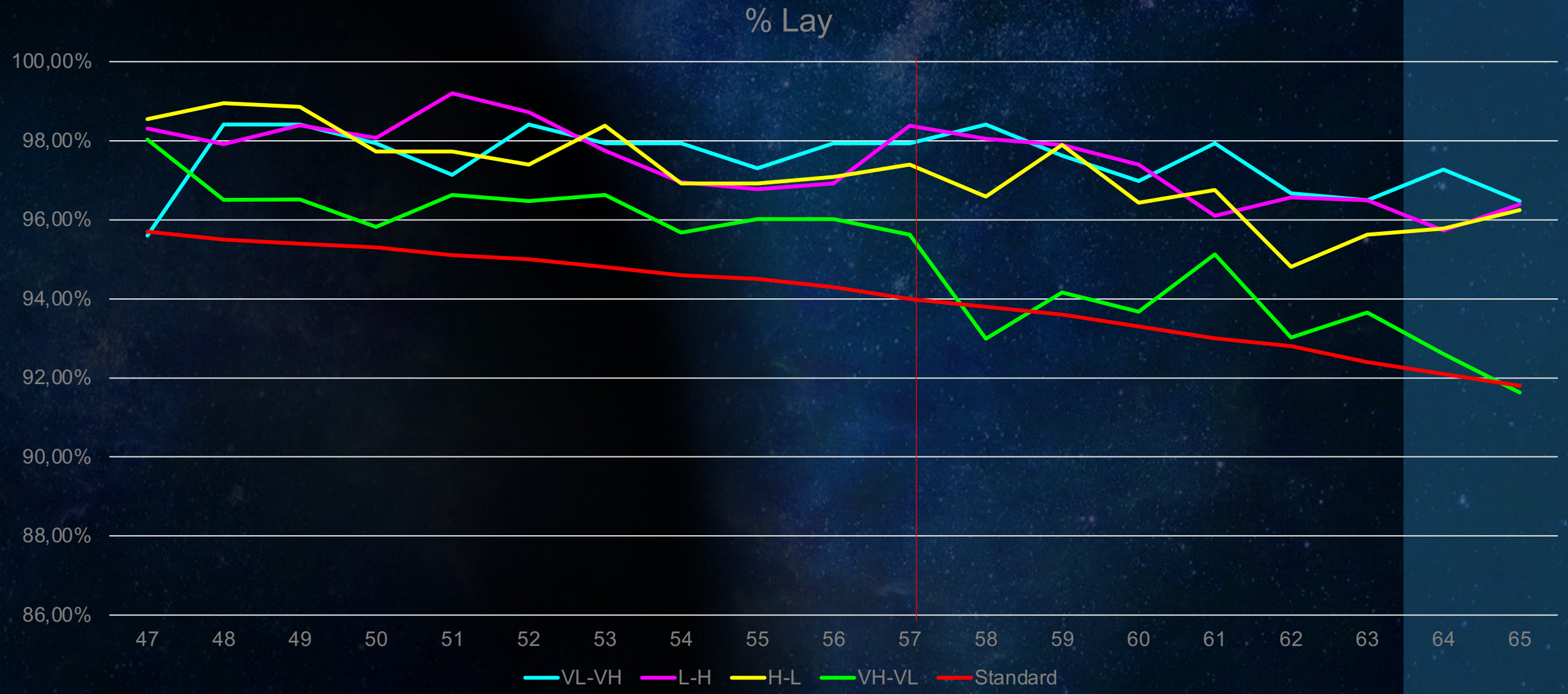
- VL-VH
- L-H
- H-L
- VH-VL

Change treatments

Quick change



Change treatments



Feed design

Option 1

Option 2

Corn - Soy 46% -soybean oil - bran

Energia (kcal/kg)	2840	112 g	117 g	Energia (kcal/kg)	2710
Dig Lis (%)	0,762	853 mg	851 mg	Dig Lis (%)	0.727
Dig Met (%)	0,381	427 mg	426 mg	Dig Met (%)	0.364
Dig M+C (%)	0,686	768 mg	767 mg	Dig M+C (%)	0.655
Dig Thr (%)	0,533	597 mg	596 mg	Dig Thr (%)	0.509
Dig Trp (%)	0,168	188 mg	188 mg	Dig Trp (%)	0.160

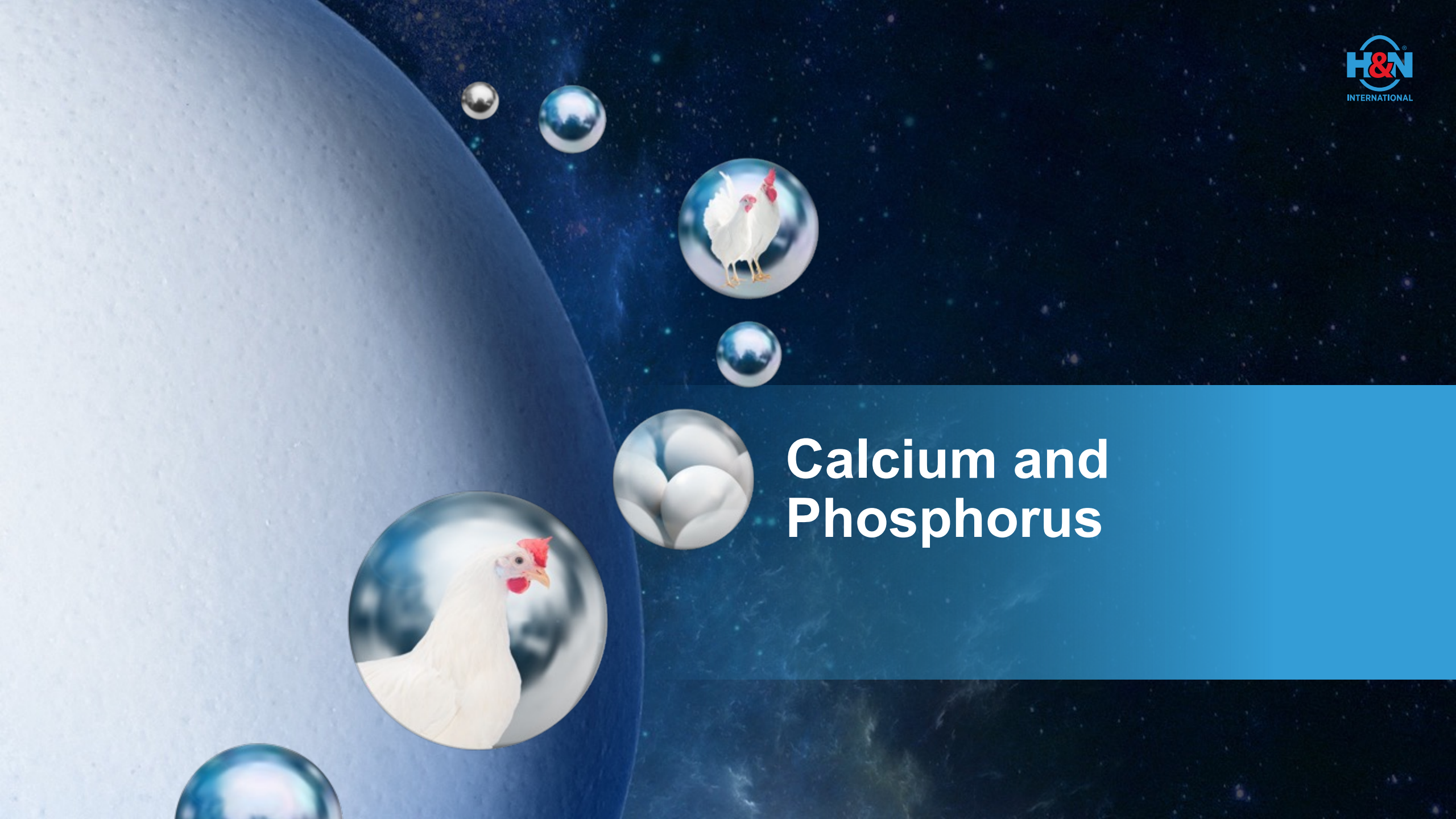
Feed formulated according to the consumption objective

Who sets the consumption target?

You…and the market

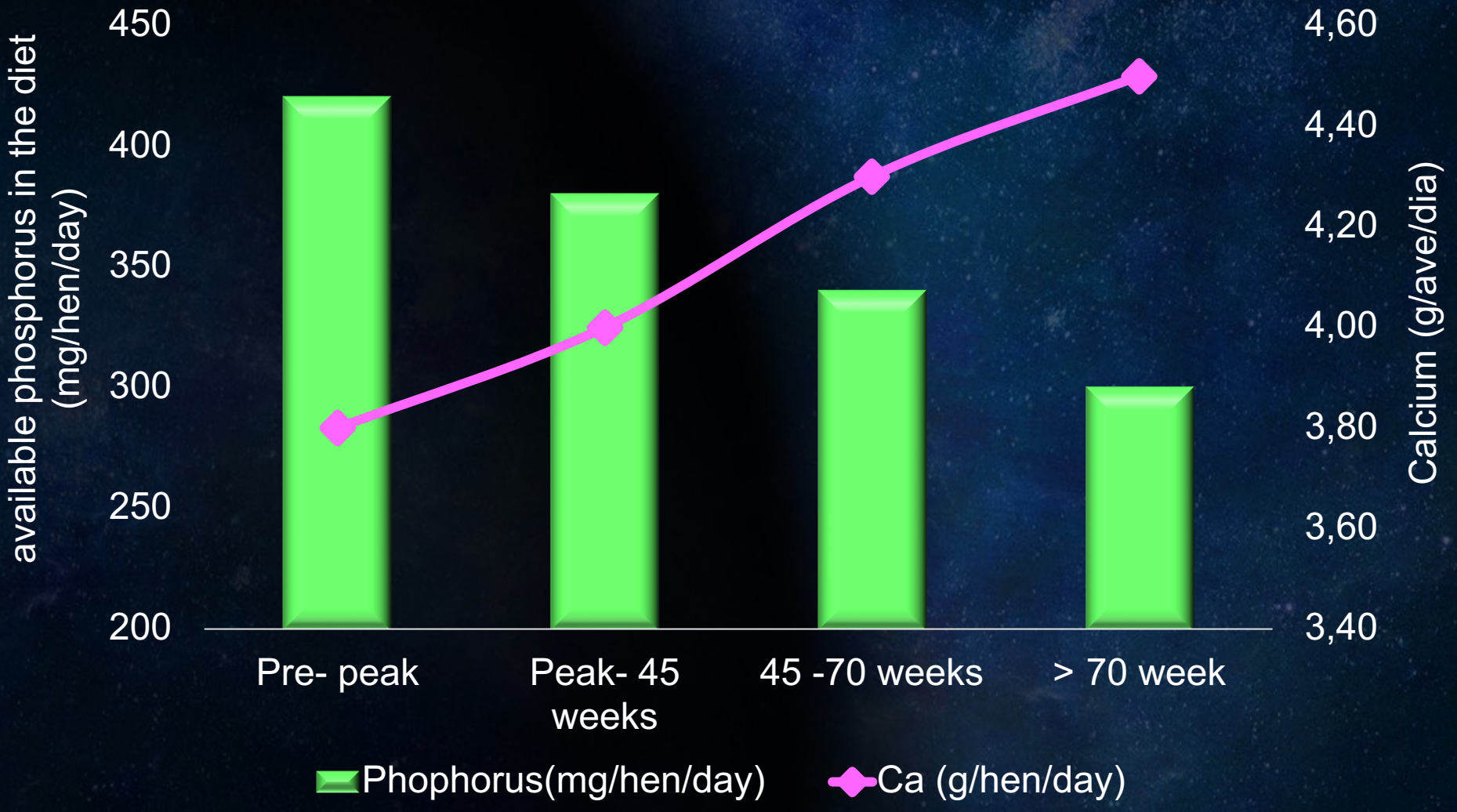
Energy formula

Option A	Option B
2840 kcal/kg	2710 kcal/kg



Calcium and Phosphorus

Calcium and Phosphorus

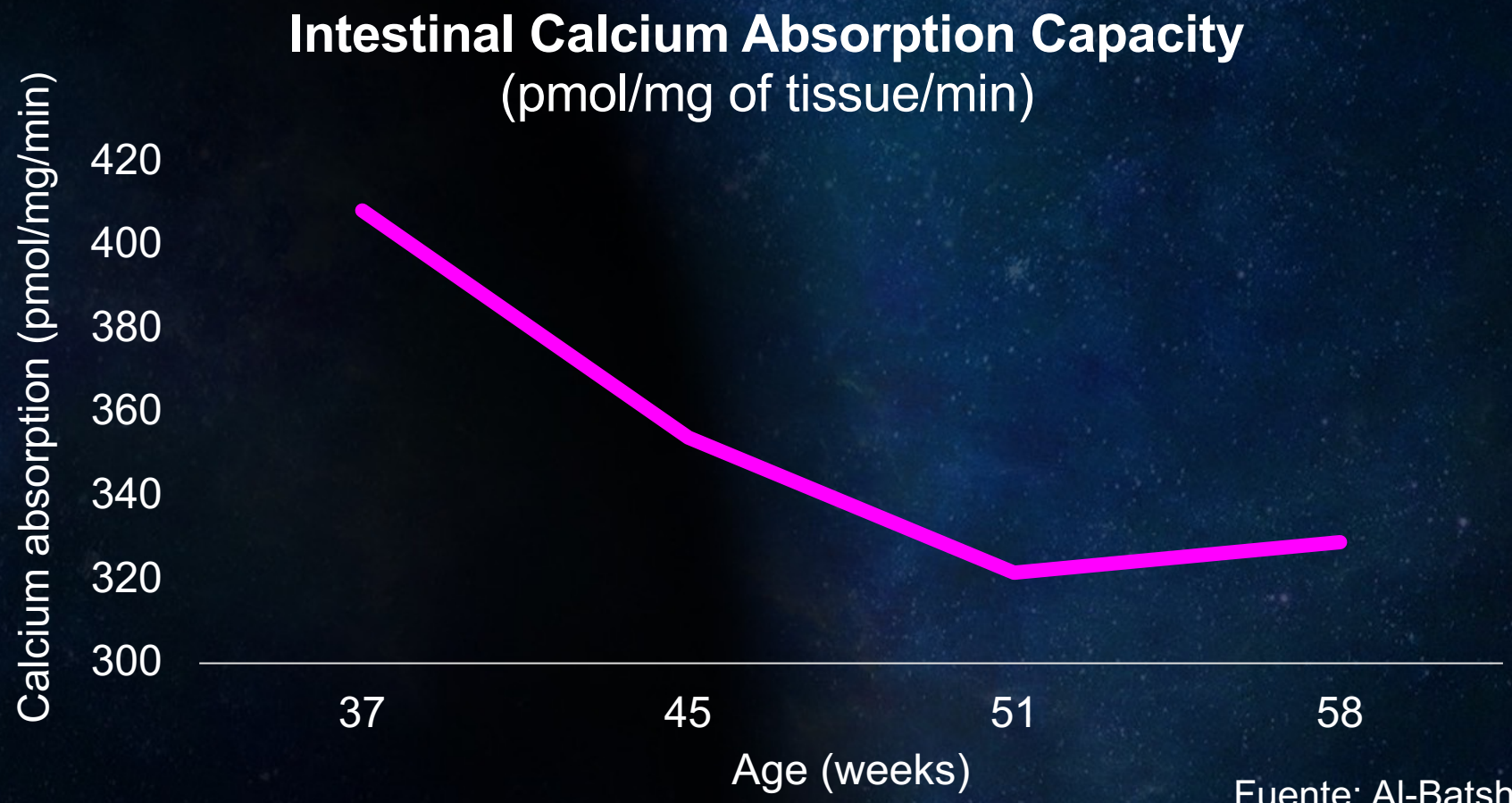


- **70%**

Coarse carbonate

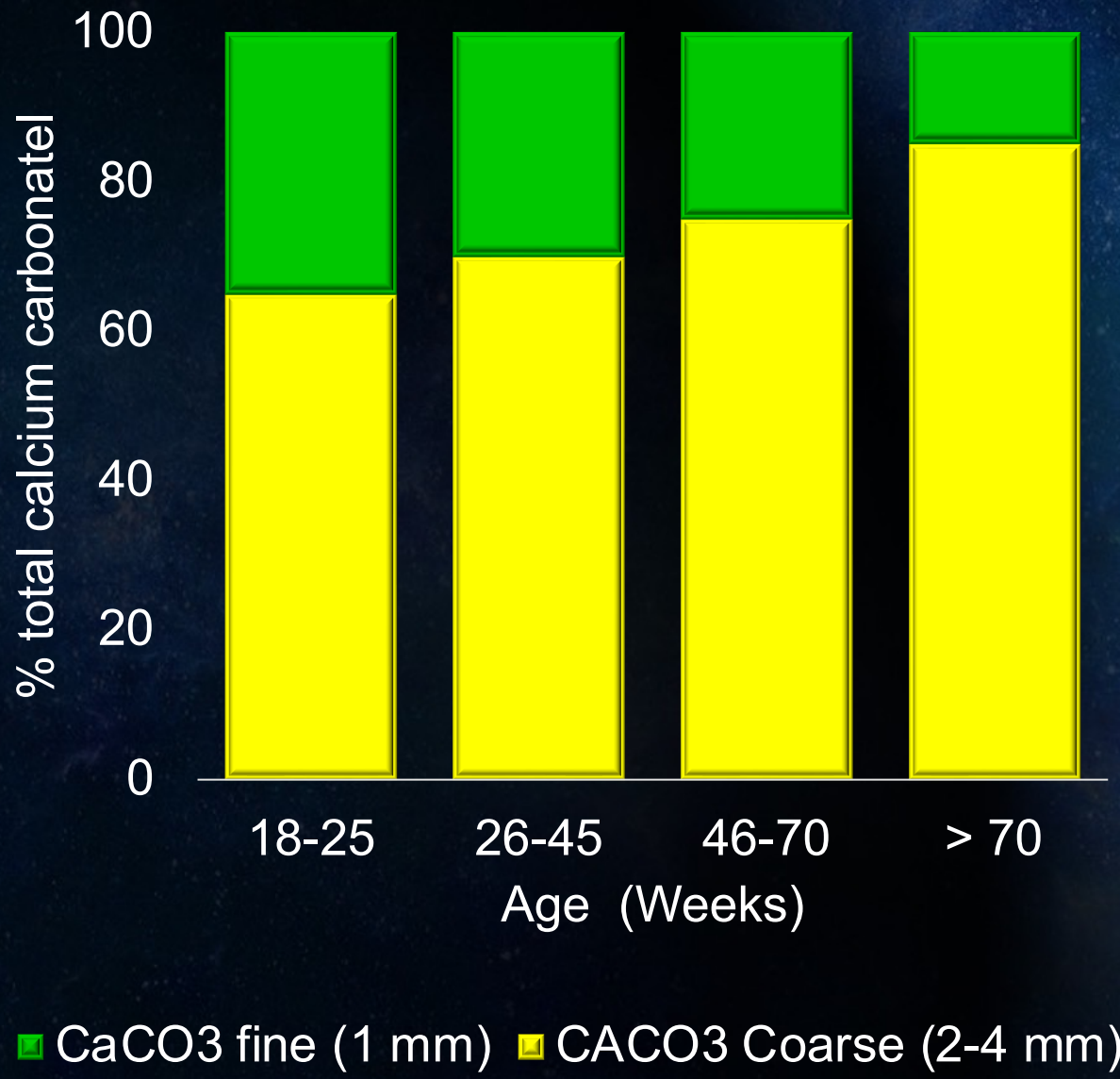
Calcium and Age

Why do the needs increase with age?



Fuente: Al-Batshan et al., 1994.

Calcium and Age – Inclusion of Coarse Carbonate

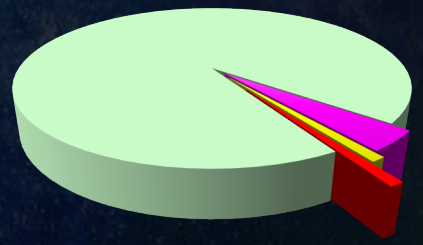


1. **Longer retention in the gizzard**
   - **> More calcium available**
   - **<** Less use of medullary bone
2. **Better phytase activity**
3. **Improved texture and flow of the feed**

Phosphorus and Age

Why do the needs decrease with age?

Eggshell Composition



$Ca_3(PO4)_2$ = 20% P

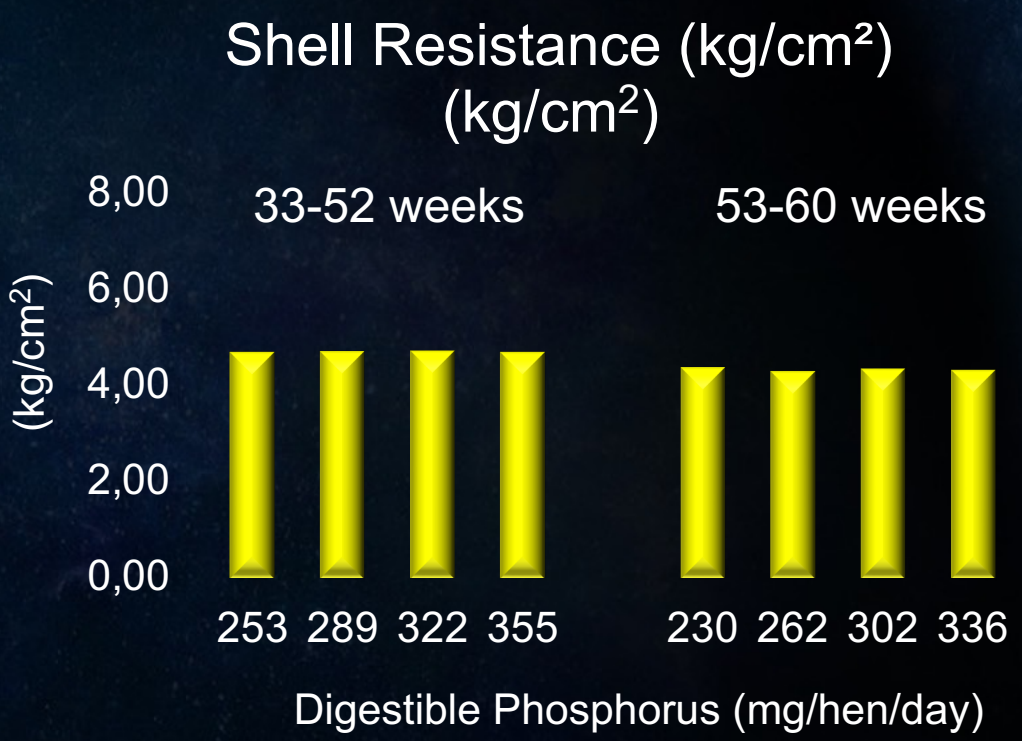
Eggshell of 62 grams[1]
Calcium carbonate (mg)
Calcium phosphate (mg)
Total (mg)

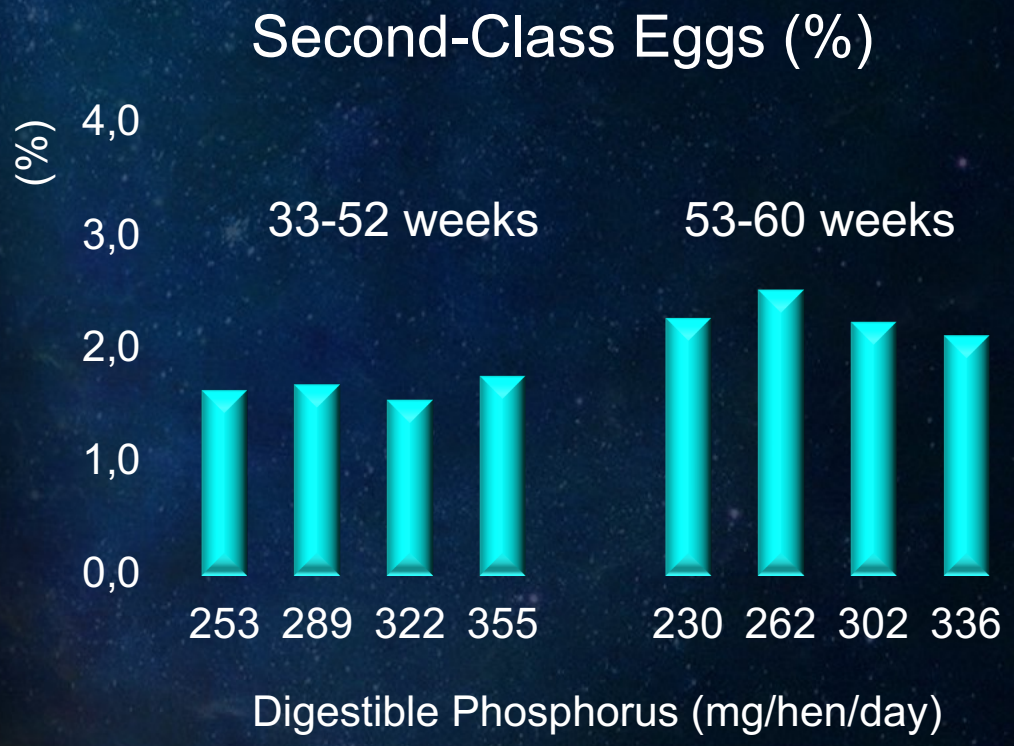
[1] *Eggshell represents 9% of total weight, 5.6 g*)

Total Phosphorus in egg: 110 – 150 mg (mostly in yolk)

Effect of the Digestible Phosphorus Level in the Diet on the Egg Quality of Brown Laying Hens from 33 to 60 Weeks of Age

Age	Digestible Phosphorus (mg/hen/day)			
33-52 weeks	253	289	322	355
53-60 weeks	230	262	302	336





P digestible ≤ 250 mg/hen/day

Fuente: de Juan et al., 2023

Feeding program

	Phase 1	Phase 2	Phase 3
Age (weeks)	22-45	46-70	> 70
Feed consumption goal (gr)	**115**	**115**	**115**
EM (kcal/kg)	2,750	2,750	2,750
Lys dig.	0.704	0.704	0.667
Met dig.	0.352	0.352	0.333
Met+Cys dig.	0.634	0.634	0.600
Thr dig.	0.493	0.493	0.467
Trp dig.	0.155	0.155	0.147
Na	0.16	0.16	0.14
Cl	0.16	0.16	0.14
Ca	3.40	3.70	3.90
P dig.	0.33	0.29	0.26

Is the hen's weight changing?

Check the egg mass

Age

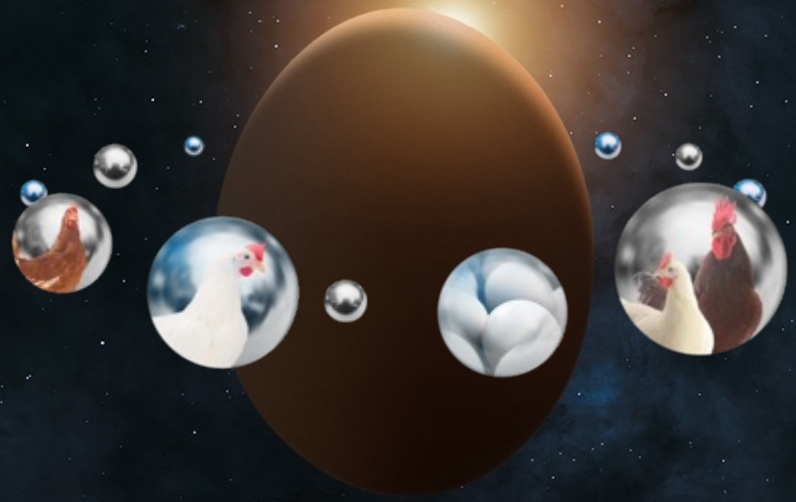
Adapting to the market

Summary – Laying Phase

Power without control is useless

- Body weight, egg mass, and activity are the factors that define the needs..
- All laying hens... and producers need a target for feed consumption.
- We can change egg size with amino acid nutrition.
- The feeding program doesn’t change much:
  - ✓ Energy concentration depends on body weight.
  - ✓ Amino acids depend on the egg mass produced.
  - ✓ Calcium (Ca) and Phosphorus (P) are based on age.

Gracias por su atención



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