H&N INTERNATIONAL

The key to your profit!

Layer nutrition in a nutshell

What are the targets of a layer

1. Produce one egg

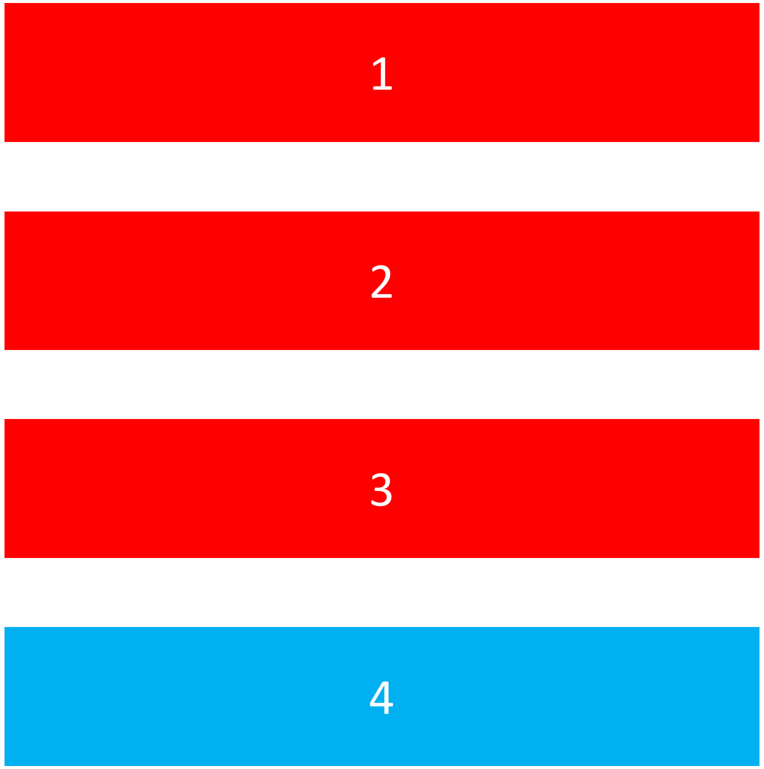
2. Produce size with the resources she has

Behaviour of the birds

- The broiler is a ‘hungry’ bird
- Hen eats as she needs and what she produces

How many eggs produce a hen?

1. 500 small ones
2. 400 medium ones
3. 300 big ones
4. All the above



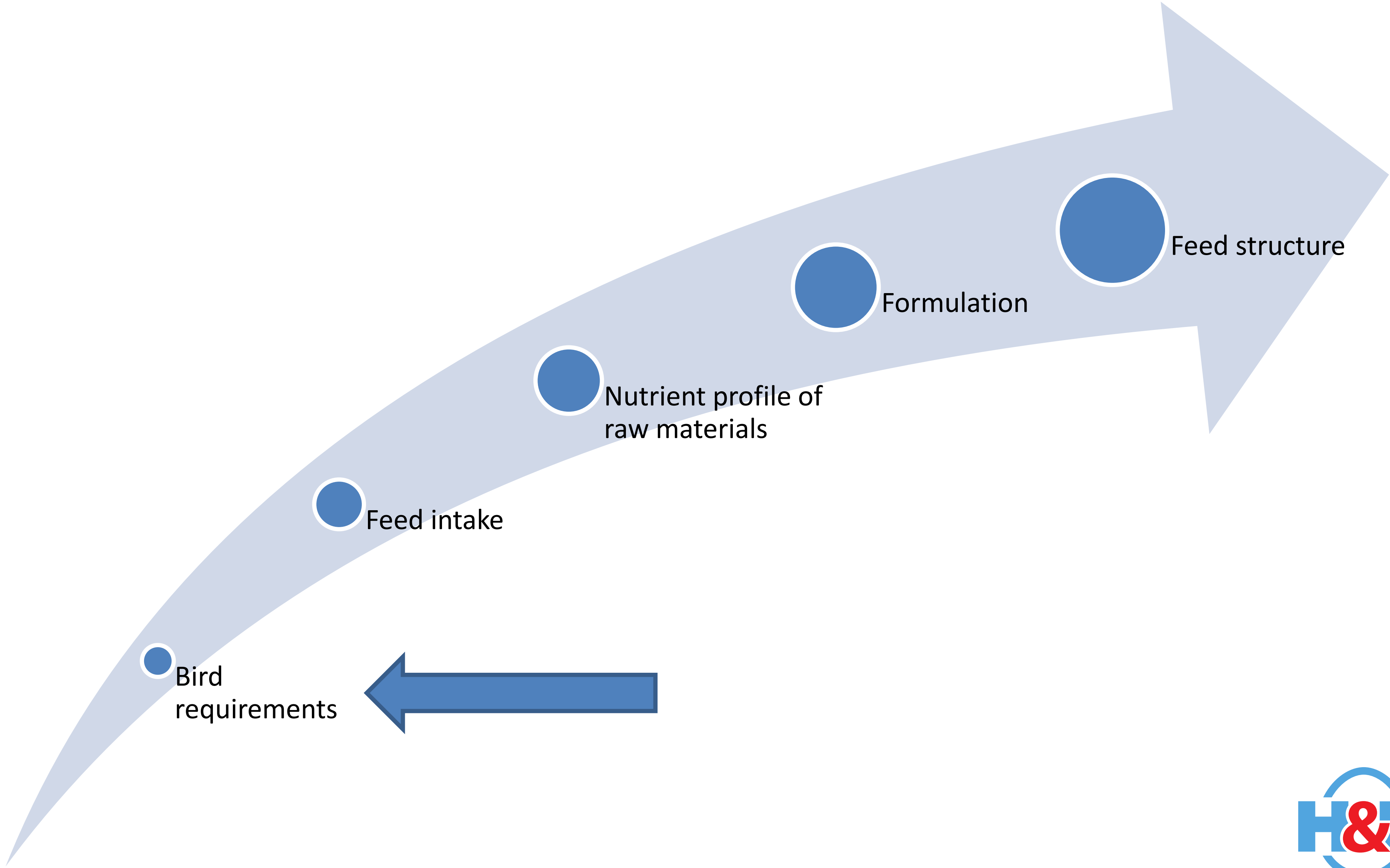
Layers don't lay number of eggs

Kg eggs = Number of eggs x Egg size

- Lighting program

- Nutrition

5 steps in feeding



What do the hens need for egg production?

1. Nutrients
2. Corn and soya
3. Energy
4. Amino acids

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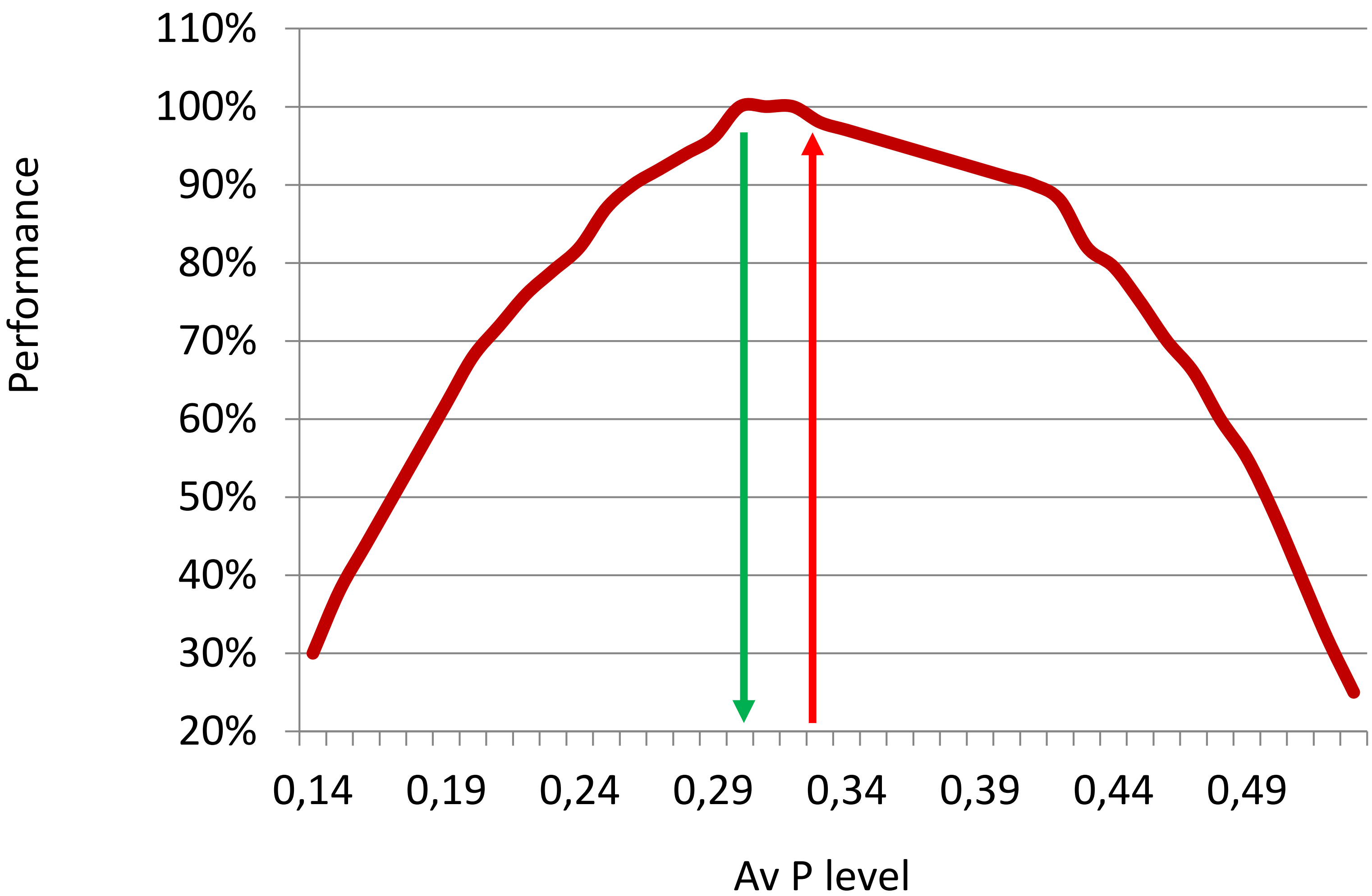
Bird requirements

- Energy
- Amino acids

- Ca / P and Vit D balance
- Vitamins
- Trace minerals

Performance vs nutrients



Needs

- Maintenance
- Growth
- Production

When the carcass of the pullet is developed?

1. At week 3
2. At week 6
3. At week 10
4. At week 16

When does the raring of the pullets end?

1. At week 30
2. At week 22
3. At week 16
4. At week 10

1	
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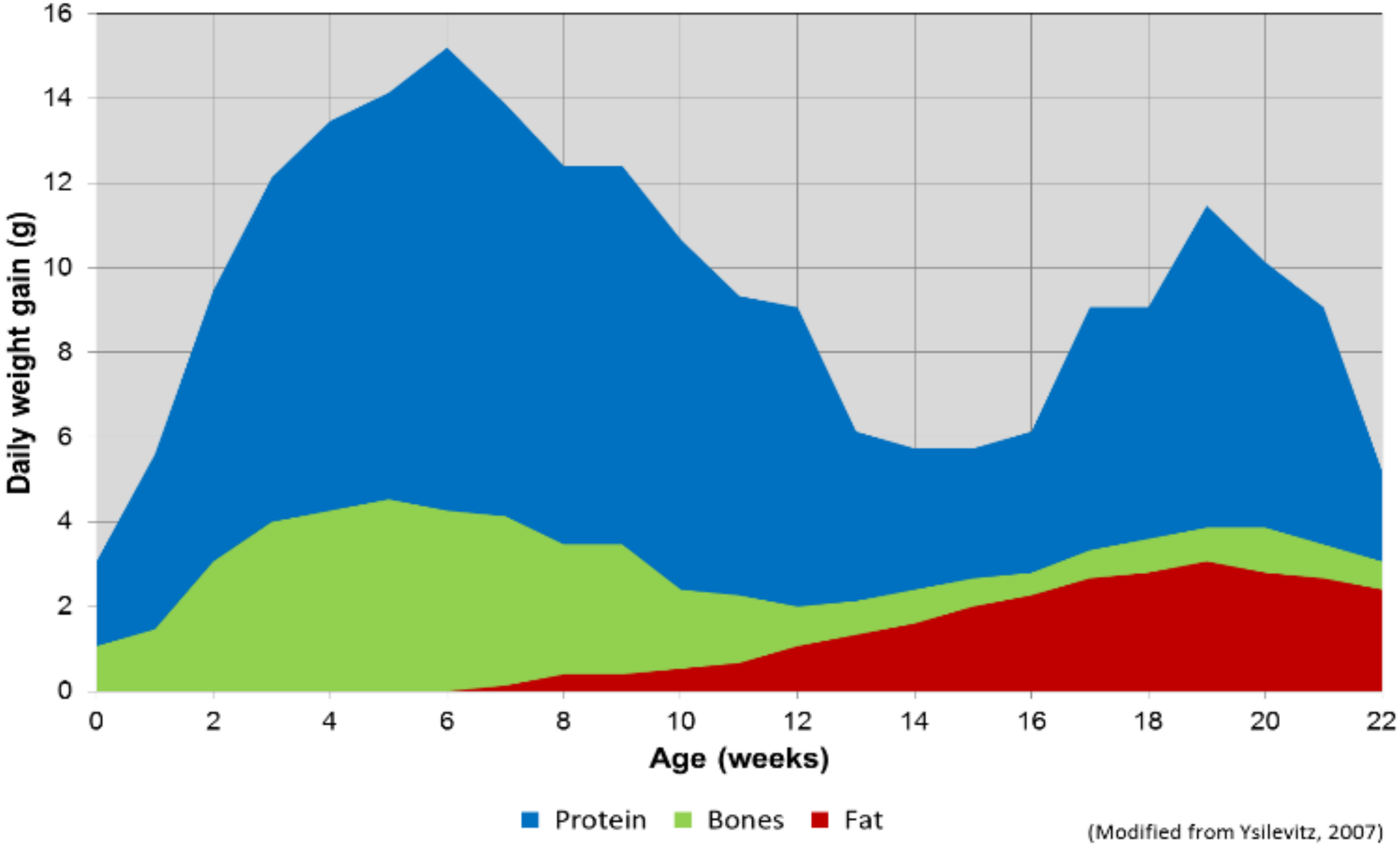
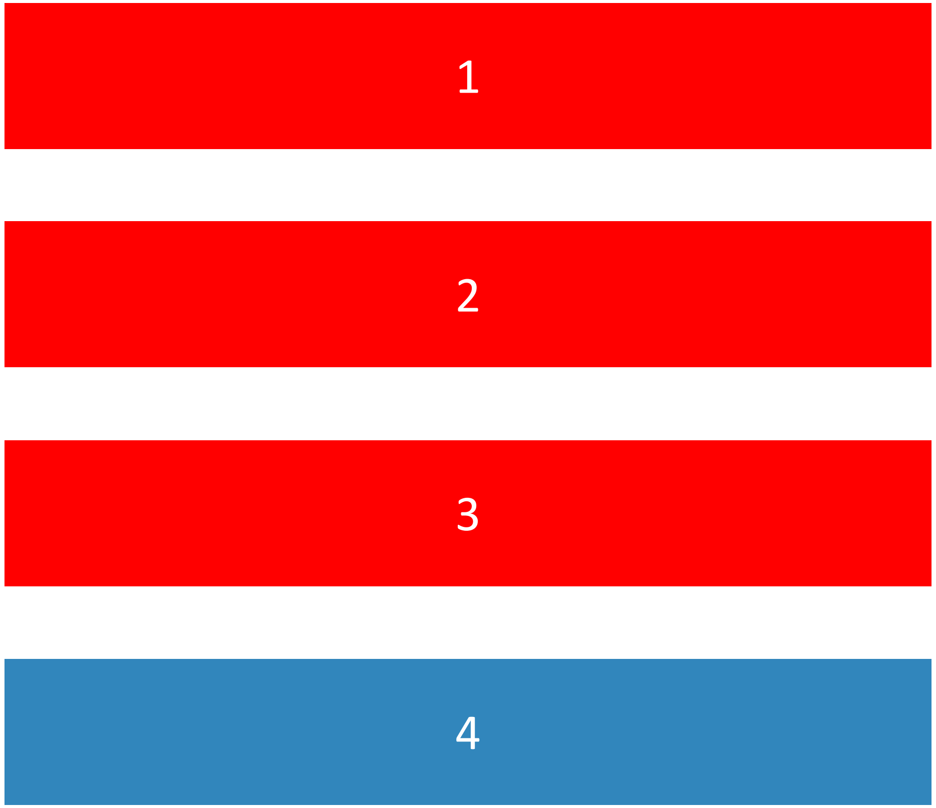
Pullets needs



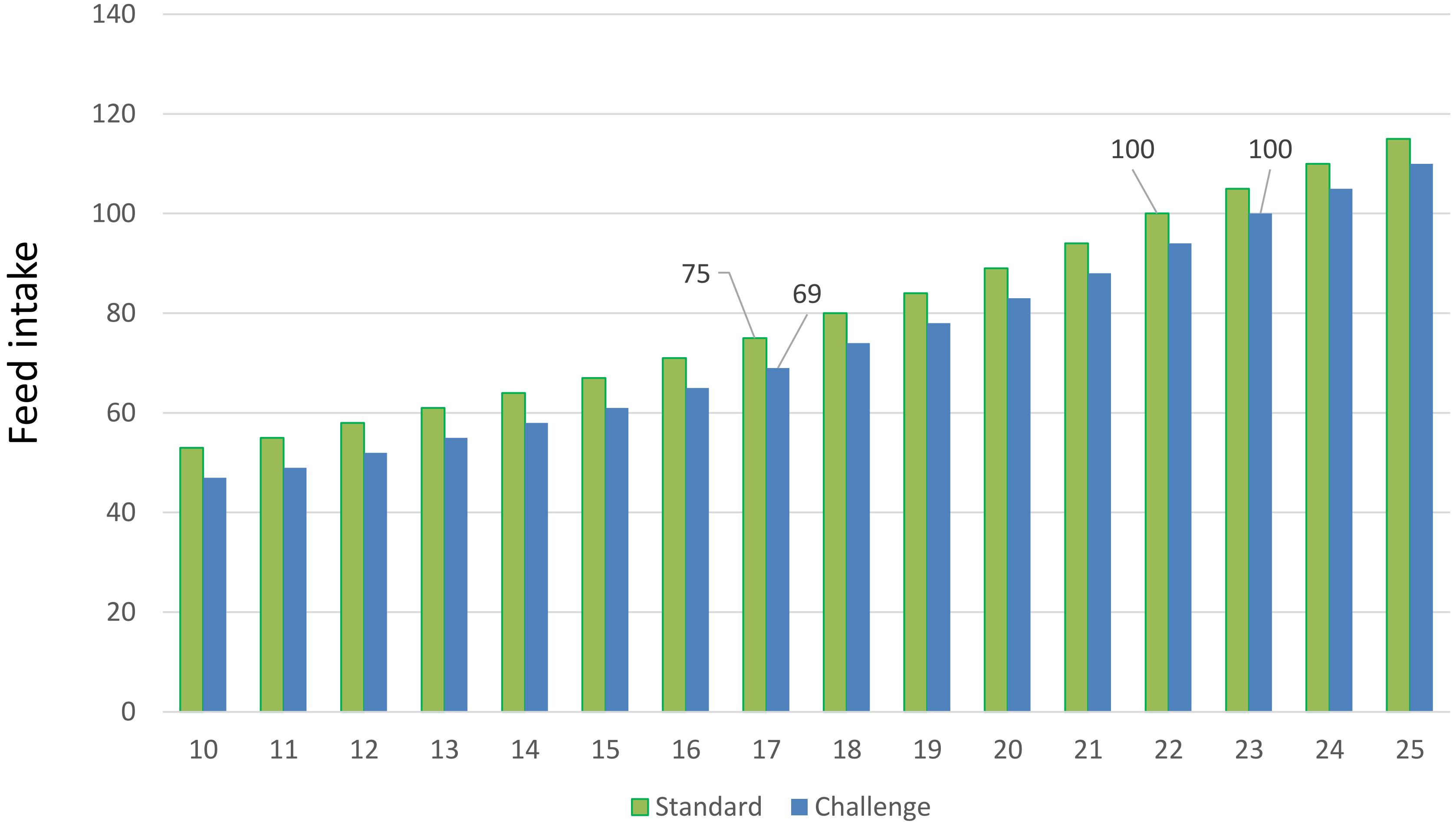
(Modified from Ysilevitz, 2007)

How much fiber should I put in the pullet diet?

1. 4%
2. 5%
3. 6%
4. All the above



Target: reduce feed intake gap



Increase feed intake capacity

g / Kg BW	Control	Fiber
Crop	4.5	6.8**
Proventriculus	2.63	3.03*

Particle size of feed and management work

Kondra et al 1974

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How much pre lay I have to use?

1. Until 3% of production
2. Until 5% of production
3. Until 6% of production
4. None of the above

1
2
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On set feed - Concept

Nutrient		
ME	Kcal / kg	2700
Dig Lys	%	0.8
Dig Met	%	0.4
Dig M+C	%	0.72
Dig Thr	%	0.56
Dig Trp	%	0.176
Ca	%	3.8
Av P	%	0.44
CF	%	4
Salt	%	0.28

Low energy

High amino acid

Enough to lay one egg and 60% coarse particle in particle form

Keep the feed intake development

Stimulate feed intake

Use: after the birds are housed to 70% of lay or the feed intake is over 90 grams / day

What is the most costly nutrient of the diet?

1. Protein
2. Phosphorus
3. Energy
4. Amino acids

1	
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4	

The energy for maintenance

1. Is same as production needs
2. Is less than production needs
3. Is more than production needs
4. None of the above

1	
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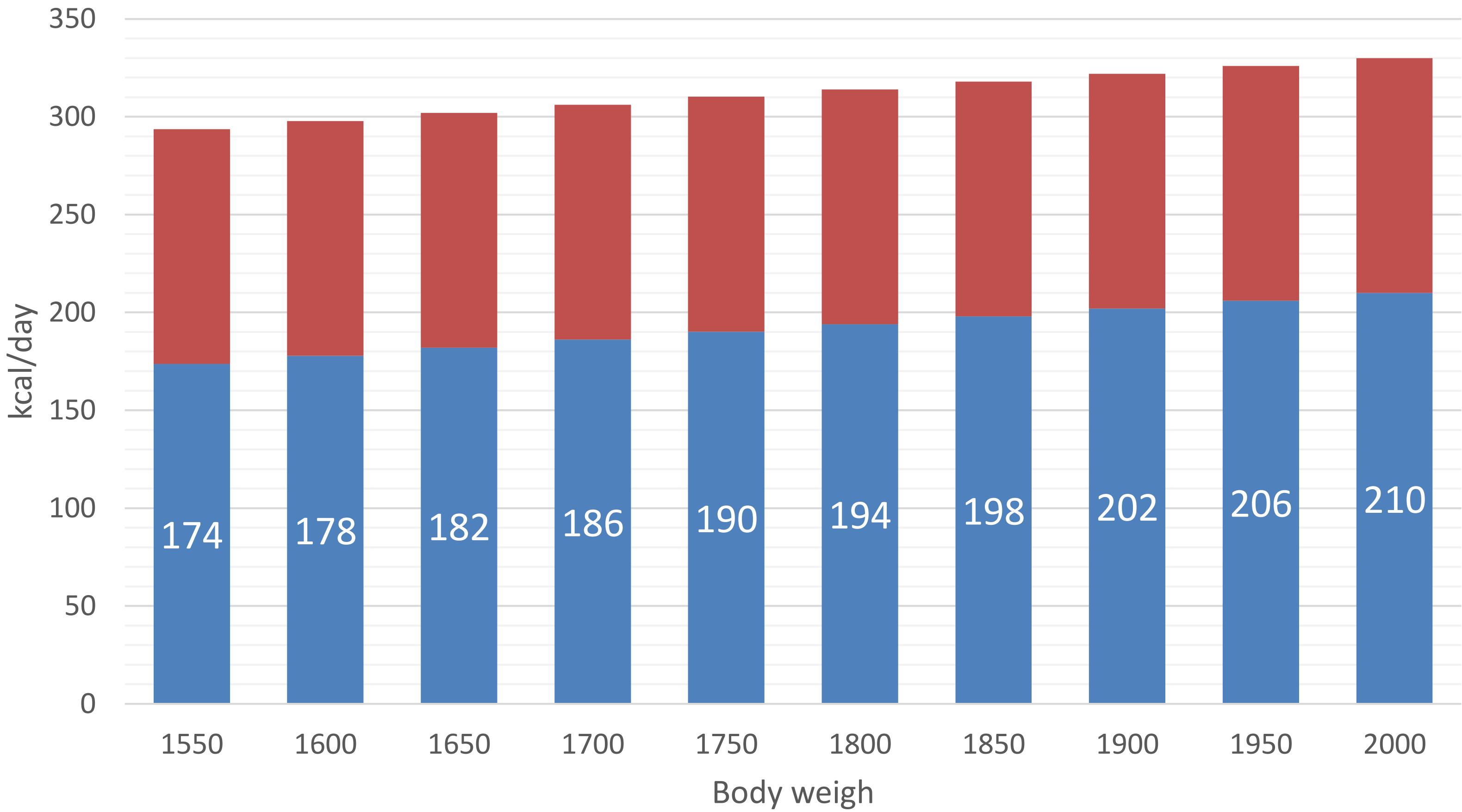
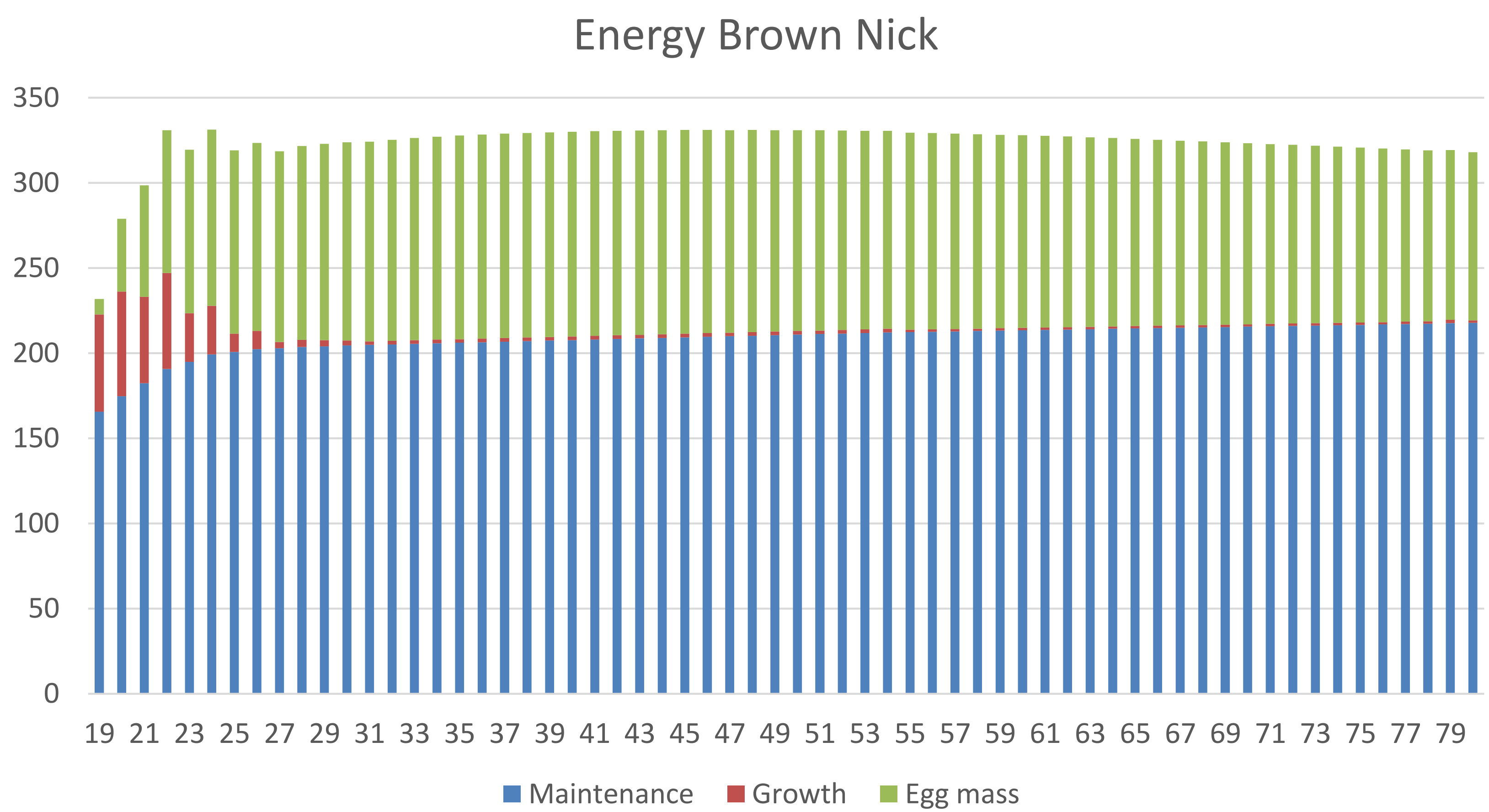
Energy recommendation based on BW



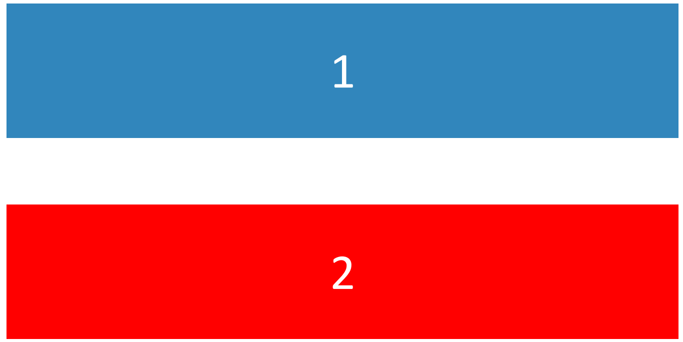
Energy needs



Maintenance 64% Growth 2% Egg mass 34%

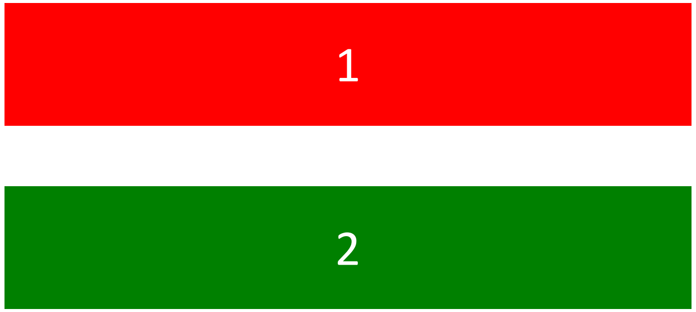
Energy intake it is temperature dependent

1. True
2. False

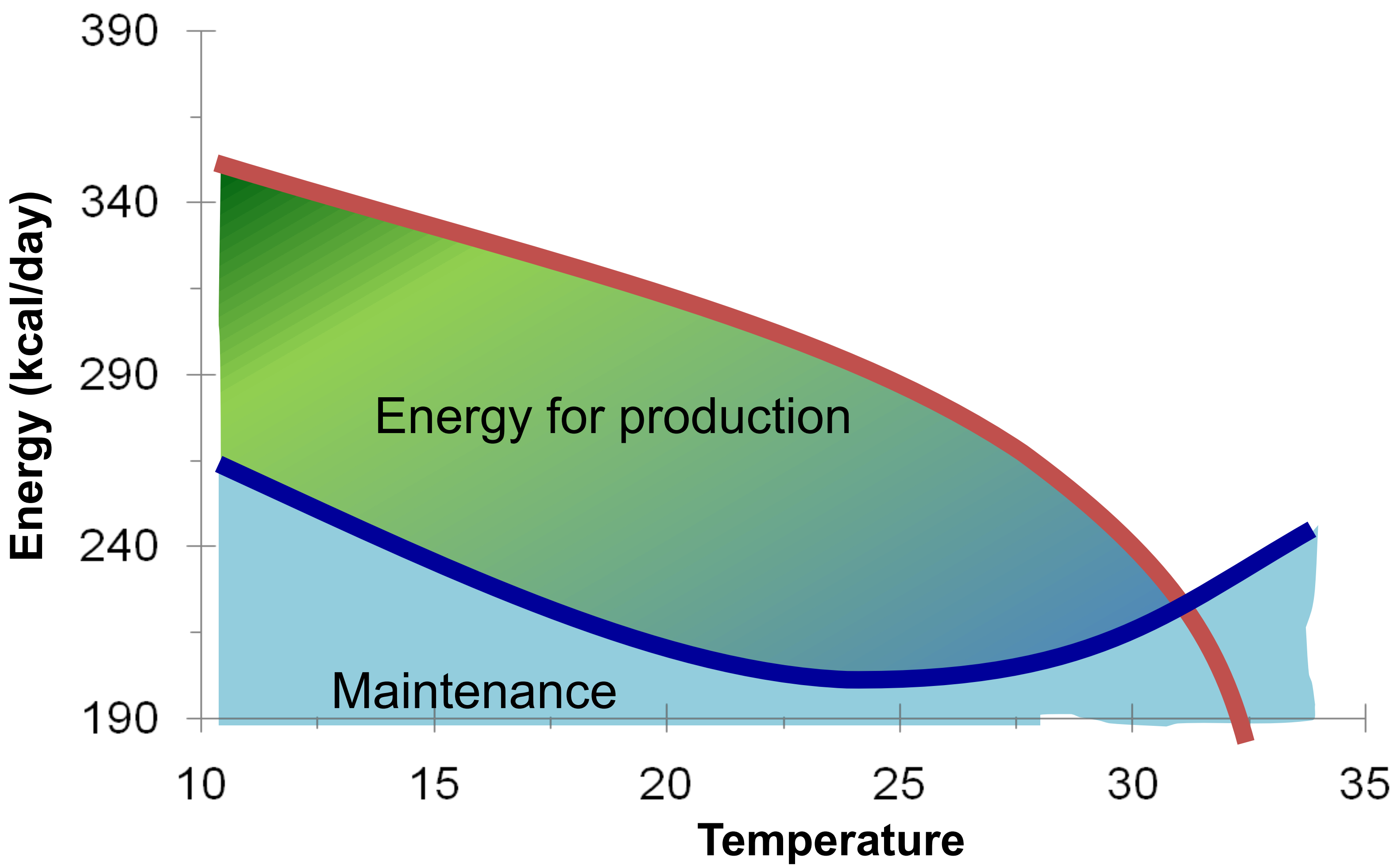


Layers maintenance need don't change, no matter the temperature

1. True
2. False



Effect of the temperature



Adaptaded from Leeson (2012)

The amino acids for production

1. Is same as maintenance needs
2. Is less than maintenance needs
3. Is more than maintenance needs
4. None of the above

1
2
3
4

I reduce egg size:

1. Reducing lysine
2. Reducing methionine
3. Reducing the isoleucine
4. All the above

1	
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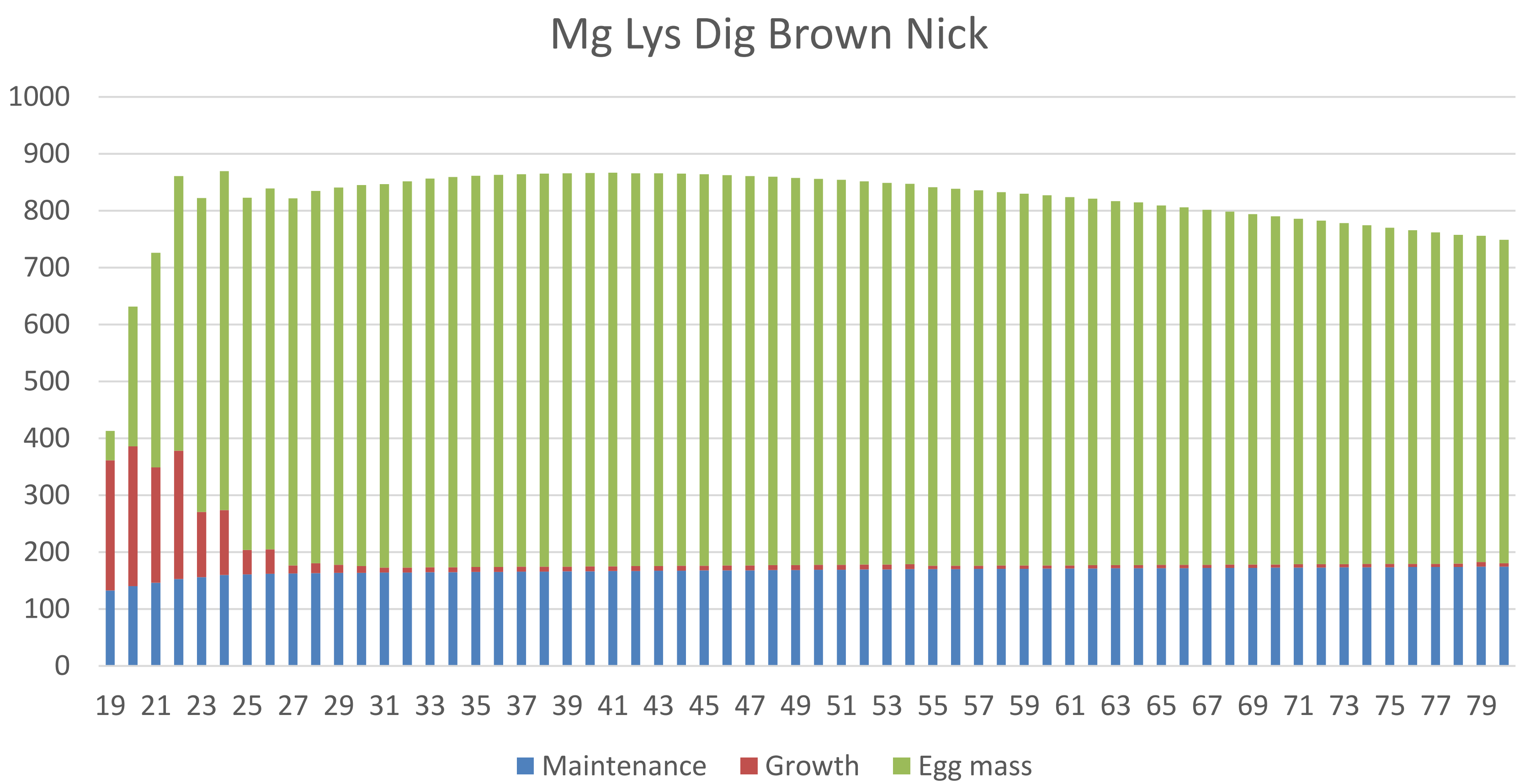
Amino acid needs



Maintenance 20% Growth 1% <u>**Egg mass 79%**</u>

Make formulation based on egg mass

Egg mass	60-58			
MEn	301 kcal / hen / day			
CP	17.5 gr / hen /day			
	mg / hen / day	100	105	110
Dig Lysine	810	0.810	0.771	0.736
Dig Methionine	405	0.405	0.386	0.368
Dig Met + Cys	729	0.729	0.694	0.663
Dig Threonine	567	0.567	0.540	0.515
Dig Tryptophane	178	0.178	0.170	0.162
Dig Isoleucine	648	0.648	0.617	0.589
Dig Valine	709	0.709	0.675	0.644
Dig Argenine	844	0.844	0.804	0.767

Egg mass	57-55			
MEn	295 kcal / hen / day			
CP	17.2 gr / hen /day			
	mg / hen / day	100	105	110
Dig Lysine	780	0.780	0.743	0.709
Dig Methionine	390	0.390	0.371	0.355
Dig Met + Cys	702	0.702	0.669	0.638
Dig Threonine	546	0.546	0.520	0.496
Dig Tryptophane	172	0.172	0.163	0.156
Dig Isoleucine	624	0.624	0.594	0.567
Dig Valine	683	0.683	0.650	0.620
Dig Argenine	813	0.813	0.774	0.739

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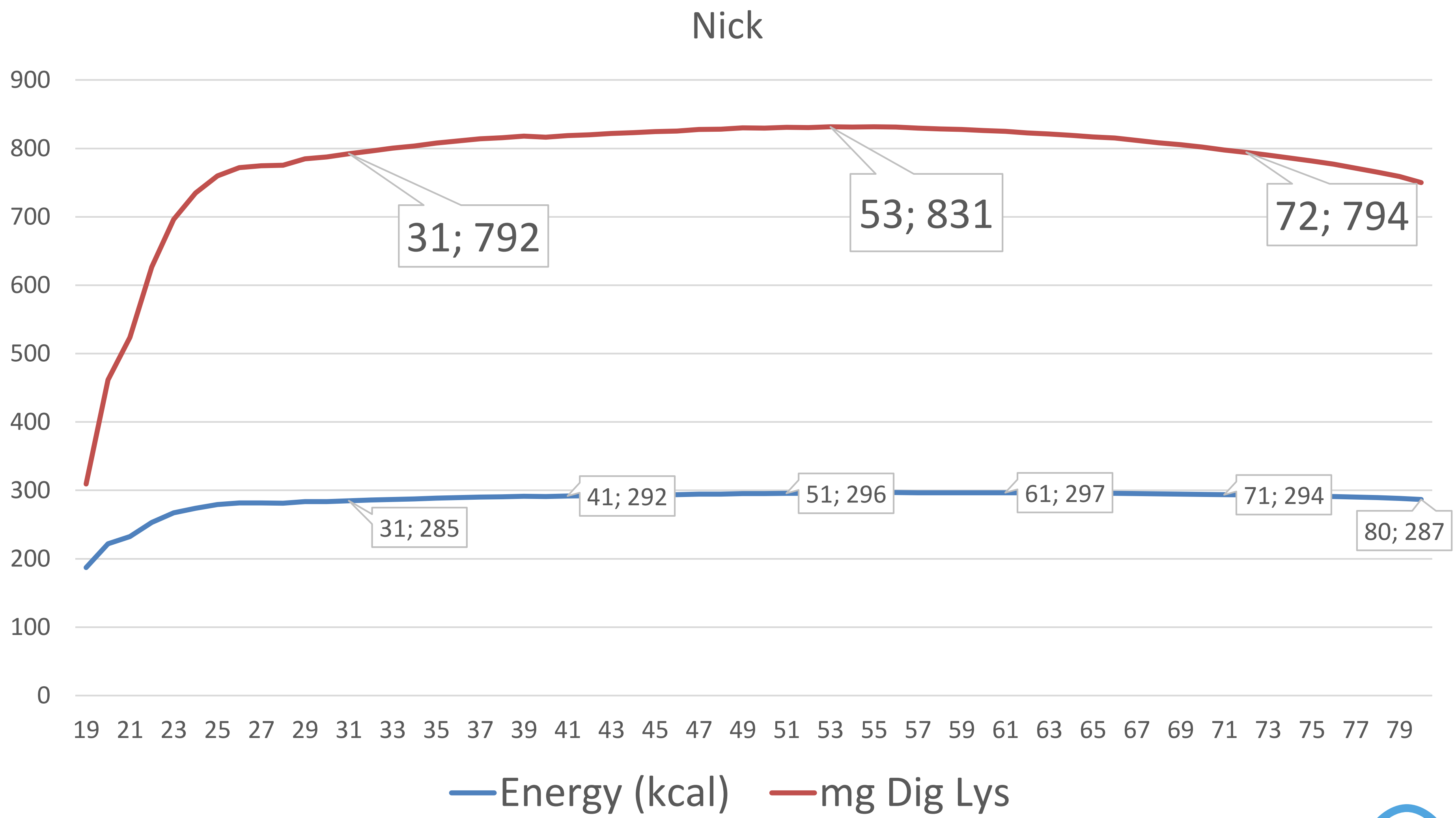
Egg size controlled by ALL the amino acids

Pullet same size at 17 weeks, same energy feed and production from 22 to 50 weeks

Protein (%)	Fat (%)	Lay (%)	Egg size (gr)	Egg mass
18.5	1.8	91.6	65.2	59.7
17.5	1.8	92.4	64.9	60
16.5	1.8	92.3	64.3	59.3

Perez-Bonilla et al 2011b

Need / day


Nick
900
800
700
600
500
400
300
200
100
0
19 21 23 25 27 29 31 33 35 37 39 41 43 45 47 49 51 53 55 57 59 61 63 65 67 69 71 73 75 77 79
31; 792
53; 831
72; 794
31; 285
41; 292
51; 296
61; 297
71; 294
80; 287
Energy (kcal)
mg Dig Lys

Change of feed vs bird needs

Needs	Age	mg / bird / day	D Lys in feed (%)	Feed intake (gr/bird)
D Lys	31	792	0.75	106
	53	831	0.72	115

- What does it happen if feed intake doesn’t increase?

1. Drop of body weight
2. Lost of feathers
3. Increase of unspecific mortality
4. Lost of production

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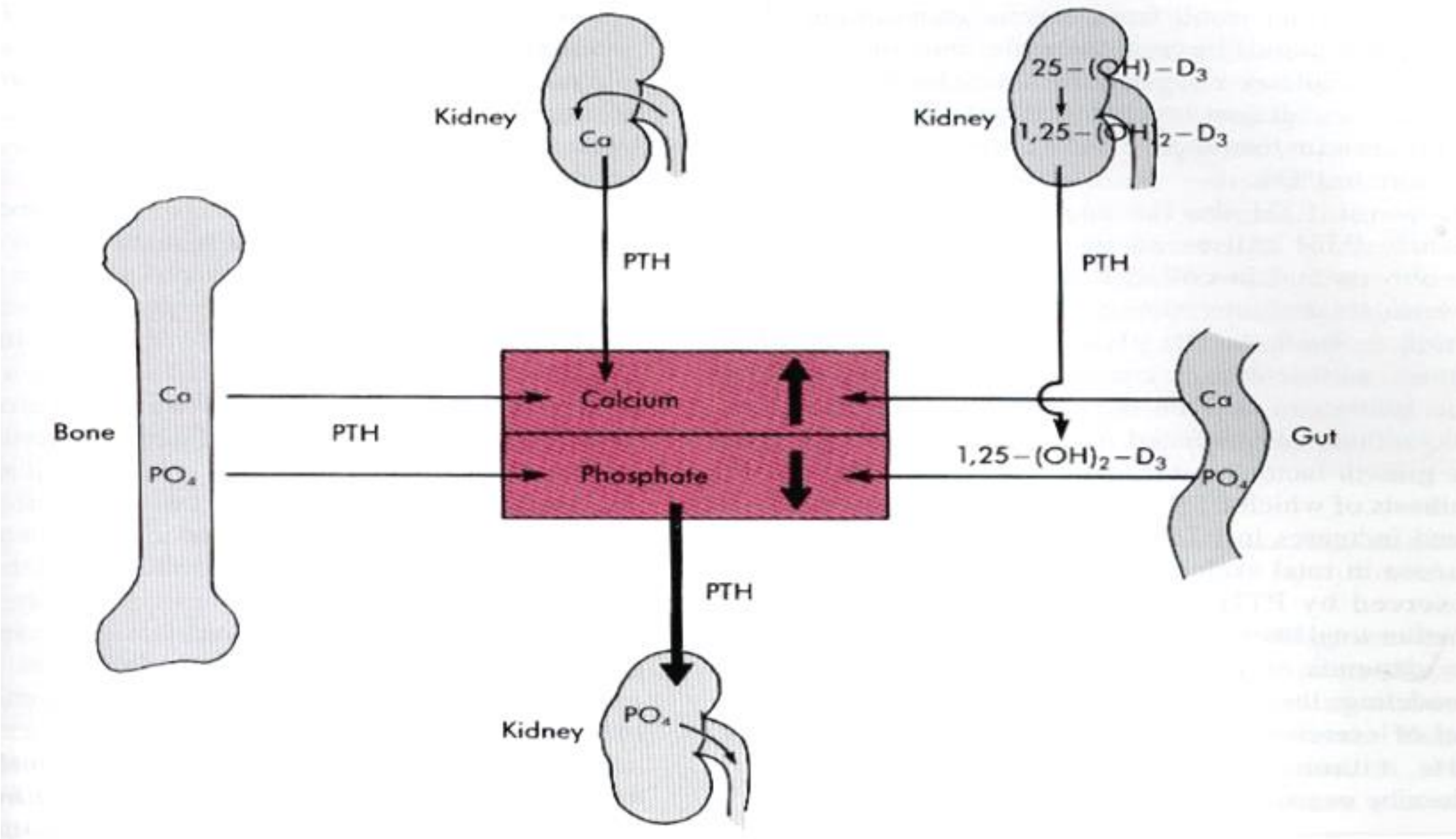
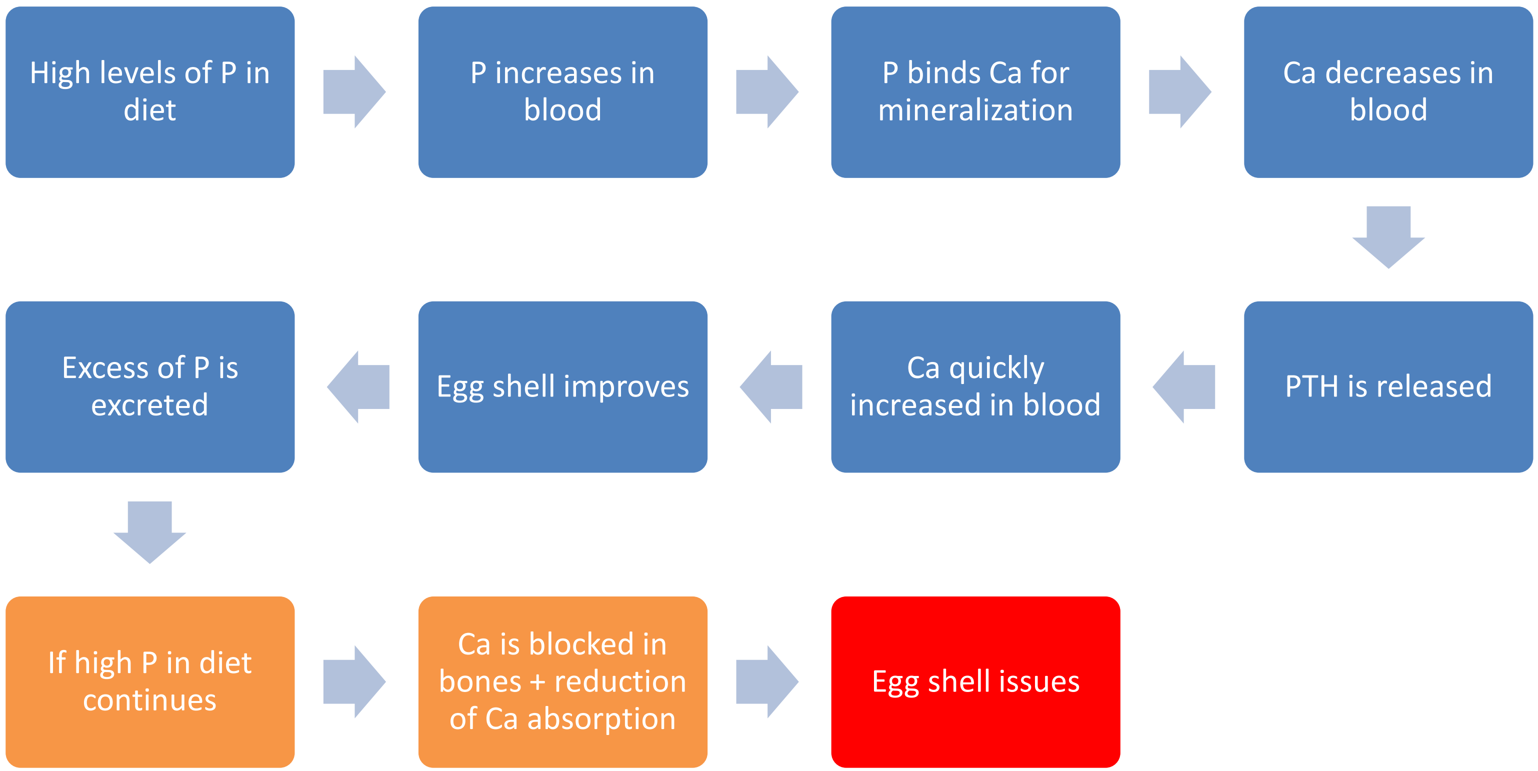
Ca – P – Vitamin D

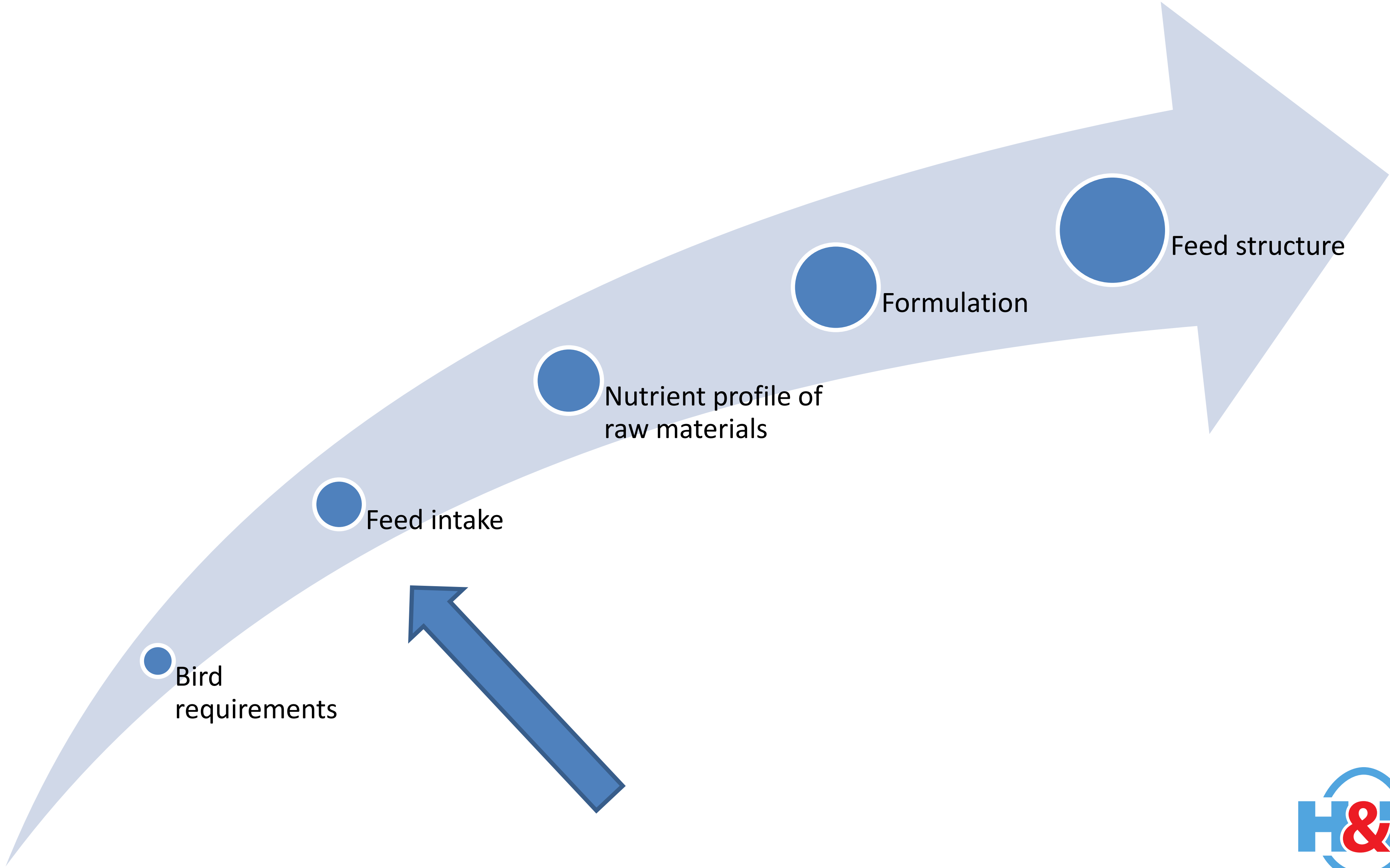


Calcitonine antagonism of the PTH and depends on Ca levels

Ca – P – Vitamin D balance

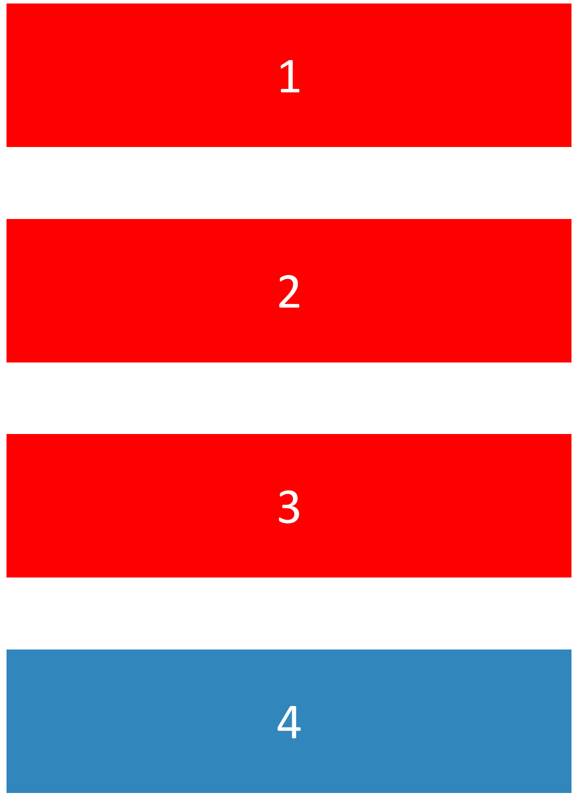


5 steps in feeding



How much a Brown Nick eats

1. 110 gr / 24 lb
2. 115 gr / 25 lb
3. 120 gr / 26 lb
4. All the above



How much Nick chick eats

1. 105 gr / 23 lb	1
2. 110 gr / 24 lb	2
3. 115 gr / 25 lb	3
4. All the above	4

What is the feed intake driver?

1. Protein
2. Energy
3. Phosphorus
4. All the above

1
2
3
4

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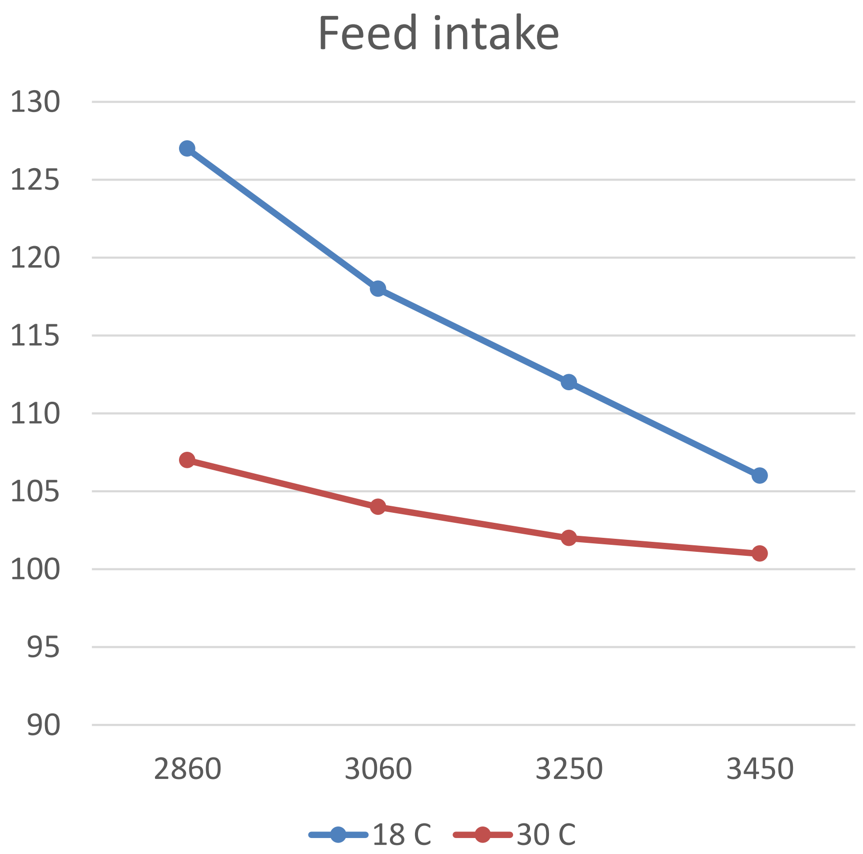
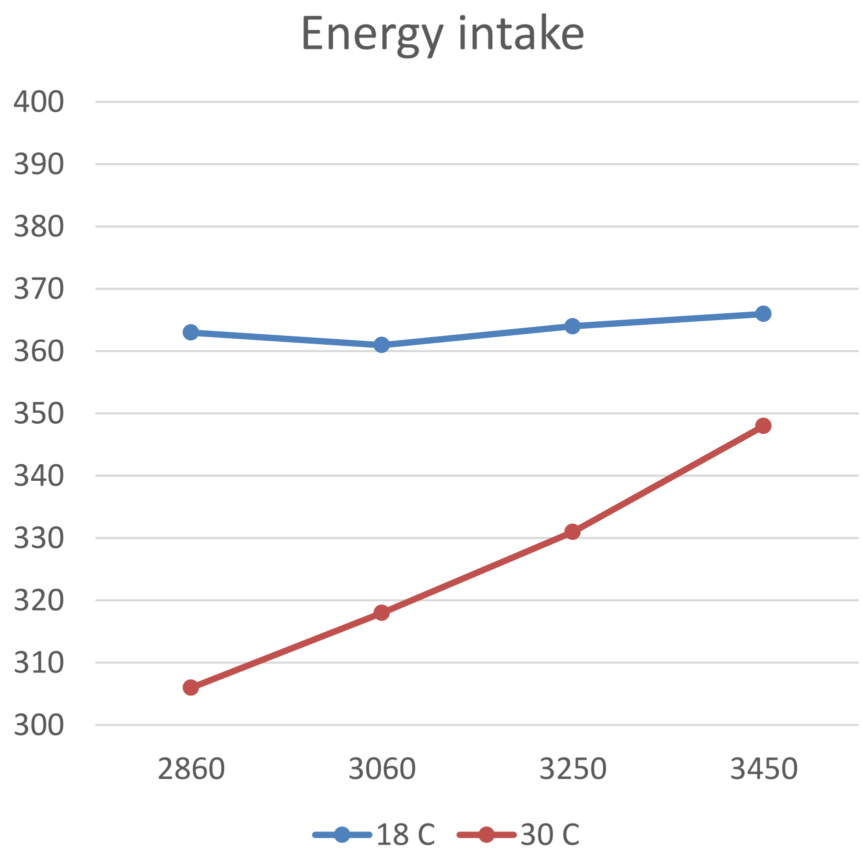
Feed intake

- People dependent:
  - Company-Marketing
  - Farmer targets
- Production dependent:
  - Feed intake capacity
  - Housing:
    - Open vs Close; Winter vs Summer; Cage vs Cage free
  - Health
- Deficiencies in nutrients

Feed intake behaviour





Courtesy of Steve Leeson

Feed intake

	Nec / ave / dia	105	110	115
EM	314	2990	2855	2730
D Lys	830	0.790	0.755	0.722
D Met	415	0.395	0.377	0.361
D M+C	747	0.711	0.679	0.650
D Thr	581	0.553	0.528	0.505
D Trp	183	0.174	0.166	0.159
Ca	4.1 gr	3.90	3.73	3.56
Av P	420 mg	0.40	0.38	0.36

Feed intake – make your math

Lower feed intake
- FCR is low
- Need antibiotics for keeping gut health
- Diet with only 2-3 raw materials
- Lower transport cost of ingredients and feed

Higher feed intake
- FCR is high
- It has fiber to improve digestibility of amino acids
- Better feather quality: energy intake lower
- Multiple raw material diets

At the end: What is the cost of production per bird and flock?

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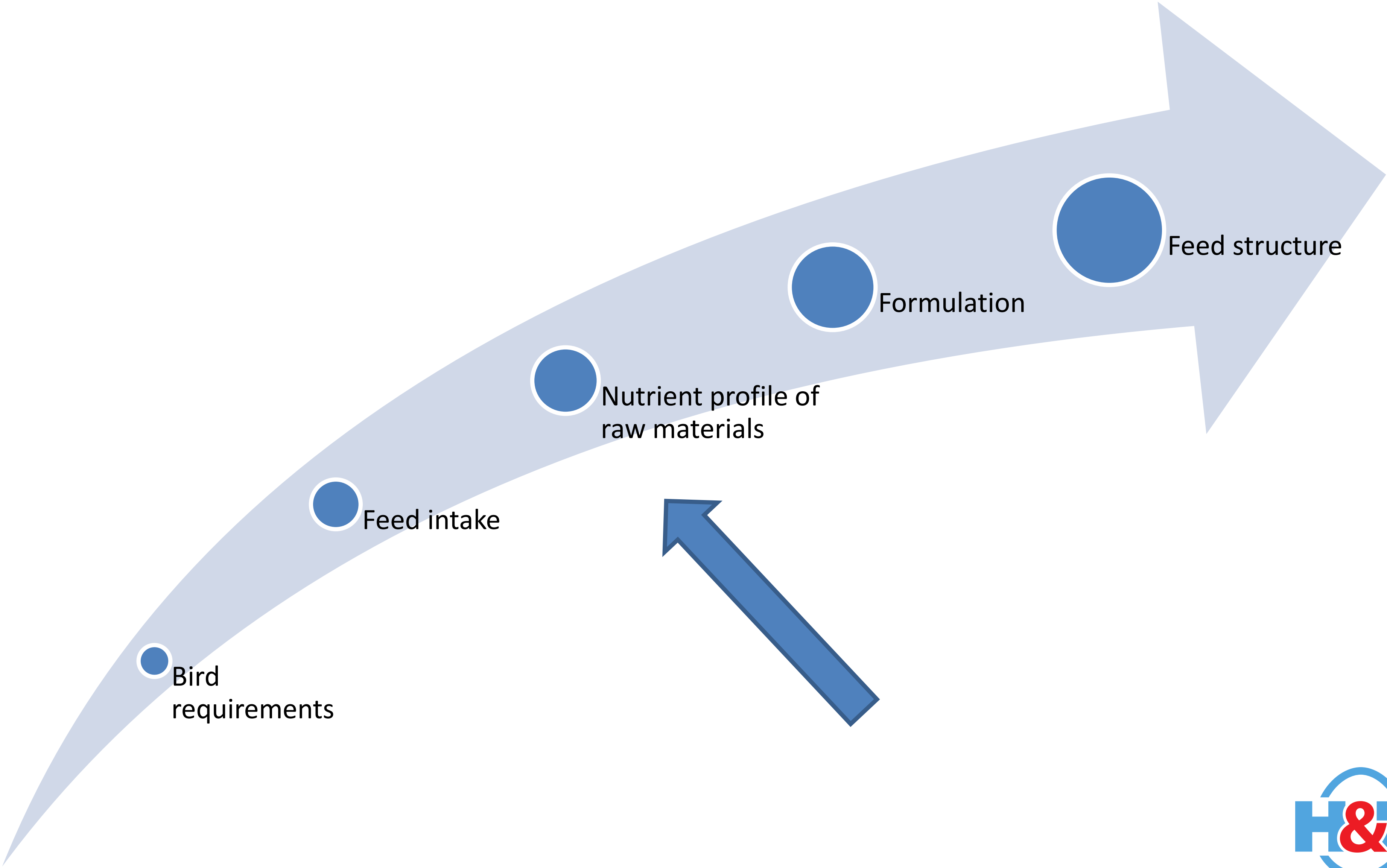
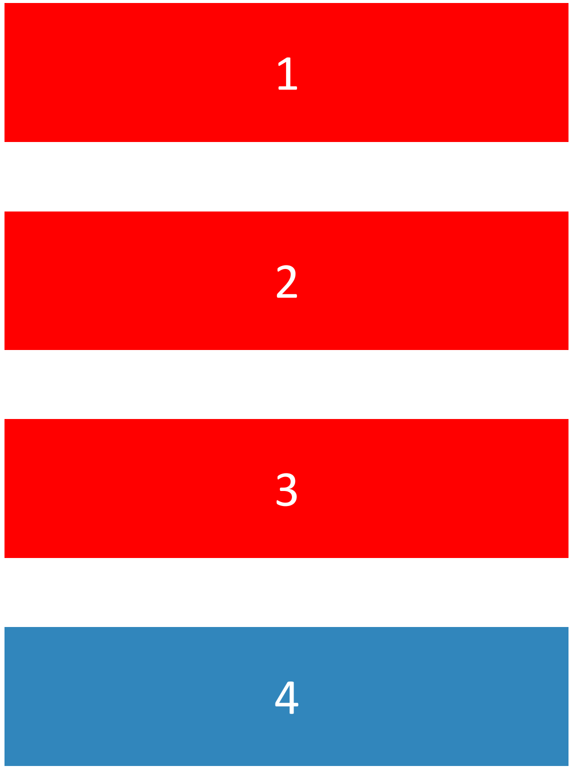
5 steps in feeding



What is the energy of corn?

1. 3100 kcal
2. 3200 kcal
3. 3300 kcal
4. All the above



What is the most energetic raw material?

1. Corn
2. Wheat
3. Soya oil
4. Palm oil

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How to calculate energy

- Animal research
  - INRA, NRC, FEDNA…
  - Additive suppliers
- Formula
  - ME = 3.98 x gr starch + 3.10 x gr sugar
  + 3.7 x gr CP + 8.19 x gr fat

Where is the energy in the raw materials

	Energy kcal/kg	Starch	Sugars	Protein	Fat
Corn	3300	62%	1.7%	7.9%	3.5%
Wheat	3150	60.4%	1.5%	11.2%	1.4%
MBM	2650	0%	0%	52.3%	14.1%
Fish meal	3410	0%	0%	70%	9.5%
Soya meal 47%	2360	0.5%	7%	49%	1.9%
Rape seed meal	2030	0%	7%	31.2%	7.3%
Palm oil	8150	0%	0%	0%	99%
Soya oil	9000	0%	0%	0%	99%

Energy methods

By the book	ME Value	% in diet	Energy contribution	Total (kcal/kg)
Corn	3300	55	1815	2287
Soya	2360	20	472	

6.4% more

By the formula	ME Value	% in diet	Energy contribution	Total (kcal/kg)
Corn	3104	55	1707	2149
Soya	2210	20	442	

Crude protein is limiting

1. Egg size
2. Egg number
3. Egg shell
4. All the above

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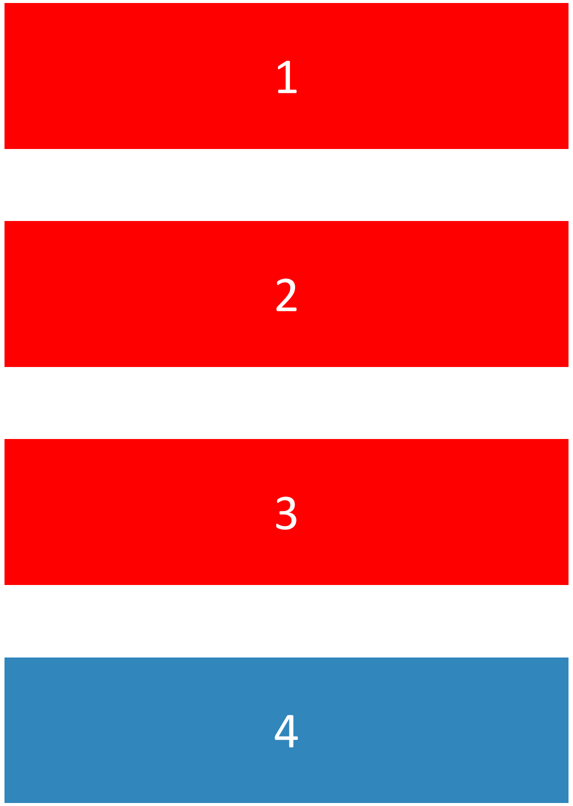
The best soya is from

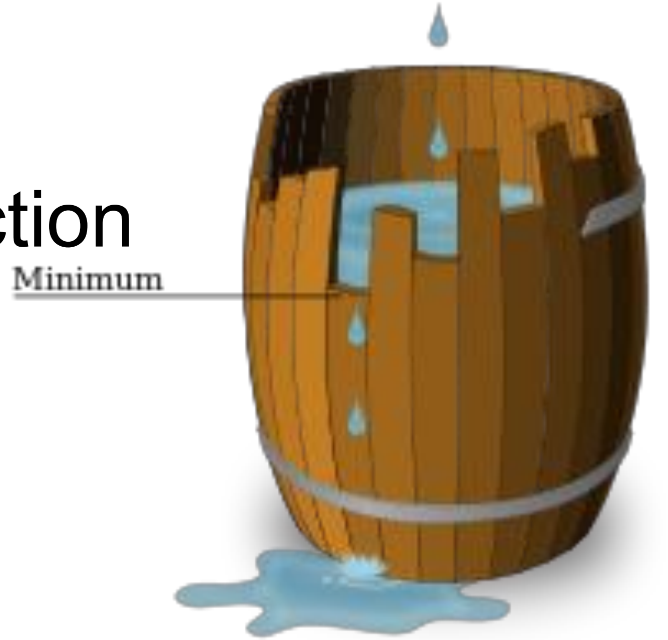
1. USA
2. Brazil
3. Argentina
4. All the above



Crude protein

- The crude protein (CP) content is calculated from the nitrogen content of the feed or raw materials
- It is assumed that the nitrogen is derived from protein containing 16 per cent nitrogen,and by multiplying the nitrogen figure by 6.25 (i.e. 100/16) an approximate protein value is obtained
- This is not ‘true protein’ since the method determines nitrogen from sources other than protein, such as free amino acids, amines and nucleic acids

Amino acids



- They will be limiting the production
  - Egg production and size
  - Growth
  - Feathering

- Key AA:
  - 1st Methionine; 2nd Lys; 3rd M+C

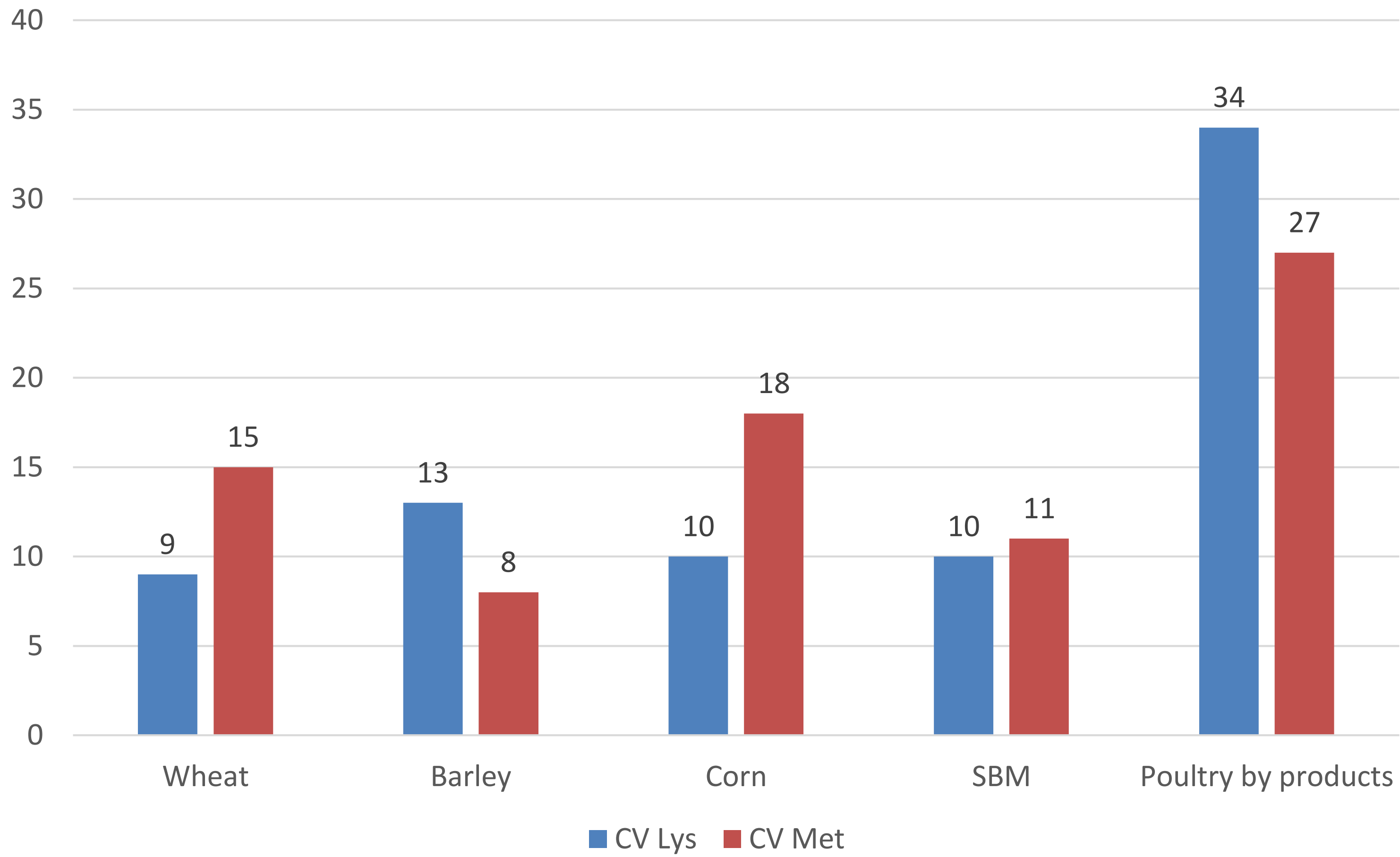
  - Keep a balance

Same SBM?

	n	Lys	TSAA	Thr	Trp
ARG	141	6.10[b]	2.87[a]	3.93[a]	1.37[a]
BRA	144	6.05[c]	2.81[b]	3.88[b]	1.34[c]
USA	170	6.16[a]	2.87[a]	3.91[a]	1.36[b]
SEM		0.005	0.005	0.002	0.001
P		***	***	***	***

PSA, 2014

Variability of the raw materials



Simmins PH, van Kempen (1999)

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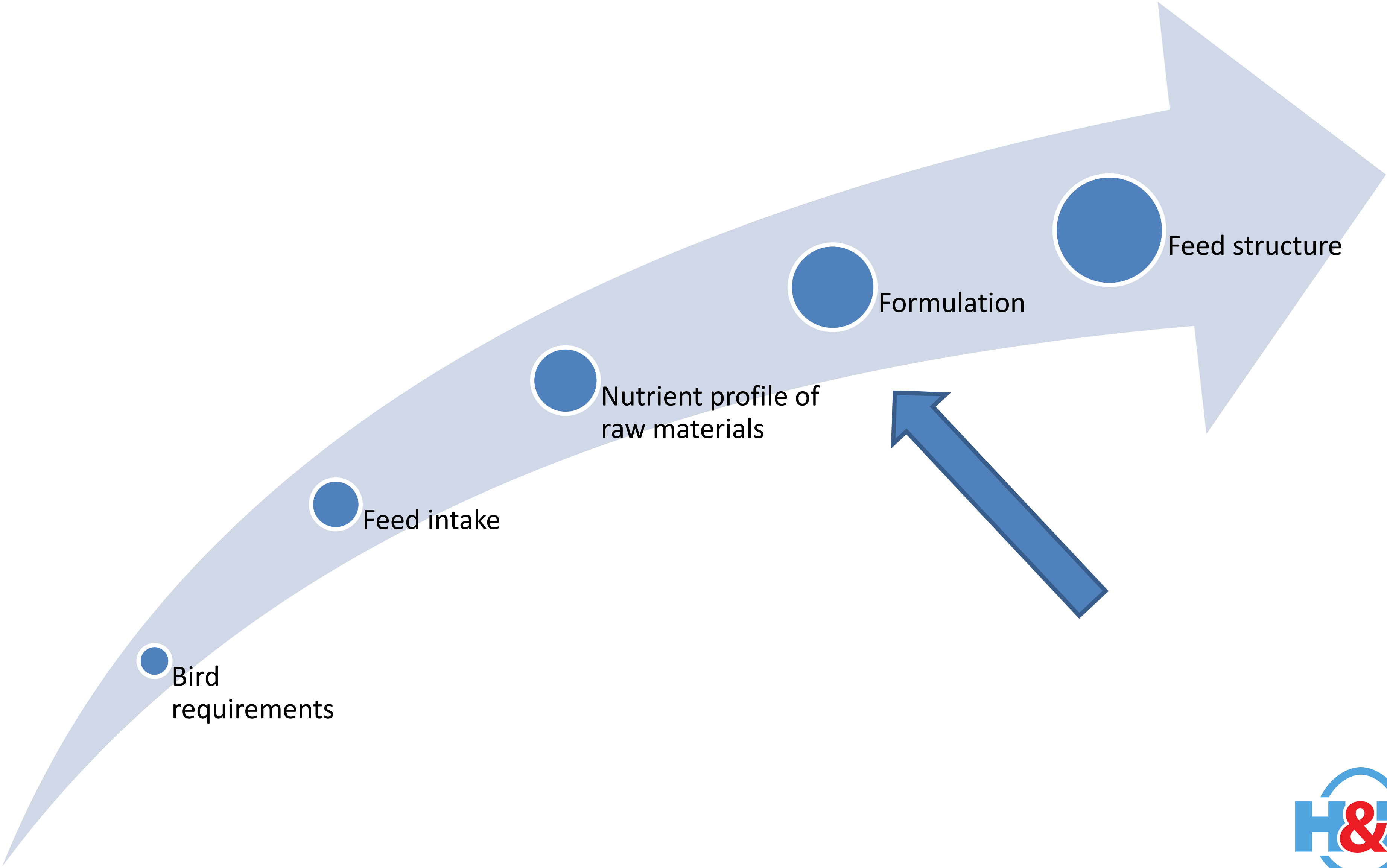
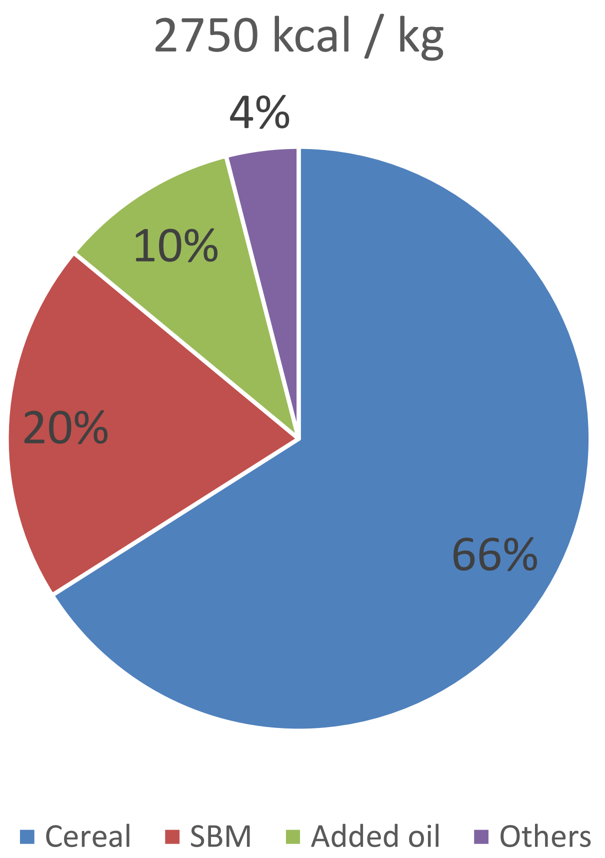
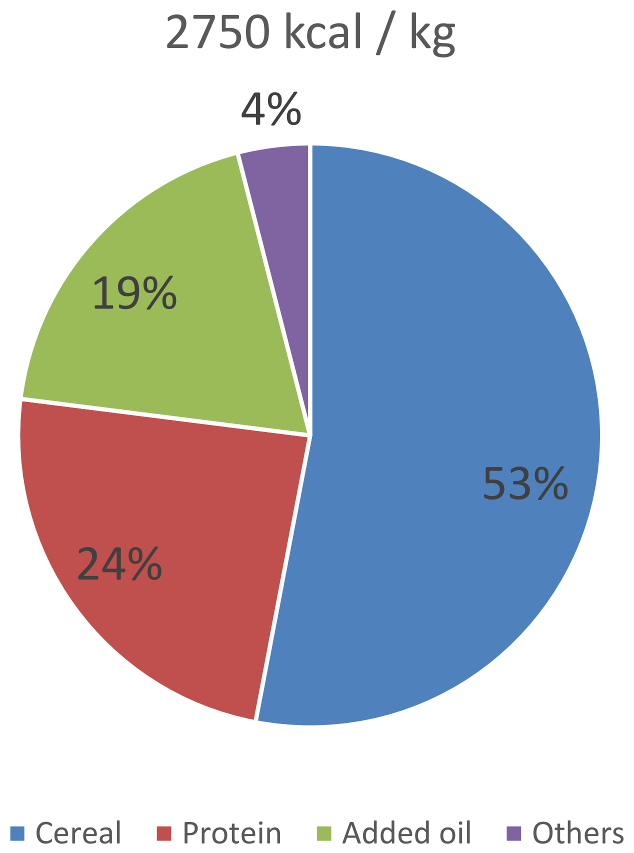
5 steps in feeding



Risk management in formulation





The best formulation for the birds

1. Left, cheap one.
2. Right, expensive one.

1

2

Enzymes need a substrate

Enzyme	Substrate	Where I can find it?
Phytases	Phytate/Phytic acid	All the vegetables
Xylanese	Xylans	Wheat, Barley > Corn
ß glucanase	ß glucanase	Barley > Wheat
Mananese	Mannans	SBM, Canola, Copra meal
Protease	Undigested proteain	All raw materials

Effect of phytases

Diet 1	%
Corn	50.47
Soya	34.44
Phytic acid	0.23

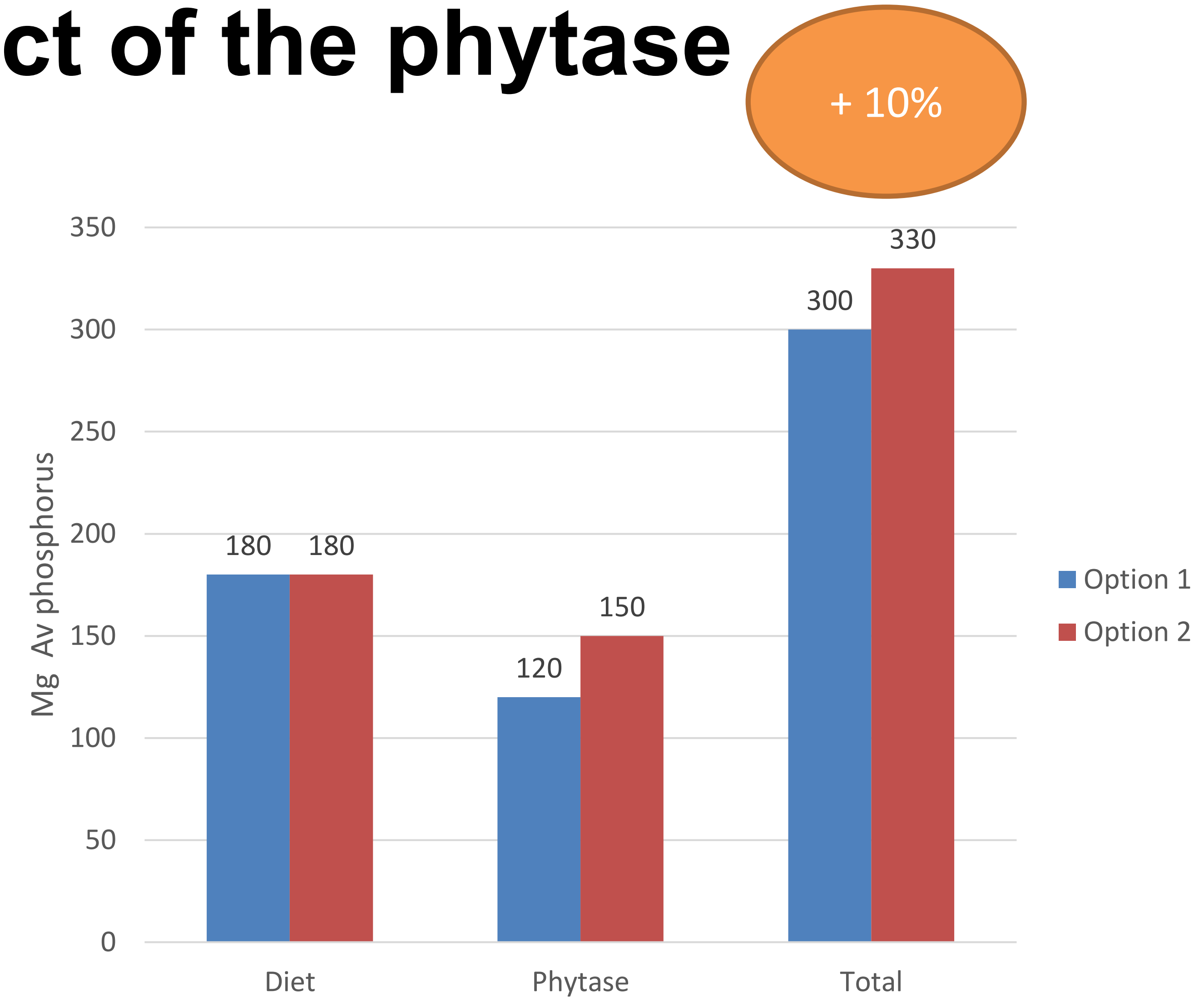
Diet 2	%
Corn	43.31
Soya	33.11
Rice bran	7
Phytic acid	0.30

30% more substrate

Same effect of the phytase?

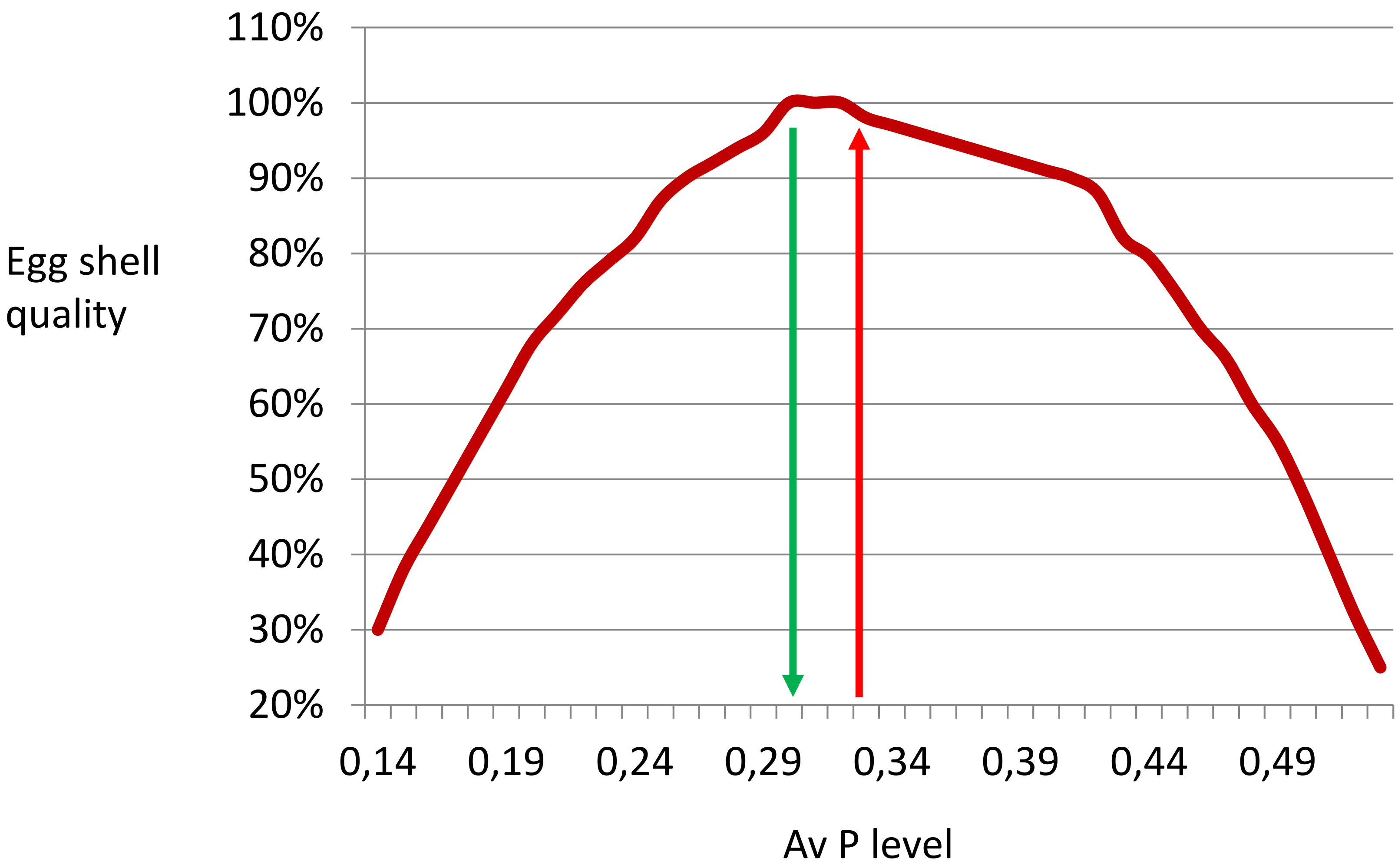
How much more P in the diet?

Effect of the phytase

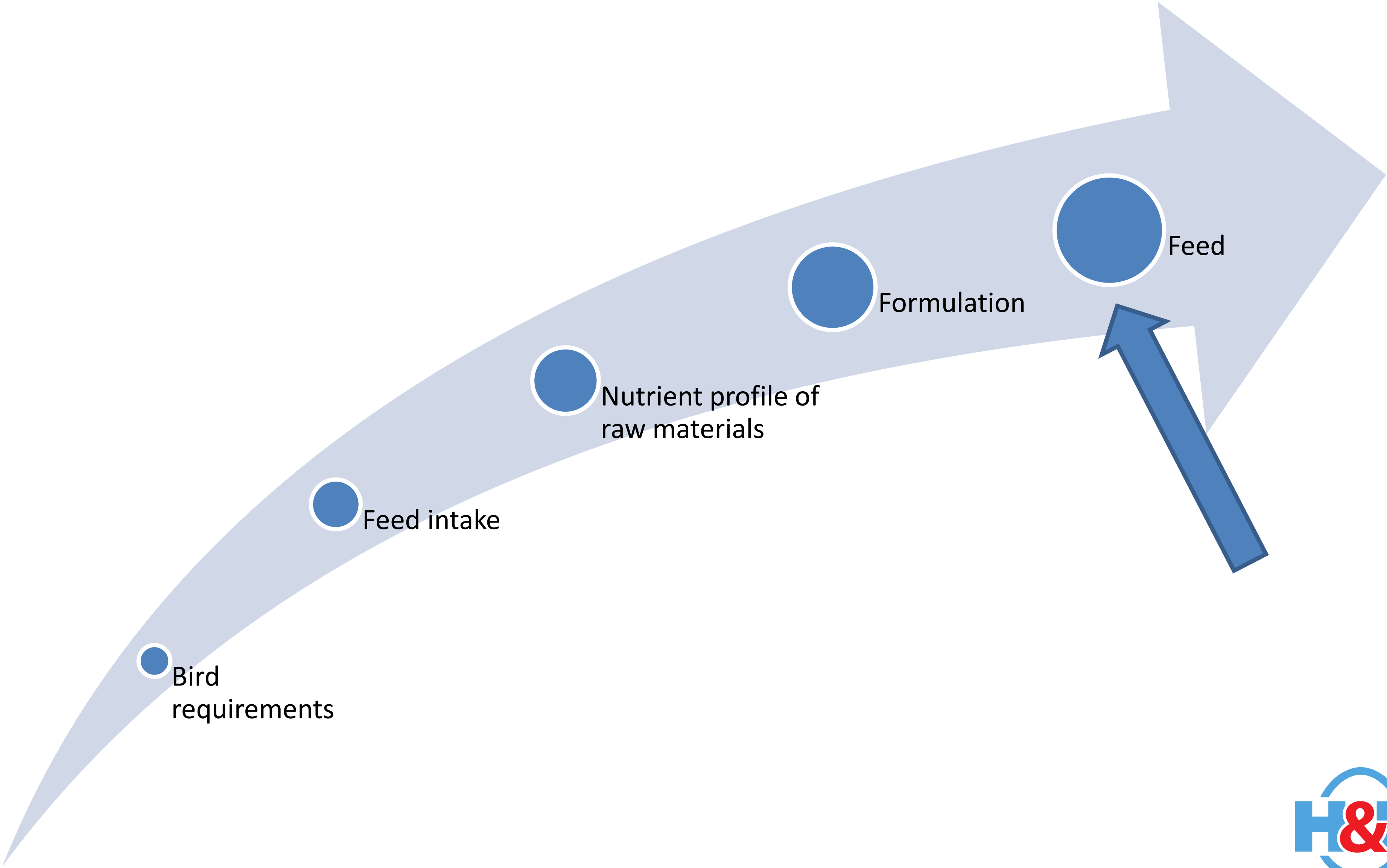


Recommendation after 70 weeks:
300 mg Av P/ bird / day

Performance vs nutrients



5 steps in feeding



Uniformity

Summary

- We need to understand the needs but also the how we are going to supply those needs
- Birds will tell us how good is the formulation we are doing
- Making the feed is a process, all steps are important