H&N INTERNATIONAL EXCLUSIVE

FEEDING INSIGHTS

Turning H&N R&D feed trials into practical results for your flock

EGG SIZE VERSATILITY IN NICK CHICK

H&N NUTRITION TEAM

H&N® INTERNATIONAL

Optimizing Diets
for Performance from 26–56 Weeks

At H&N International, we continuously evaluate how nutrition strategies impact laying performance, egg size, and overall flock efficiency. A recent trial with **Nick Chick layers** explored the effect of **four dietary protein and amino acid levels** while maintaining constant energy.

Material and Methods

Nick Chick hens were housed (368 birds, 72 cages) at 16 weeks of age and light stimulated at a body weight of 1,250 grams. All hens were offered the same feed the same feed until the trial started at 26 weeks of age.

Trial diets were formulated by the H&N nutrition team and produced in a local facility. Raw material analysis was conducted with the support of EVONIK and the diets were a combination of corn, soya bean meal, wheat bran, and soya oil (**Table 1**). Diets were formulated to achieve a feed intake of 110g. The treatment diets consisted of different amino acids levels and were defined as: Very Low (VL), Low (L), High (H), and Very High (VH). The ideal protein ratio remained constant for all diets, as did energy (2,810 kcal). The ideal protein ratio of the diets remained constant. See below nutritional specifications and diets.

Nutrient spefications	VL	L	H	VH
Crude protein (%)	13	14.3	15.5	16.79
ME birds (Kcal/Kg)	2,810	2,810	2,810	2,810
Starch (%)	44.2	42.8	41.4	40
Sugars (%)	3.3	3.5	3.7	3.89
Crude fibre (%)	2.77	2.7	2.5	2.44
Neutral detergent fibre (%)	12.11	11.4	10.7	10.01
Ash (%)	11.36	11.5	11.6	11.68
Fat (%)	4.68	4.6	4.6	4.55
Linoleic acid (%)	2.45	2.4	2.4	2.36
Digestible Lys poultry (%)	0.56	0.64	0.71	0.79
Digestible Met poultry (%)	0.32	0.38	0.44	0.50
Digestible M+C poultry (%)	0.52	0.59	0.66	0.73
Digestible Thr poultry (%)	0.42	0.46	0.51	0.55
Digestible Trp poultry (%)	0.13	0.14	0.16	0.18
Digestible Arg poultry (%)	0.73	0.82	0.90	0.99
Digestible Val poultry (%)	0.53	0.58	0.63	0.68
Digestible Ileu poultry (%)	0.46	0.51	0.56	0.62
Calcium (%)	3.85	3.85	3.85	3.85
Total Phosphorus (%)	0.63	0.63	0.63	0.63
Phytic Phosphorus (%)	0.25	0.25	0.24	0.24
Available Phosphorus (%)	0.36	0.36	0.36	0.36
Digestible Phosphorus poultry (%)	0.19	0.19	0.20	0.20

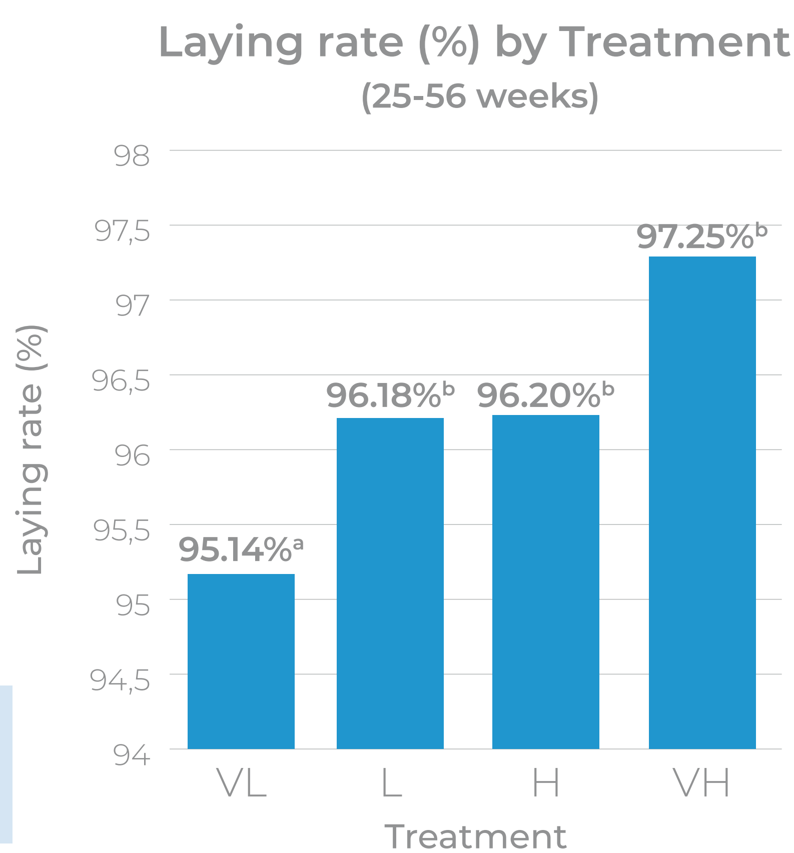
	VL	L	H	VH
Corn	61.2	59.9	58.6	57.3
SBM	13.7	17.2	20.6	24.0
Wheat Bran	12.4	10.2	8.1	5.9
Calcium carbonate mix	9.0	9.0	8.9	8.9
Soya oil	2.0	2.0	2.0	2.0
Dicalcium phosphate	0.51	0.52	0.53	0.54
Salt	0.28	0.28	0.28	0.28
Mycotoxin binder	0.25	0.25	0.25	0.25
Premix	0.25	0.25	0.25	0.25
Sodium bicarbonate	0.16	0.16	0.16	0.16
DL Met	0.14	0.18	0.22	0.27
Enzymes	0.10	0.10	0.10	0.10
L-Lysine Cl	0.03	0.03	0.03	0.03
L-Threonine	0.01	0.02	0.02	0.03

Table 1: *Diets and nutritional specifications. for treatments defined as Very Low (VL), Low (L), High (H), and Very High (VH) amino acid levels.*

Results

Laying Rate

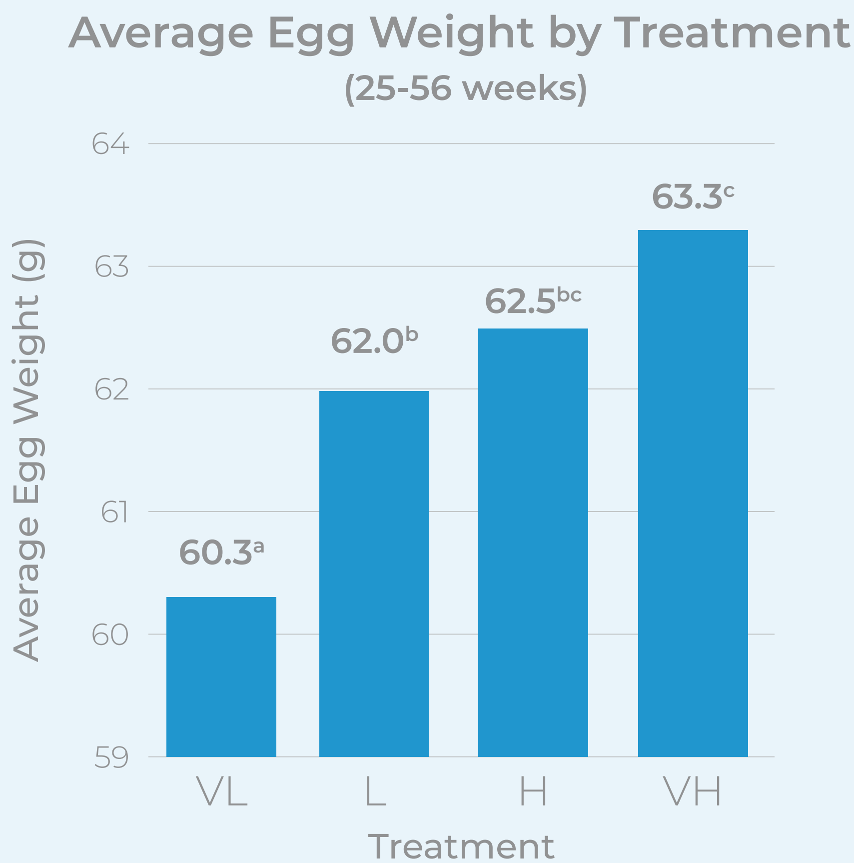
Hens fed the Very Low amino acid diet showed a significant decrease in rate of lay when compared to the other three treatments. Rate of lay was numerically increased for hens fed the Very High diet, but their performance remained statistically similar to the Low and High groups.



Graph 1: *Laying rate (%) as influenced by diets of different amino acid levels, from Very Low (VL), Low (L), High (H) to Very High (VH).*

Egg Weight

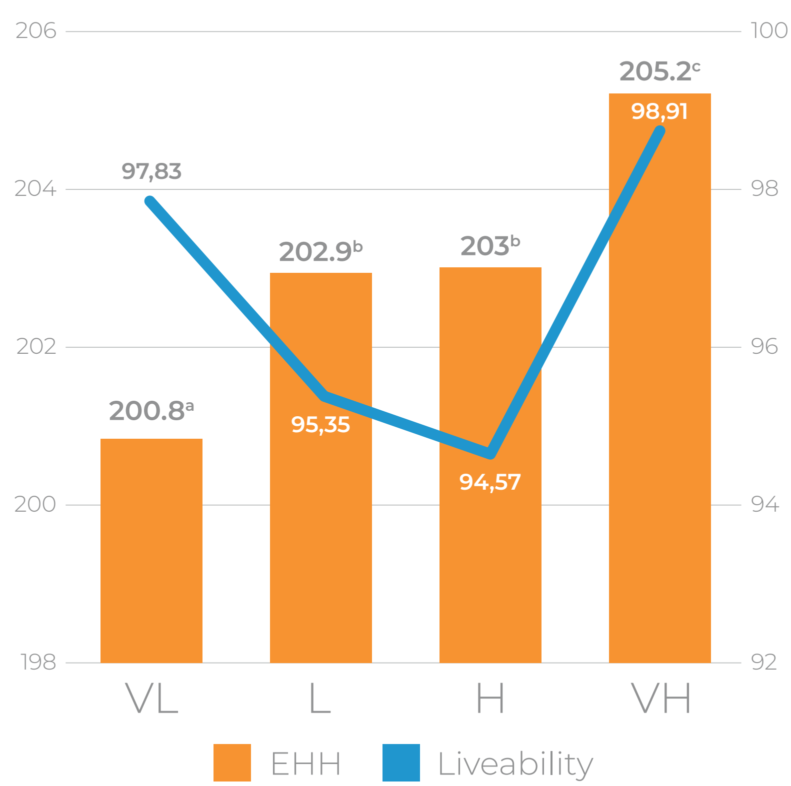
There was a clear progression of egg size based on the levels of amino acid intake. Significant differences were noted between the VL, L, and VH diets, confirming that higher amino acid intakes are associated with increases in egg size. Interestingly, the Low treatment produced an egg size similar to the Nick Chick standard.



Graph 2: Average egg weight as influenced by different dietary levels of amino acids ranging from Very Low (VL), Low (L), High (H) to Very High (VH).

Total Eggs per Hen Housed (EHH)

There was a clear and significant effect on the number of EHH depending of the diet. This parameter was defined by the significant effect of the % of lay shown in **Graph 1** and the non significant effect of the mortality.

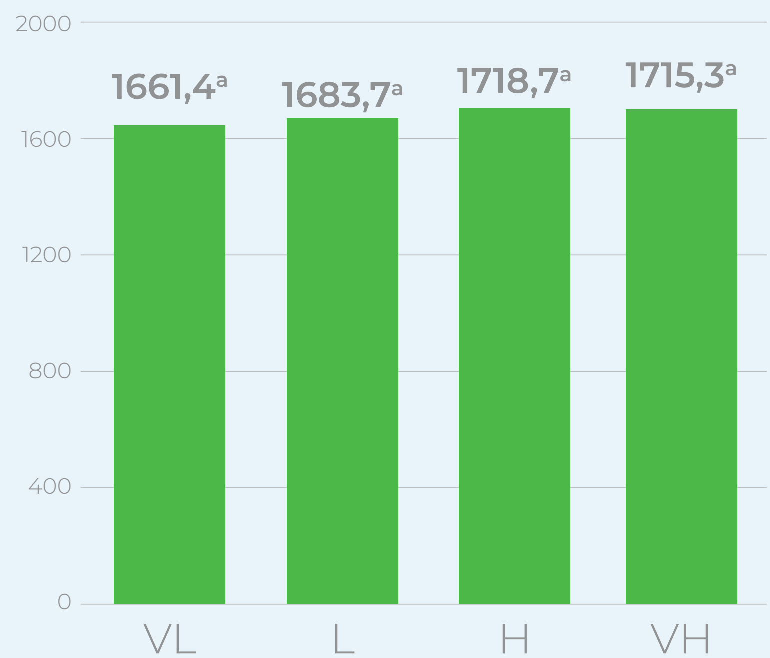


Graph 3: Total eggs per hen housed and livability as influenced by dietary amino acids levels ranging from Very Low (VL), Low (L), High (H) to Very High (VH).

Feed Intake and Body weight

Feed intake remained similar between the treatments (between 111–112 grams) due to the diets being formulated to the same energy. Body weight was also not significantly different between treatments (**Graph 4**), however a numerically higher body weight was noted for the treatments which produced the highest egg weights (H and VH).

Graph 4: *Average hen body weight as influenced by dietary amino acid levels defined as Very Low (VL), Low (L), High (H) to Very High (VH).*



Cost Analysis of Egg Production

It is important to understand the cost implications of using all these diets in different scenarios. Based on the cost of feed at the time of the trial and applying the same feed intake, the cost per egg was not significant different (**Table 2**). However there was a numerically higher cost associated with the increase egg production. This analysis does not include the price producers can receive for the different egg sizes produced by each treatment, which could help offset production costs.

Feed consumption for the period
30 week x 7 days x 111 grams = 23.31 kilo grams

$$\frac{\text{Cost}}{\text{egg}} = \frac{\text{Feed cost x Feed consumption}}{\text{Eggs Hen housed}}$$

Here's the table alone, ready for you to copy into Word or Excel:

Label	Feed price (€/TN)	Feed cost/ hen (€)	Eggs/HH	Cost/egg (€)
VL	270,46	6,31	200,8	0,0314
L	284,27	6,63	202,9	0,0327
H	298,08	6,94	203,0	0,0342
VH	311,89	7,27	205,2	0,0354

Table 2: *Comparison between costs associated with diets of different amino acid levels and egg production.*

Practical Takeaways

Amino acids drive egg size

Increasing digestible Lys from 0.56% to 0.79% raised average egg weight by 3 g.

Economic balance

The Very High diet had the highest feed cost and best production compared to the lower amino acid treatments. However producers must weigh feed cost against production costs and their market's preference for larger eggs to decide which diet is best for them. Producers must weigh the added feed cost against gains and market preference for larger eggs.

Efficiency matters

While differences in laying rate were modest for the 26 – 56 week trial period, in a longer production cycle higher level of amino acids can further influence the number of eggs produced.

Nutritional discussion

Amino acids drive egg size

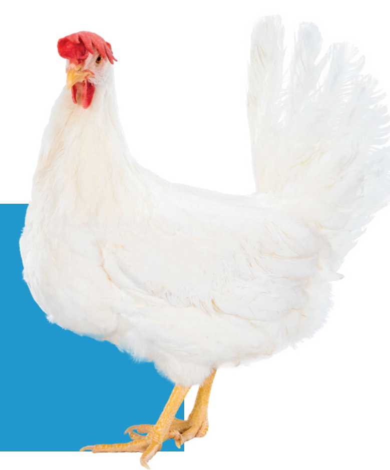
The sensitivity of egg size to amino acid intake in Nick Chick hens is very clear from these results. Therefore, when challenges with achieving egg size arise, one of the first points to examine should be if the birds have a sufficient level of amino acid intake and if this intake is being used for egg production.

Crude protein vs % lay

There is a lost of % lay when using diets of 13% Crude protein at an intake of 111 grams. As per the literature, we can assume that the nonessential amino acids play a role in egg production that is only influential when diets are too low in crude protein.

Conclusion for Nick Chick supporters

Nick Chick hens respond positively to different levels of amino acids; the versatility of Nick Chick allows egg producers to aim for different egg markets with the same bird.



Optimizing Diets

for Performance from 57–93 Weeks

At H&N International, we continuously evaluate how nutrition strategies impact laying performance, egg size, and overall flock efficiency. A recent trial with **Nick Chick layers** explored the effect of **four dietary protein and amino acid levels** while maintaining constant energy.

Material and Methods

After the Nick Chick egg size versatility trial in 26 – 56 week old hens presented in chapter 1, treatments and hen numbers were adjusted for the 57 – 93 week production period. The trial continued with fewer Nick Chick hens (256 birds, 54 cages) and three treatments of varying amino acid levels set at Very Low (VL), Low (L), and High (H).

Trial diets were formulated by the H&N nutrition team and produced in a local facility. Raw material analysis was conducted with the support of EVONIK and the diets were a combination of corn, soya bean meal, wheat bran, and soya oil (**Table 1**). However, in this trial amount of synthetic amino acids used was increased to six as compared to three in the previous trial. Diets were formulated to target a 110g feed intake, with energy remaining constant at 2,810 kcal and the ideal protein ratio kept consistent across the three treatments (**Table 1**).

Nutrient specifications	VL	L	H
Crude protein (%)	11.16	12.38	13.61
ME birds (Kcal/Kg)	2,810	2,810	2,810
Starch (%)	45.2	44	42.7
Sugars (%)	3.12	3.31	3.50
Crude fiber (%)	2.3	2.21	2.12
Neutral detergent fiber (%)	10.64	9.87	9.1
Ash (%)	11.7	11.8	11.9
Fat (%)	4.66	4.60	4.53
Linoleic acid (%)	2.47	2.440	2.410
Digestible Lys poultry (%)	0.56	0.64	0.71
Digestible Met poultry (%)	0.35	0.41	0.47
Digestible M+C poultry (%)	0.52	0.59	0.66
Digestible Thr poultry (%)	0.405	0.46	0.51
Digestible Trp poultry (%)	0.135	0.15	0.17
Digestible Arg poultry (%)	0.60	0.52	0.585
Digestible Val poultry (%)	0.51	0.57	0.64
Digestible Ileu poultry (%)	0.46	0.68	0.76
Calcium (%)	4.1	4.1	4.1
Total Phosphorus (%)	0.59	0.58	0.58
Phytic Phosphorus (%)	0.24	0.22	0.22
Available Phosphorus (%)	0.33	0.33	0.33
Digestible Phosphorus poultry (%)	0.17	0.18	0.18

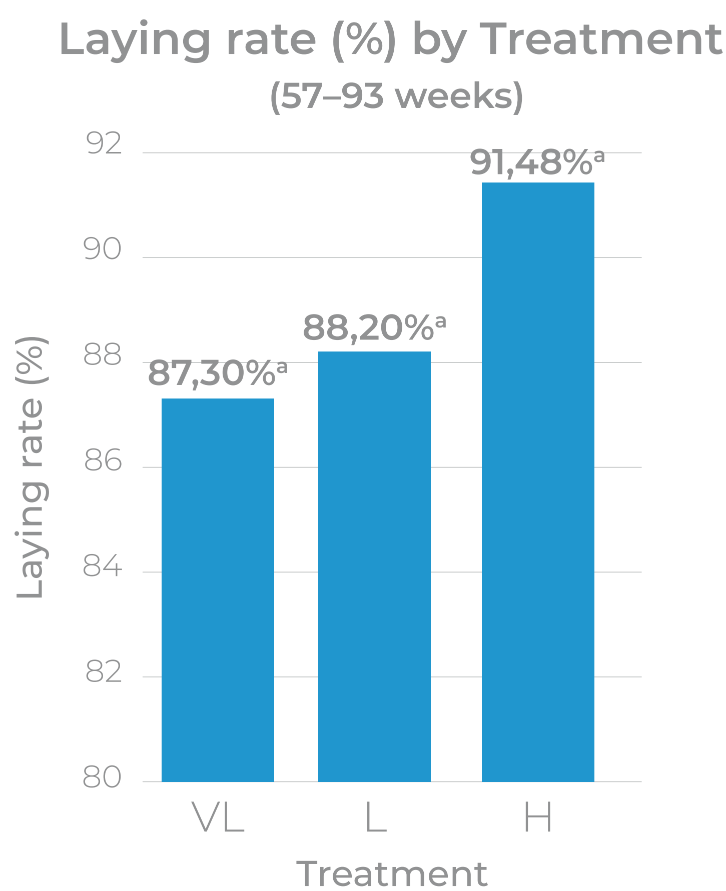
	VL	L	H
Corn	64.44	63.41	62.38
SBM	10.72	14.07	17.43
Wheat bran	11.10	8.69	6.28
Calcium carbonate mix	9.74	9.71	9.69
Soya oil	2.00	2.00	2.00
Dicalcium phosphate	0.37	0.38	0.40
DL Met	0.20	0.24	0.29
L-Lysine Cl	0.142	0.146	0.149
L-Isoleucine	0.091	0.103	0.114
L-Threonine	0.077	0.092	0.106
Valine	0.066	0.086	0.105
L-Tryptophane	0.023	0.028	0.033
Salt	0.28	0.28	0.28
Sodium bicarbonate	0.16	0.16	0.16
Premix	0.25	0.25	0.25
Acids	0.20	0.20	0.20
Enzymes	0.10	0.10	0.10
Micotoxin binder	0.05	0.05	0.05

Table 1: *Nutrient specifications and diet composition for the dietary treatments with Very Low (VL), Low (L), and High (H) amino acid levels.*

Results

Laying Rate

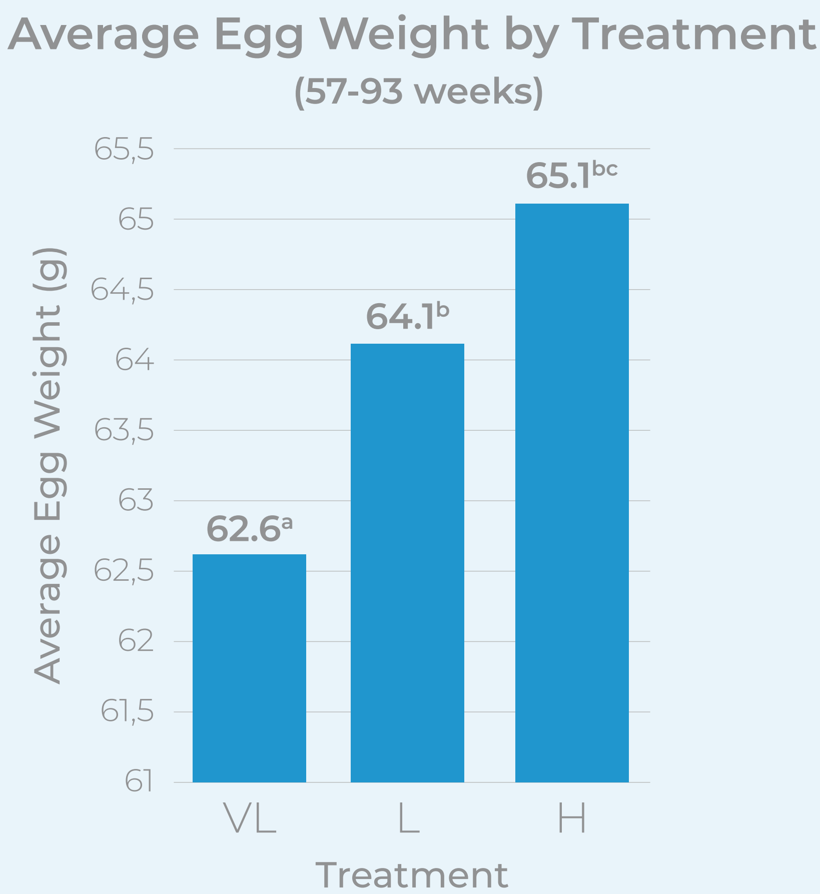
The Laying rate was not significantly affected by the level of dietary amino acids. Although egg production in hens from the High diet was numerically higher, the difference was not significant (p=0.08).



Graph 1: *Laying rate (%) as influenced by diets of different amino acid levels, from Very Low (VL), Low (L), to High (H).*

Egg Weight

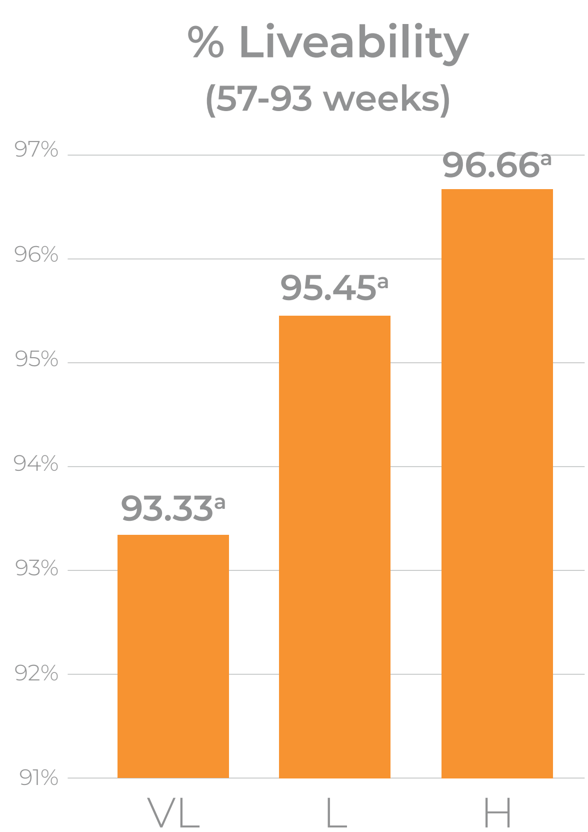
Egg weight was significantly affected by dietary amino acids levels. As shown in **Graph 2**, increases in egg size coincide with higher levels of amino acid intake. Egg size in the Low treatment was similar to the standard for Nick Chick hens.



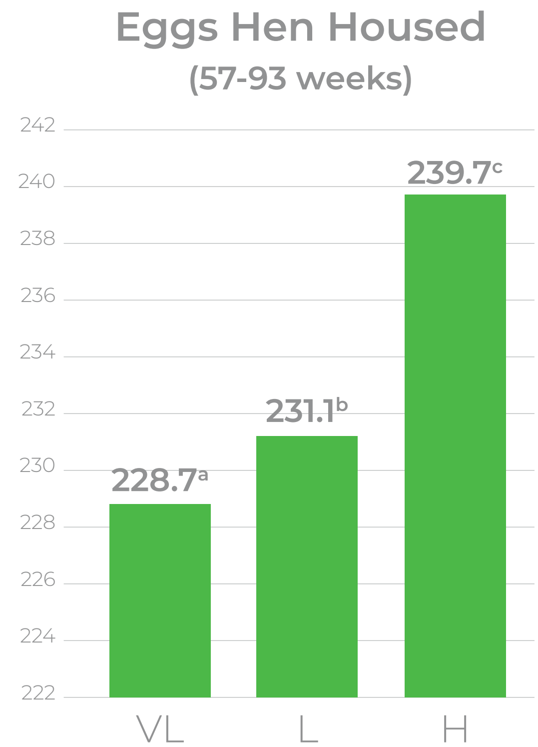
Graph 2. *Average egg weight as influenced by different dietary levels of amino acids defined as Very Low (VL), Low (L), and High (H).*

Total Eggs per Hen Housed (EHH)

All the birds performed above the standard for the period of age the trial was done. There was a clear effect of amino acid levels on EHH, which increased significantly with higher amino acid intakes (**Graph 3**). This effect contributed to the rate of lay results (**Graph 1**) and was positively influenced by liveability (**Graph 4**), however the differences between treatments were only significant for EHH.



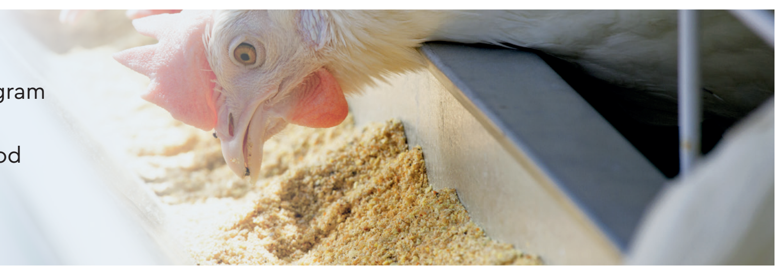
Graph 3: *Liveability as influenced by dietary amino acids at Very Low (VL), Low (L), and High (H) levels.*



Graph 4: *Eggs per hen housed for diets varying in amino acid levels from Very Low (VL), Low (L), to High (H).*

Feed Intake

There was not an effect on feed intake (106–107 gram range), as all the diets had the same energy and all the birds had similar body weight. In this period the feed intake was lower than expected as part of the trial was conducted during the summer.



Cost Analysis of Egg Production

It is important to understand the cost implications of using all these diets in different scenarios. Based on the cost of feed at the time of the trial and applying the same feed intake, the cost per egg was not significant different (Table 2). However there was a numerically higher cost associated with the increase egg production. This analysis does not include the price producers can receive for the different egg sizes produced by each treatment, which could help offset production costs.

Feed consumption for the period
37 week x 7 days x 106 grams = 27.45 kilo grams

$$\frac{\text{Cost}}{\text{egg}} = \frac{\text{Feed cost x Feed consumption}}{\text{Eggs Hen housed}}$$

Here's the table alone, ready for you to copy into Word or Excel:

Label	Feed price (€/TN)	Feed cost/ hen (€)	Eggs/HH	Cost/egg (€)
VL	283,8	7,79	228,7	0,0340
L	293,9	8,07	231,1	0,0349
H	304,0	8,34	239,7	0,0347

Table 2: *Comparison between costs associated with diets of different amino acid levels and egg production. This table is ready to copy into Word or Excel.*

Practical Takeaways

Amino acids drive egg size
Increasing digestible Lys increased the egg size in the different groups for the second part of the production (57–93 weeks).

Excess nitrogen
Feeding hens with low levels of protein and including synthetic amino acids increases amino acid utilization. The amino acid levels formulated in these diets can be used when this combination is applied.

Productivity
These results suggest that formulating to such low levels of crude protein could have an impact on productivity. The impact may not be directly on one production parameter, but may be the sum of several variables that were affected. Therefore, **it might be important to define a minimum for Crude Protein when pushing to very low levels.** *(Check Chapter III)*

Economic balance
The increased performance achieved in the High group can reduce the cost of egg production below that of the Low group.

Nutritional discussion

Amino acids drive egg size

The sensitivity of egg size to amino acid intake in Nick Chick hens is very clear from these results. Therefore, when challenges with achieving egg size arise, one of the first points to examine should be if the birds have a sufficient level of amino acid intake and if this intake is being used for egg production.

Crude protein

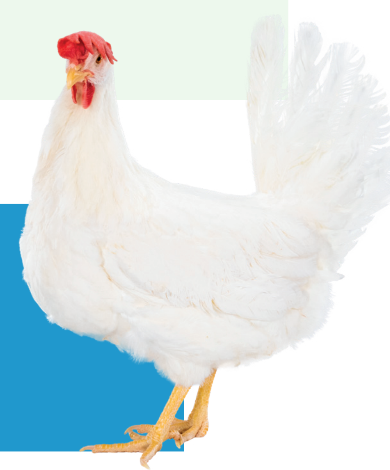
If the intake of crude protein is below certain level, there could be some effect on the productivity of the birds. It seems lower levels of crude protein may boost egg size when combined with synthetic amino acids, however going too low may have consequences for production. As per the literature, we can assume that the nonessential amino acids play a role in egg production that is only influential when diets are excessively low in crude protein.

Synthetic amino acids

The performance of the birds didn't collapse, even at very low levels of crude protein with high levels of synthetic amino acids. This opens the door to the use of local raw materials, so long as the synthetic amino acid price is competitive against the soya bean meal prices.

Conclusion for Nick Chick supporters

Nick Chick hens respond positively to different levels of amino acids; the versatility of Nick Chick allows egg producers to aim for different egg markets with the same bird.



Nutrient intake

Young vs old hens

The trial on egg versatility produced interesting results regarding egg size and how diets can be adapted to meet production needs. Given the length of the trial, a large amount of information was recorded, allowing for multiple comparisons. This chapter focuses on nutrient intake and compares the intake of nutrients with the performance observed in young versus older hens.

Material and Methods

Data from the trials described in Chapters I and II were combined. Diets in Chapter I contained higher levels of crude protein, while diets in Chapter II had lower crude protein but a higher supply of synthetic amino acids.

Results

Lysin intake

Average lysine intake was lower in Phase II diets compared to Phase I, even though both diets contained the same lysine levels. This difference can be explained by the timing of Phase II (July to February), when high temperatures reduced feed intake. Despite the lower amino acid intake, average egg size increased significantly in Phase II.

Discussion

It is well known that older hens tend to lay larger eggs, but producing larger eggs requires more amino acids. The question is: where do these amino acids come from?

- **Digestibility in older hens** does not appear to improve with age, in fact, gut health declines.
- **Digestibility of raw materials** may be lower than expected, while synthetic amino acids provide a boost beyond predictions.
- **Low crude protein diets** allowed hens to produce larger eggs than expected at recommended amino acid levels. Although synthetic amino acids are highly digestible, it seems unlikely they alone explain the observed increase.

For example, in Phase II the Very Low group consumed ~600 mg of lysine yet produced eggs similar in size to the High group in Phase I, which consumed ~780 mg. The Low group even produced larger eggs than the Very High group in Phase I, despite lower amino acid intake.

- **Older hens have lower metabolic rates** but are heavier than younger hens. If maintenance requirements are reduced with age, some amino acids may be spared. However, the quantities do not seem sufficient to explain the increase in egg size. For instance, assuming maintenance requires 20% of total amino acid intake, the Very Low group (600 mg lysine) would allocate ~120 mg to maintenance—insufficient to explain the larger eggs.

Amino acid storage (and it could be the one): as hens age, egg production (% lay) decreases, while daily amino acid intake remains constant. Amino acids not used for egg production could be stored and later utilized for larger eggs. The calculations suggest this is plausible, though unproven.

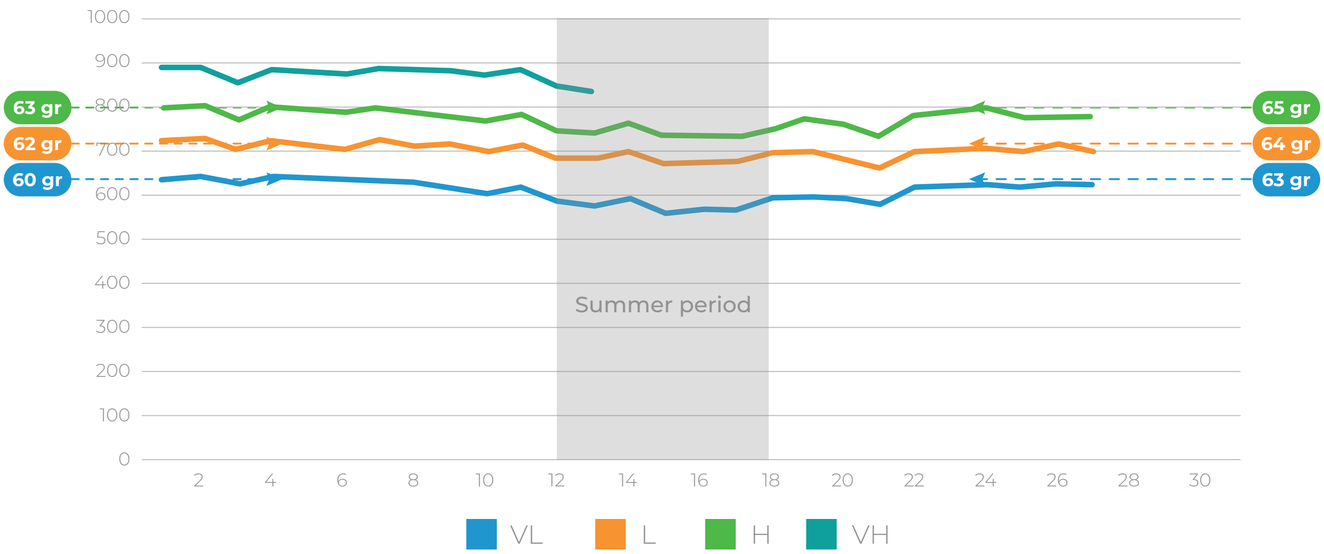
Example for 1 hen

Phase	Weekly eggs	% Lay	Lys intake (mg)	Egg weight (gr)
I	7	100%	700	62
II	6	85.7%	700 but **866 if repartition is possible**	64

In Phase I, the Very High group reached 64 g egg size with 880 mg lysine intake, supporting the hypothesis.

Lys Av Intake	Phase 1	Phase 2
VL	617	595
L	708	689
H	778	760
VH	872	

Av egg size	Phase 1	Phase 2
VL	60.3	62.6
L	62.0	64.1
H	62.5	65.1
VH	63.3	



Graph 1: *Digestible lysine intake Phase I and II*

Nutritional discussion

- **The lower consumption of amino acids can be compensated if the supply is highly digestible. Could be a tip for summer strategy?!**
- **Do we need a different Ideal Protein Ratio as the hen gets older?**
- **Is there any additional supply of amino acids from the muscles that we aren't aware?**

Crude Protein

The average Crude Protein intake shows lower intakes in the phase II. This effect could be explained as the phase II of the trial had lower levels of Crude Protein and because the effect of summer described before.

In the phase I below 16 grams of protein 2 EHH were lost. No effect was seen in the range of 16–17 grams and 2 EHH were produced at levels of 19 grams. In the phase II during the summer part (12–28 data points) the intake of Crude Protein went very low, reaching the lowest 13 grams in the Very Low group. At the end, the High group with 16.6 grams intake average had 11 eggs more than the Very Low and 8 eggs more than the Low.

Discussion

Minimum of protein: in the first part we could learn that the number of eggs could be affected by the crude protein intake, and just going to higher values could get additional eggs.

→ **Are the 16 grams the minimum protein intake we need to have to avoid loss of production? It seems so.**

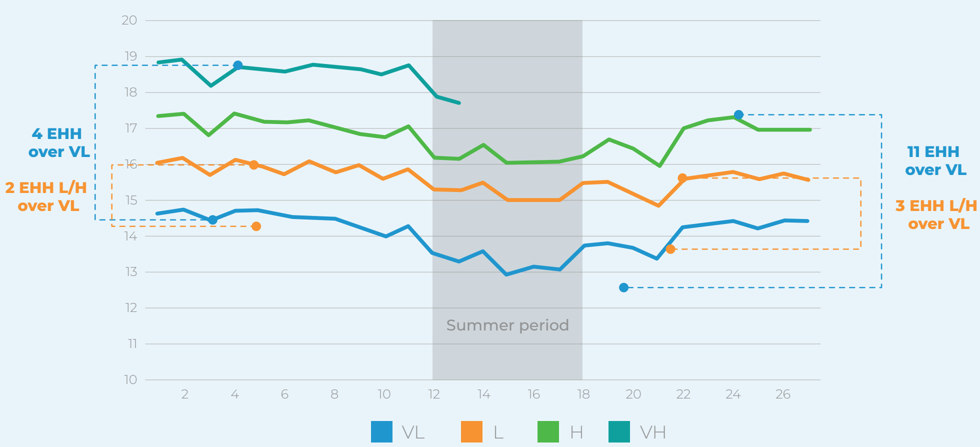
Discussion

Very low protein vs summer: in the summer period because of the lower CP diets and the low feed intake the Very Low and Low groups consumed below 16 grams of Crude Protein. The loss of eggs in Very Low diet was bigger than expected, it was related to the mortality partially however the mortality could be related to the Crude Protein too. The Low group lost 8 EHH, more than expected based on the difference saw in part 1.

→ **Did the summer 13 grams Crude Protein intake really penalize the number of eggs? Or was it a summatory effect of the phase 1 and phase 2?** It looks like there is a combination of both factors.

CP Av Intake	Part 1	Part 2
VL	14.33	13.81
L	15.82	15.4
H	16.98	16.6
VH	18.53	

EHH	Part 1	Part2
VL	200.8	228.7
L	202.9	231.1
H	203.0	239.7
VH	205.2	



Graph 2. *Crude Protein intake during Phase I and II.*

Nutritional discussion

As we don't have accurate information of the nonessential amino acids composition of raw materials nor the needs for the nonessential amino acids, it seems good approach to be sure of having a minimum intake of 16 grams of Crude protein. Do we need to be more conservative?

If the hens really need to storage amino acids to lay bigger eggs as they get older and reduce the frequency of lay. How could we reduce the levels of amino acids enough to control the egg size and keep the Crude Protein at the 16 grams intake?

The loss of EHH could be explained by a reduction of % lay and effect on mortality. Are the nonessential amino acids involved in both parameters?

Energy

The average intake fluctuated as the temperatures of the seasons. The intake decreased as the temperatures increase and vice versa (**Graph 3**).

The intake of the Very Low group is more affected than the other groups during the summertime.

Discussion

Drop of intake in summer: the literature says that the lack of amino acids like glutamine and glycine during heat stress reduces the feed intake.

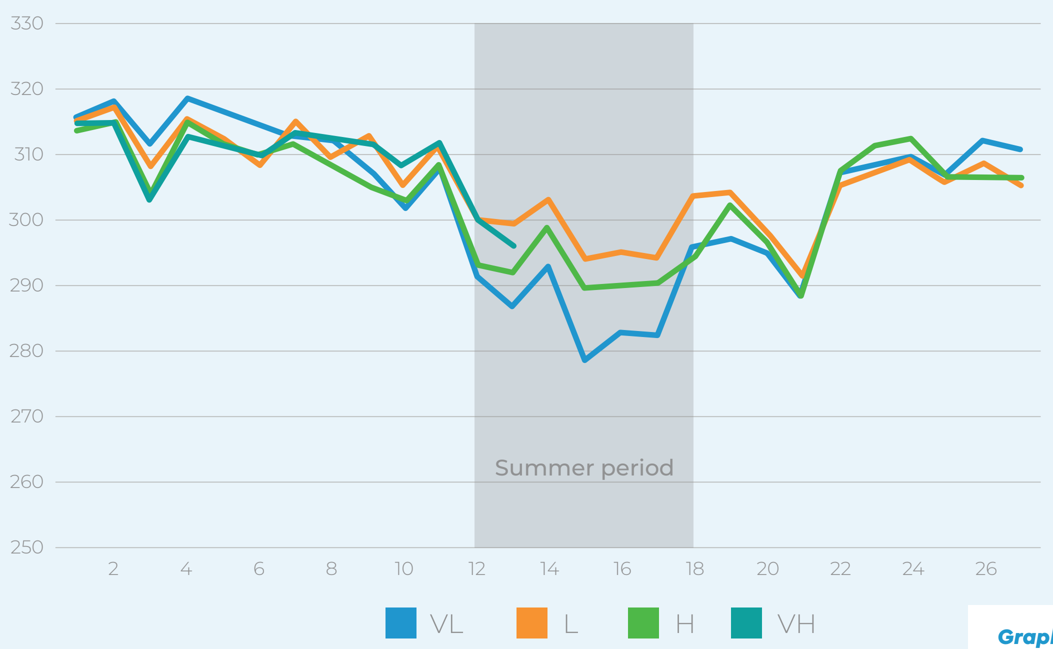
→ **Are these amino acids important when there is an intake below the 15 grams of daily intake? It seems so.**

Discussion

Enzyme effect: there was a lot of internal discussion about the real effect of the enzymes used in the diets. We used a phytase and a xylanase and the combined effect was 60 kilocalories, and no amino acid value was given.

In the first part mainly cold and thermoneutral weather, out of the 309 kcal / day (average), 7 kcal / day were from enzymes and in the second part out of 293 kcal / day (average) 6 kcal / day were from enzymes. In the summertime, the energy intake dropped didn't affect significantly the % lay neither the egg size (discussion for another chapter).

The recommendation of 295 kcal / day for Nick chick based on the Evonik and Fedna energy indications seems a good number if we consider the whole trial, with the temperature variations.



***Graph 3.** Energy intake during Phase I and II*

Nutritional discussion

Energy is a difficult discussion as each nutritionist has his/hers matrix. As per this trial it seems the hens were able to keep the production no matter the energy intake. However, it seems in the long run the ones eating less, number of eggs was reduced.

NEXT

There is more research to be done about old hens and how the metabolism works at they get older.

Changing egg size

by changing dietary amino acids at low and very low crude protein diets

Egg producers often need to adjust the egg profile of their flocks to meet market demands while flocks are in production. At H&N International, we wanted to test the reactivity of the **Nick Chick** layers to dietary changes to the amino acids and see how the variations impact egg production. Two experiments were conducted to evaluate the possibility.

Material and Methods (part 1)

Nick Chick hens (360 birds, 72 cages) were housed at 16 weeks of age. They were light-stimulated at a body weight of 1,250 g and received the same feed until the trial began at 26 weeks and ended at 56 weeks. The groups had same diets until 45 weeks and at 46 weeks diets were switched VL ate VH, L ate H, H ate L and VH ate VL. The birds were kept until 56 weeks of age.

The diets were produced in a local facility and formulated by the H&N nutritionist team and the raw materials were analysed with the support of EVONIK. The diets were a combination of corn, soya bean meal, wheat bran and soya oil as below. Four different treatments were formulated aiming 110 grams of feed intake, the energy was kept constant 2,810 kcal and the four different amino acids were defined, and ideal protein ratio remained constant. See below nutritional specifications and diets.

Nutrient specifications	VL	L	H	VH
Crude protein (%)	13	14.3	15.5	16.79
ME birds (Kcal/Kg)	2,810	2,810	2,810	2,810
Starch (%)	44.2	42.8	41.4	40
Sugars (%)	3.3	3.5	3.7	3.89
Crude fibre (%)	2.77	2.7	2.5	2.44
Neutral detergent fibre (%)	12.11	11.4	10.7	10.01
Ash (%)	11.36	11.5	11.6	11.68
Fat (%)	4.68	4.6	4.6	4.55
Linoleic acid (%)	2.45	2.4	2.4	2.36
Digestible Lys poultry (%)	0.56	0.64	0.71	0.79
Digestible Met poultry (%)	0.32	0.38	0.44	0.50
Digestible M+C poultry (%)	0.52	0.59	0.66	0.73
Digestible Thr poultry (%)	0.42	0.46	0.51	0.55
Digestible Trp poultry (%)	0.13	0.14	0.16	0.18
Digestible Arg poultry (%)	0.73	0.82	0.90	0.99
Digestible Val poultry (%)	0.53	0.58	0.63	0.68
Digestible Ileu poultry (%)	0.46	0.51	0.56	0.62
Calcium (%)	3.85	3.85	3.85	3.85
Total Phosphorus (%)	0.63	0.63	0.63	0.63
Phytic Phosphorus (%)	0.25	0.25	0.24	0.24
Available Phosphorus (%)	0.36	0.36	0.36	0.36
Digestible Phosphorus poultry (%)	0.19	0.19	0.20	0.20

The diets

	VL	L	H	VH
Corn	61.2	59.9	58.6	57.3
SBM	13.7	17.2	20.6	24.0
Wheat Bran	12.4	10.2	8.1	5.9
Calcium carbonate mix	9.0	9.0	8.9	8.9
Soya oil	2.0	2.0	2.0	2.0
Dicalcium phosphate	0.51	0.52	0.53	0.54
Salt	0.28	0.28	0.28	0.28
Mycotoxin binder	0.25	0.25	0.25	0.25
Premix	0.25	0.25	0.25	0.25
Sodium bicarbonate	0.16	0.16	0.16	0.16
DL Met	0.14	0.18	0.22	0.27
Enzymes	0.10	0.10	0.10	0.10
L-Lysine Cl	0.03	0.03	0.03	0.03
L-Threonine	0.01	0.02	0.02	0.03
Premix	0.25	0.25	0.25	0.25
Acids	0.20	0.20	0.20	0.20
Enzymes	0.10	0.10	0.10	0.10
Micotoxin binder	0.05	0.05	0.05	0.05

Results

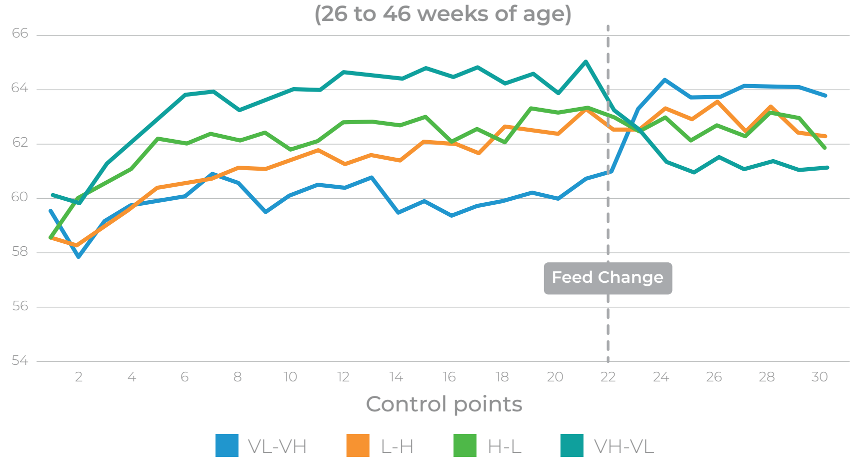
Egg Weight

There was a clear progression of egg size based on the levels of amino acid intake before making the change of the diets. After the feed change, egg size was altered both in daily production and in the overall analysis. Significant differences were observed between the VL and VH groups.

Laying Rate, EHH and Feed intake

None of these parameters were affected by the changes of the diets at this age.

Chart 2. Egg Weight
(26 to 46 weeks of age)



Material and Methods (part 2)

Nick chick hens were housed, (266 birds) at 56 weeks of age, they had 3 different treatments of very low crude protein diets from week 57, when diets were changed at 67 weeks and birds were kept until 86 weeks. The diets were switched VL ate VH, L ate H, H ate L.

The diets were produced in a local facility and formulated by the H&N nutritionist team and the raw materials were analysed with the support of EVONIK. The diets were a combination of corn, soya bean meal, wheat bran and soya oil as below. Four different treatments were formulated aiming 110 grams of feed intake, the energy was kept constant 2,810 kcal and 6 different type of synthetic amino acids were used. The ideal protein ratio remained constant. See below nutritional specifications and diets.

Nutrient specifications	VL	L	H	VH
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	0.41	0.47	0525
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

The diets

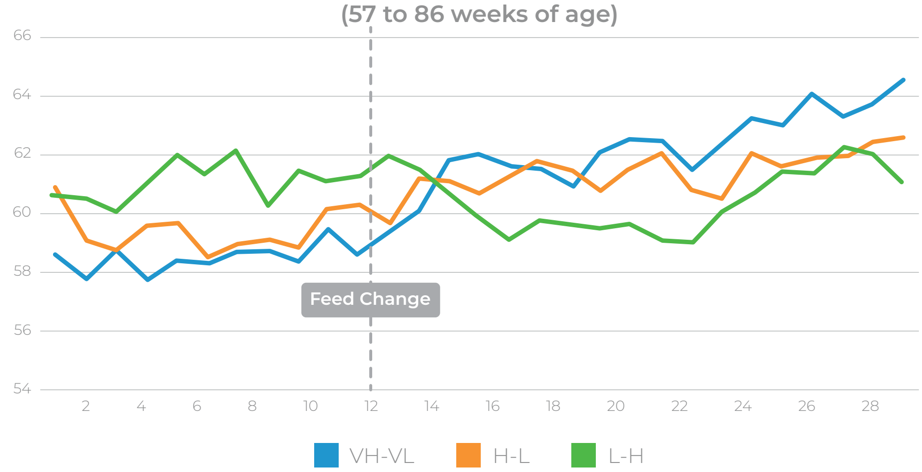
	VL	L	H	VH
Corn	64.44	63.41	62.38	61.34
SBM	10.72	14.07	17.43	20.78
Wheat bran	11.10	8.69	6.28	3.86
Calcium carbonate mix	9.74	9.71	9.69	9.66
Soya oil	2.00	2.00	2.00	2.00
Dicalcium phosphate	0.37	0.38	0.40	0.42
DL Met	0.20	0.24	0.29	0.33
L-Lysine Cl	0.142	0.146	0.149	0.153
L-Isoleucine	0.091	0.103	0.114	0.126
L-Threonine	0.077	0.092	0.106	0.121
Valine	0.066	0.086	0.105	0.125
L-Tryptophane	0.023	0.028	0.033	0.038
Salt	0.28	0.28	0.28	0.28
Sodium bicarbonate	0.16	0.16	0.16	0.16
Premix	0.25	0.25	0.25	0.25
Acids	0.20	0.20	0.20	0.20
Enzymes	0.10	0.10	0.10	0.10
Micotoxin binder	0.05	0.05	0.05	0.05

Results

Egg Weight

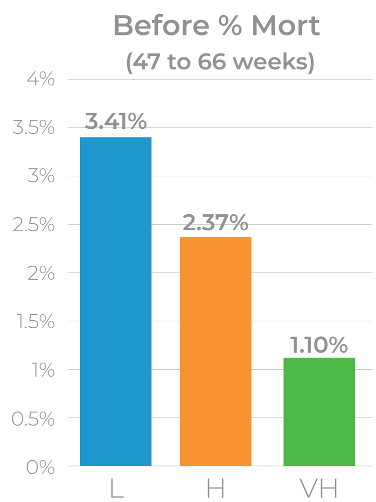
There was a progression of egg size based on the levels of amino acid intake before making the change of the diets. Once the feed was changed, the egg size was modified in the daily production and in the overall analysis of the period after the change, the VL and VH groups showed significant difference.

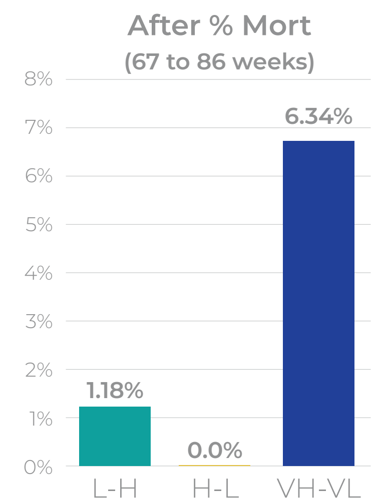
Chart 5. Egg Weight
(57 to 86 weeks of age)

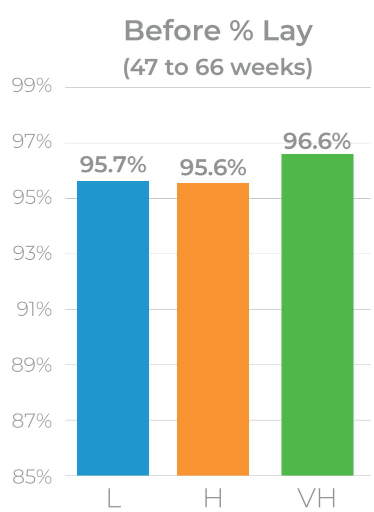


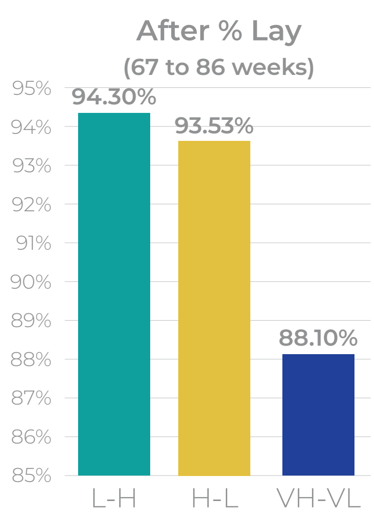
Mortality, Laying Rate and EHH

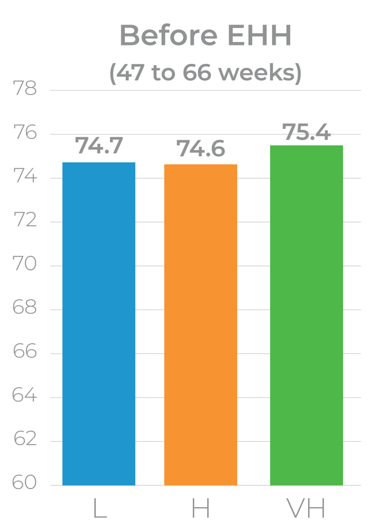
These three parameters were stable before the diet change. However, after switching diets, mortality increased significantly and laying rate decreased in hens fed VL diets, which also reduced the number of eggs housed compared to the H and L groups.

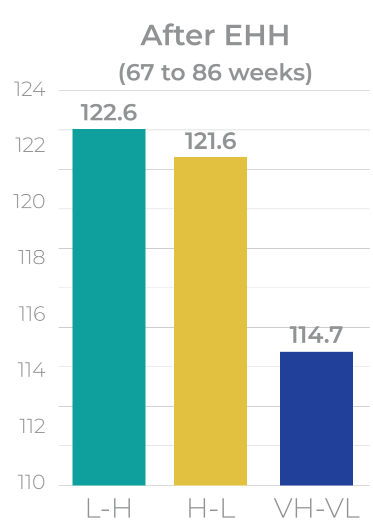












Feed intake

This parameter wasn't affected by the changes of the diets.

Practical Takeaways

Amino acids drive egg size

We can modify the egg size while the hens are in production, and the production isn't affected.

Level of Crude Protein

It seems making egg size changes with very low levels of Crude Protein affects the production. **The minimum of 16 grams of daily intake** of Crude Protein must be implemented as explained in Chapter III.

Nutritional discussion

Amino acids drive egg size

The sensitivity to the amino acid intake in the actual breeds seen in Chapter I and II trials is seen too when we make changes of while the birds are producing with a targeted egg size.

Very low Crude protein

What it was seen at trial 2 explained in this Chaper IV supports what we saw in the Chapter II, it seems a minimum of Crude Protein is needed.

Impact of the feed changes

Birds maintained on high crude protein and amino acid levels experienced a sharp decline in performance once their diet was diluted. It could be an indication that birds at high level of productivity if they are heavily penalized in the diet, they will suffer a significant reduction of the production. Therefore, **the practice of reducing amino acids when the hens are still in high egg mass production need to be reconsidered** as they might impact the long-term productivity of the flock.

Conclusion for Nick Chick supporters

Nick Chick's versatility enables producers to target different egg markets with the same flock, adjusting egg size according to market demand.

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