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H&N INTERNATIONAL EXCLUSIVE

FEEDING INSIGHTS

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EGG SIZE VERSATILITY IN NICK CHICK

CHAPTER III

NUTRIENT INTAKE CALCULATIONS AND DISCUSSION

H&N NUTRITION TEAM

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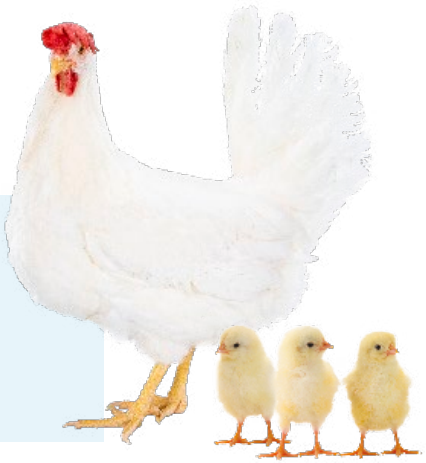
Nutrient intake

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.

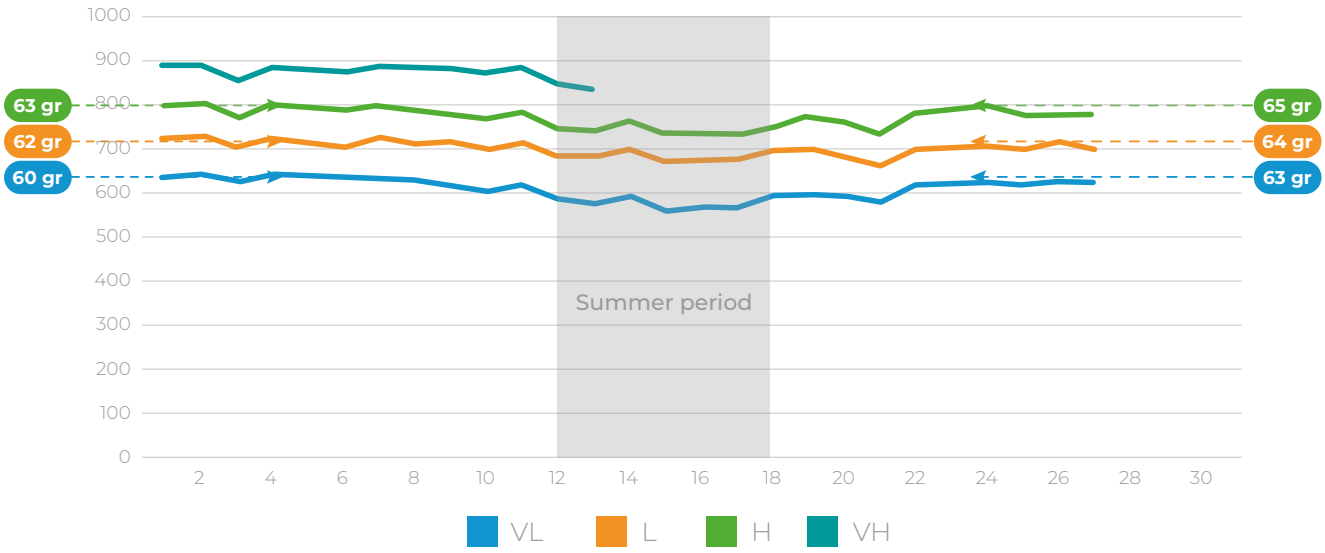
Example for 1 hen

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.**

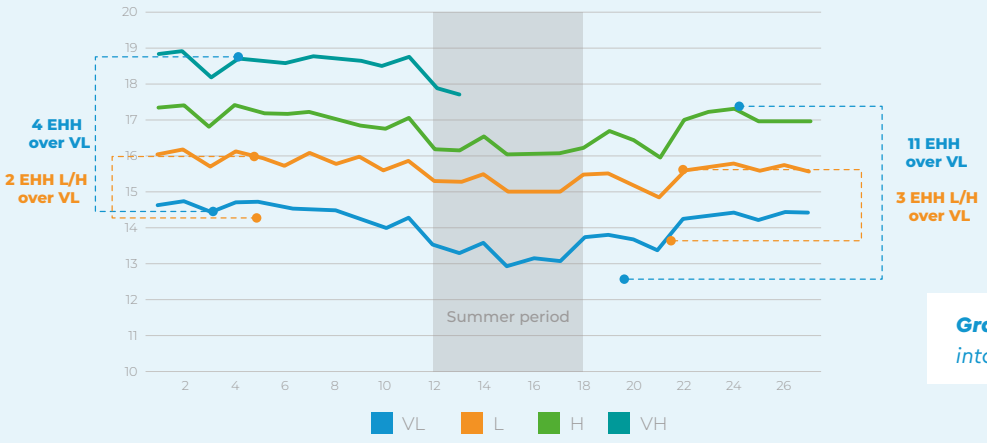
Discussion

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.

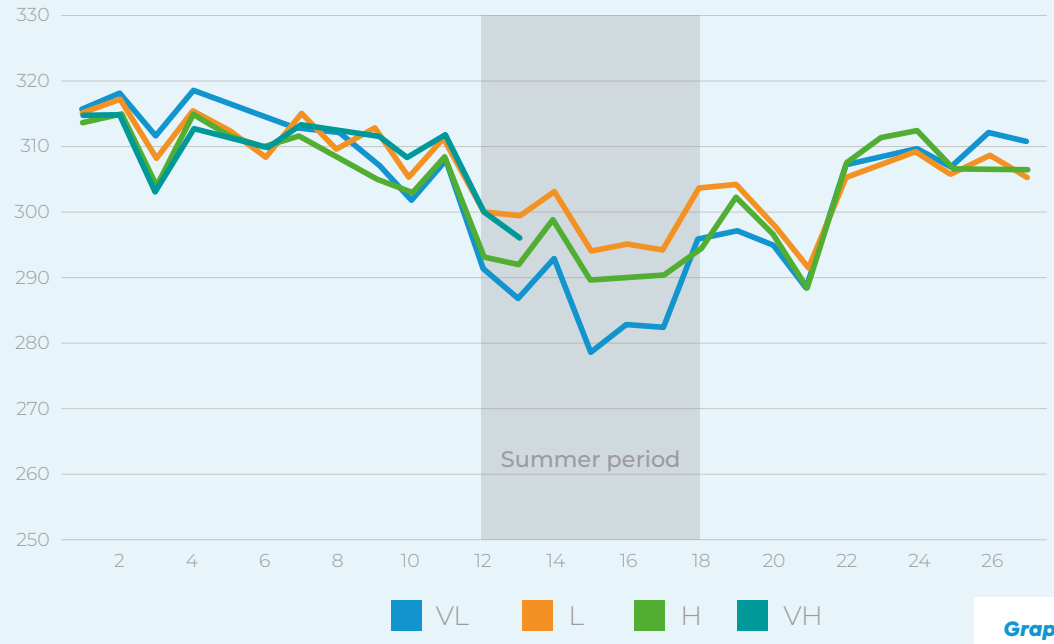
➔ **Are these amino acids important when there is an intake below the 15 grams of daily intake? It seems so.**

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.

The key to your profit

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