

Feeding for Success

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October 2024

Questions usually asked about feed:

What is the protein level?

What is the feed price?

Questions usually asked about feed:

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What is the feed price?

What is wrong with that?

Pullet and Layer Feed:

Includes 32 essential nutrients.

Additive options are available to improve feed efficiency, resilience & egg quality.

Cost/Kg of egg is more important than feed price.

Feed Quality Control is critical!

Modern commercial hybrid hens have been selected for:

- Early maturity
- Increased Rate of Lay (Hen Day Production)
- Increased early egg weight
- Better persistency of lay
- Lower mortality
- Lower feed conversion
- Better late lay shell quality.

-> PROFIT DRIVERS!!

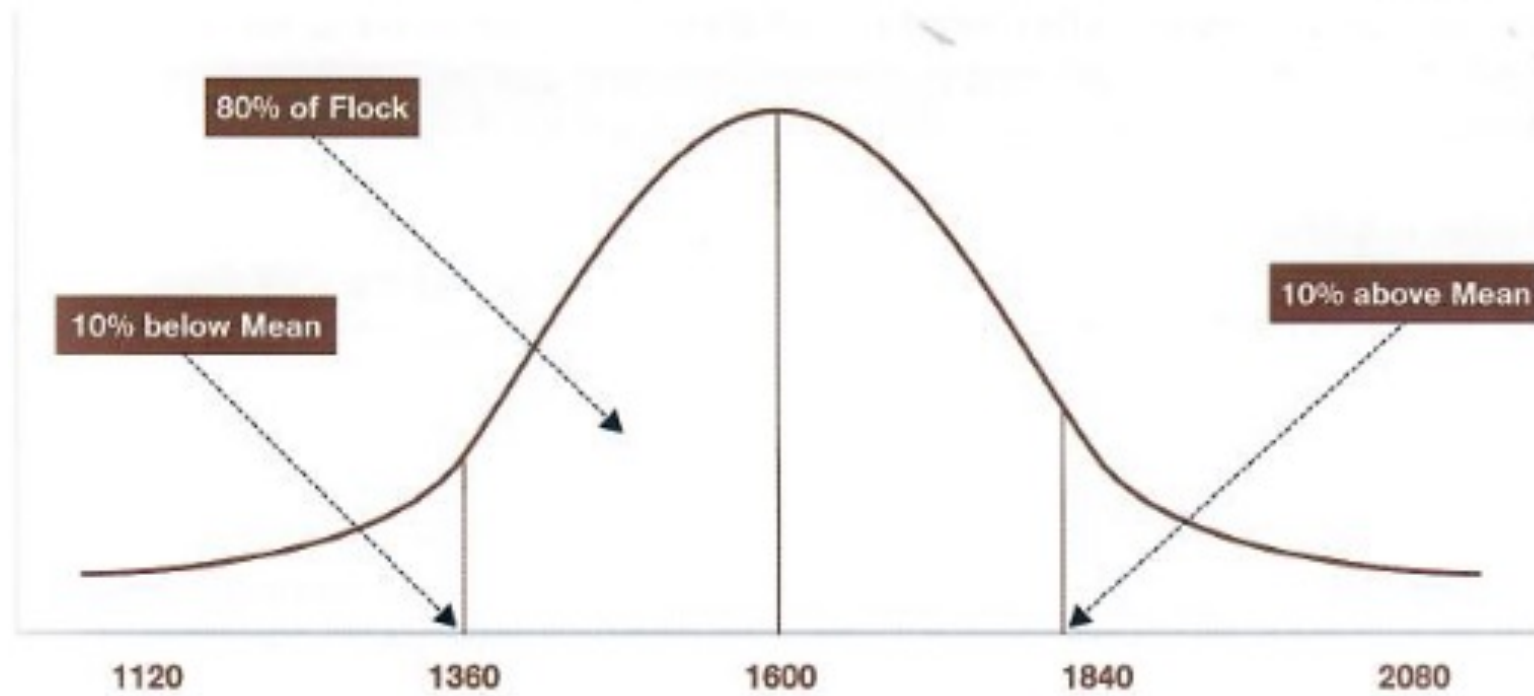
In pursuit of the hen's genetic potential...

- It starts with at the breeder farm
- Depends on conditions in the hatchery
- Relies on careful management of the growing chick & pullet
- Cannot be achieved without careful formulation & presentation of chick, pullet & pre-lay diets
- Depends greatly on nutrient intake during lay – especially during the early lay period.

**Understanding
flock uniformity
(or lack thereof)
is key!**

Uniformity of layer flock at point of lay

(Kleyn 2013)



The aim of Diet Design:

Nutrient Requirement = Nutrient Intake

Nutrient Intake = Feed Intake x Nutrient
Density

Inconsistencies within & between flocks affects
both Nutrient Requirement & Feed Intake.

It is often necessary to adjust the
Nutrient Density of the diet to compensate.

Nutrient Requirements can depend on:

- Strain of hen
- Body weight, growth rate & body composition
- Feathering status (or goal)
- In or outside the temperature “comfort” zone
- Other sources of stress
- Overall health status
- Level of activity
- Egg Mass Output objectives.

->> Know your own situation!

In a perfect world the aim is...

Strive for consistency and measure the inconsistency.

In reality...

Measure what you can and speculate about the rest.

Trial and error:

- Apply a diet that is balanced around the best estimate of required nutrient density and feed intake
- Measure results to set a performance 'base line'
- Adjust diet nutrient density and compare the response.

**Collaboration / communication
between Farming,
Veterinary
and Nutrition
staff is key!**

A flock of hens can experience a series of insults during its productive life:

- Transfer into the layer house
- Vaccinations
- Infections, parasites, dysbacteriosis, mycotoxicosis
- Insufficient nutrient intake and big changes to diet
- Physiological stress: at peak lay and peak egg mass
- Extremes of weather
- Competition with/aggression by sisters.

-> Feed for resilience!

Examples of Resilience:

Wound healing

Immune response
(to disease and vaccine)

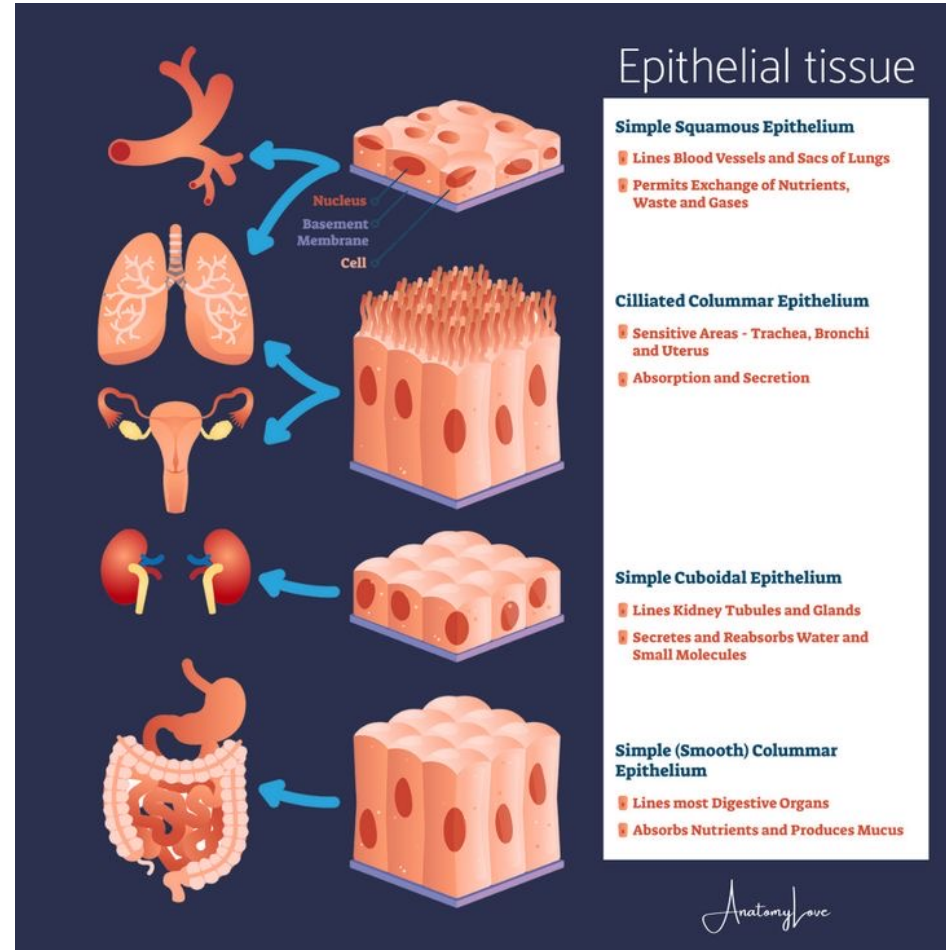
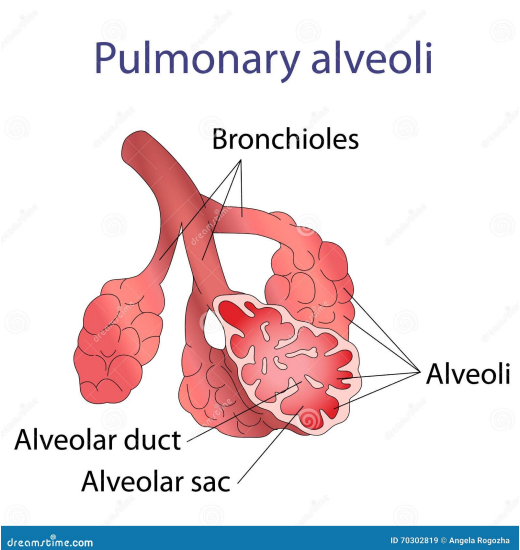
Inflammation
(some good, too much bad)

Better cope with stress.

Protection from the harsh world outside...

Healthy rapidly dividing tissue – physical barrier:

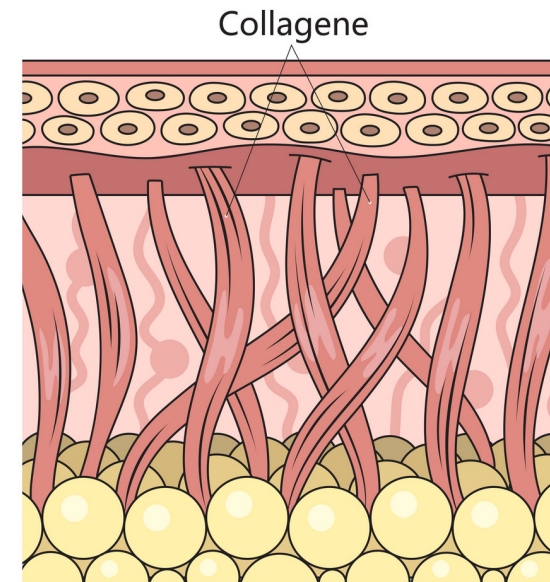
- Skin
- Gut
- Respiratory
- Reproductive Tract.



Rapidly dividing tissue & Immune cells need:

- Protein (amino Acids)
- Energy
- Zinc & Vitamin A
- Anti-oxidants:
Selenium, Vit E, Vit C
- Vit K
- Vit D.

e.g. Collagen:
needs proline & Vit C.



Gut: for feed efficiency, health, egg quality:

Nutrient digestion & uptake:

- Feed enzymes:
 - ✓ Phytase
 - ✓ Xylanase
 - ✓ Protease
- Active forms of Vit D
- Bioavailable trace mins
- Betaine
- Emulsifier for fat digestion
- Yolk pigmenter.

Gut Health Additive options:

- Essential oils
- Organic acids
- Probiotics
- Prebiotics
- Postbiotics & MOS
- Alkaloids
- Saponins
- Phytomolecules
- Mycotoxin mitigation.

-> Pick winners!

Success is not about the flock
average,
its about her.



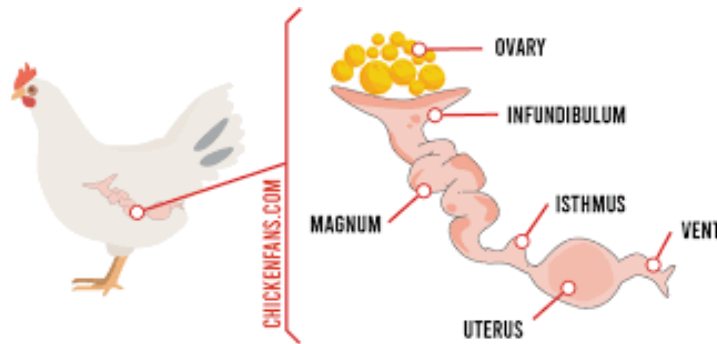
Why did the hen NOT lay an egg today?

Is she “off the lay”?

Is she “short clutching”?

Clutch size is the number of successive days on which an egg is laid before she takes a break.

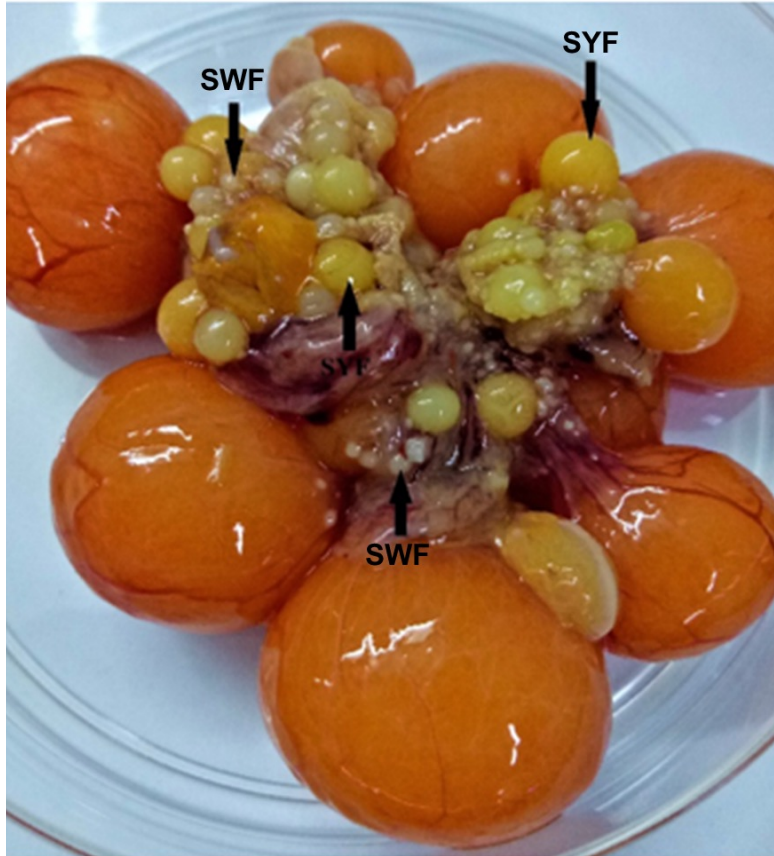
Yolk formation & ovulation relies on:



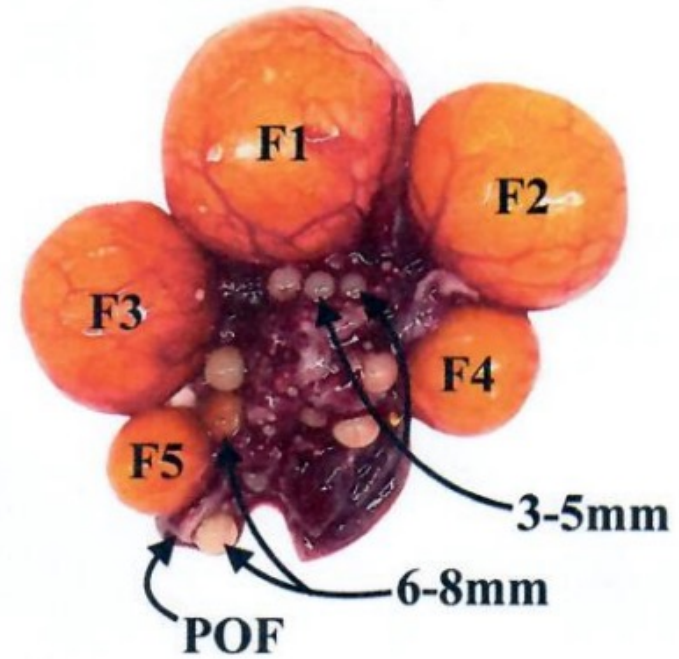
(FSH) Follicle Stimulating Hormone

(LH) Luteinizing Hormone.

Stress can affect the pituitary gland & disrupt the production of these hormones so that an ***egg does not get released.***



Ovary of a
“short clutching” hen:

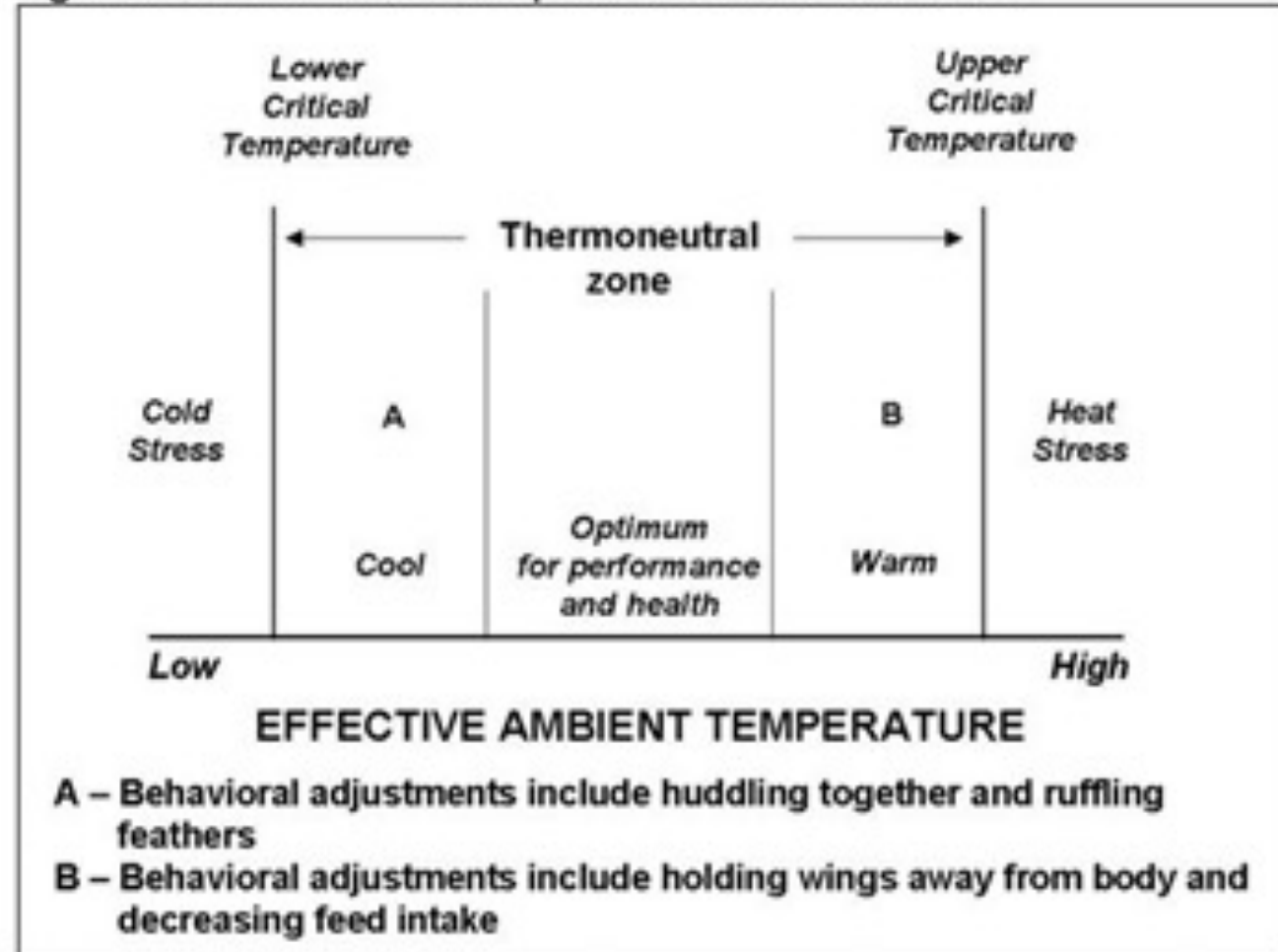


The key to improving Rate of Lay...

Turn more of the hens “on”
more of the time!

If outside the “happy zone” 18 - 24°C:

Figure 7.1 - Environmental temperatures and thermal zones.



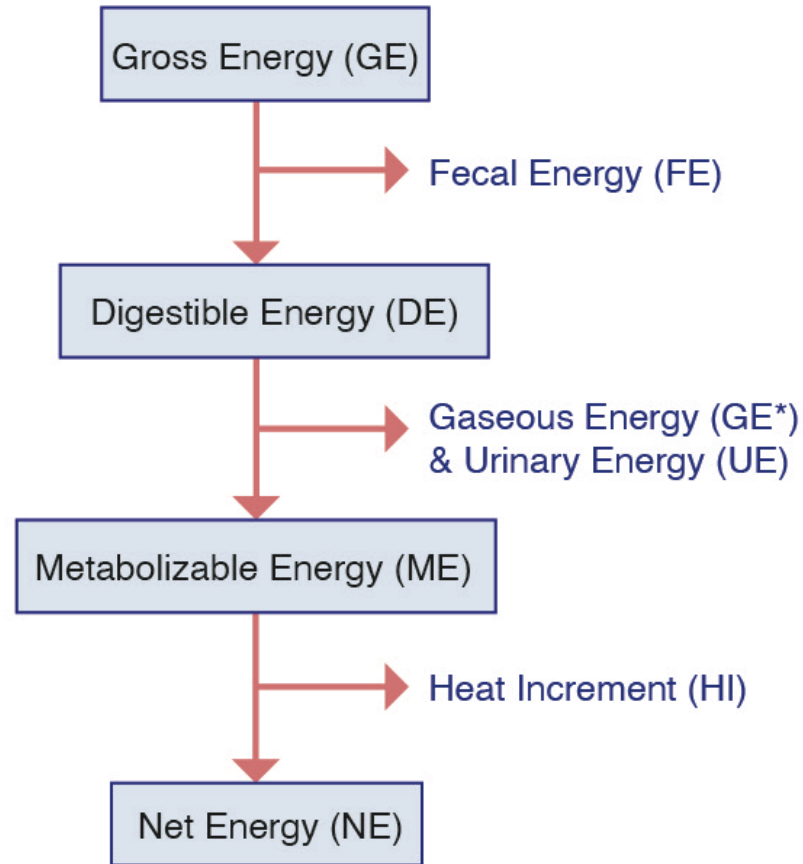
Note: Thermoneutral zone is the range of temperatures at which an animal does not have to actively regulate body temperature

Nutritional Strategies for Heat Stress:

- Midnight snack ✓ to increase feed intake
- Increase nutrient density or digestibility ✓ to compensate for low feed intake
- Cool water ✓ for intake of water & feed
- Betaine ✓ an osmolyte for hydration
- Stable Vit C ✓ for slow-release corticosterone
- Anti-inflammatory ✓ to reduce leaky gut
- Sodium Bicarb ✓ for blood pH effect / eggshells
- Increase NE : ME ✓ to reduce heat increment.

Net energy

Energy Flow Diagram



Net Energy% of Metabolizable Energy

(ref: Nafari 2019)

The lower the Net Energy % of Metabolizable Energy, the greater the heat increment.

In hot conditions increase reliance on fat/oil as a source of energy.

NE % of ME	Corn	Wheat	Soyabean MI	Canola Oil
%	74.7	73.5	61.5	91.7

To manage heat stress during lay...
... start early by preparing a better pullet!

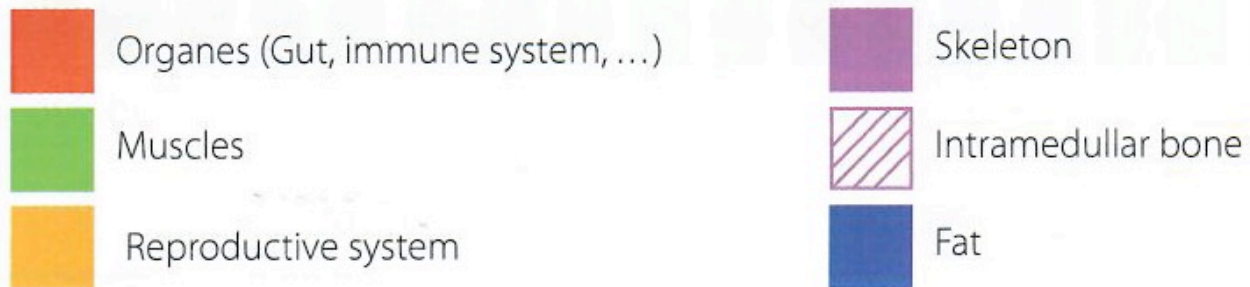
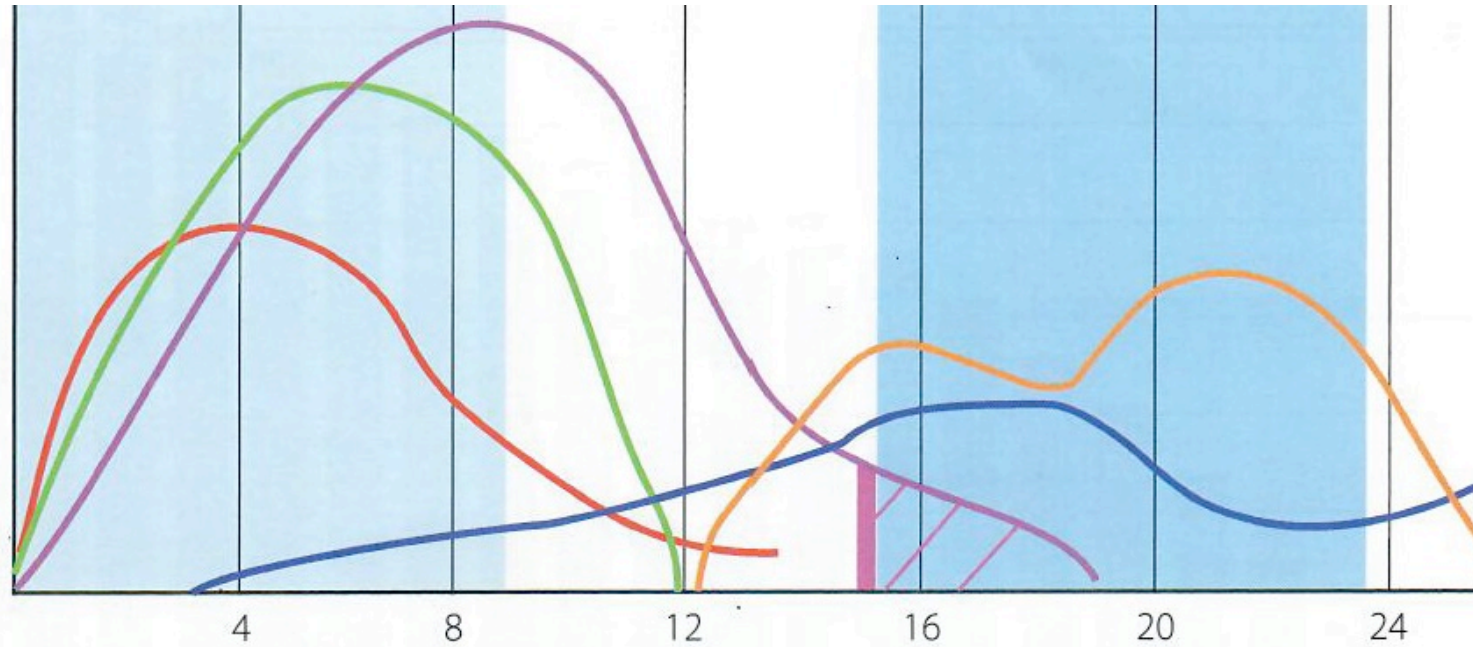
For better feed intake in early lay.

For better body reserves to draw upon when stressed.

For greater resilience.

Percentage Body Development

(ref: H&N Brown Nick Manual)



Feed the chick for better gut and immunity development

The first five weeks are critical!

- Feed a Chick Super Starter diet to 3 wks.
- Improve nutrient dose and availability, add enzymes & feed additives
 - >> for gut growth & immunity!
- “Block feeding” for flock improved uniformity.

Pullet Developer and Pre-Layer feeds:

- Introduce bulky, fibrous ingredients to “grow” the gut:
>5% Crude Fibre in diet. Choose sources of insoluble fibre (e.g. bran, lignocellulose products).
- Introduce some coarse limestone (2mm-4mm diameter):
75 : 25 fine : coarse limestone in Pullet Developer
Or do so no later than Pre-Lay phase (50 : 50).
- Ensure adequate oil in the diet to avoid feed separation.

Benefits:

- > **Greater feed intake in early lay to avoid weight loss and loss of uniformity leading to better rate of lay.**
- > **Better cortical and medullary bone for better shell quality, especially in Late Lay.**

Fibrous ingredients and coarse particle size for larger gizzards

(picture courtesy J.T. Brake North Carolina State University)



Coarse limestone retained in the gizzard during lay for slow release of Calcium



When designing layer diets it is important to attempt to evaluate...

- The market value of feedstuffs
- The market price of eggs (varies with grade).

To set the economic objectives of the feeding programme:

- ✓ Cost per Kg of eggs
- ✓ Target egg mass output of the hens.

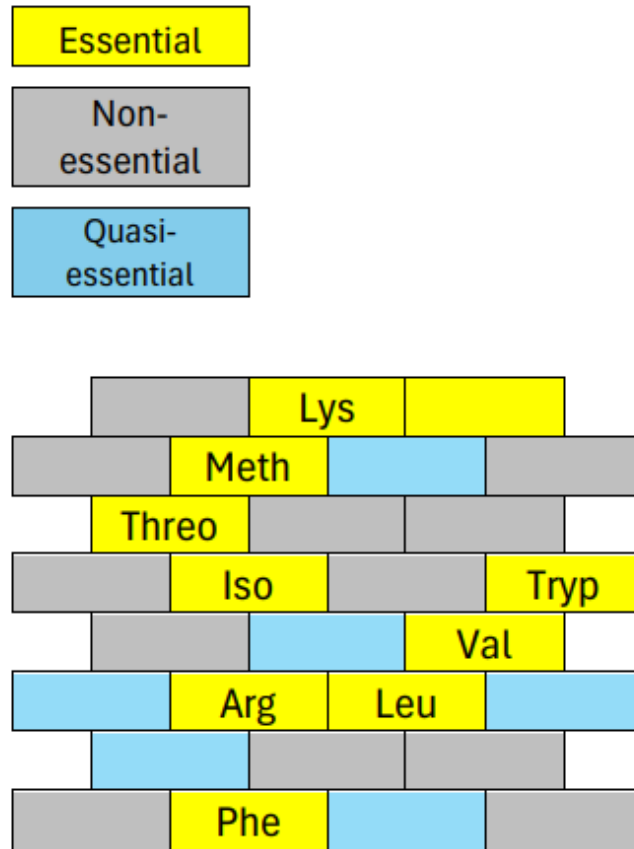
-> This is a constantly moving target!

Egg Mass g/hen/day:

$$\frac{\text{Rate of Lay}}{100} \times \text{Average Egg Weight (g)}$$

Both respond to increased intake of amino acids (and energy and linoleic acid).

Amino acids are like a brick in a wall (if protein is the wall)



Understand your Economic Objectives:

Brown Nick recommended daily intake of amino acids (Standardized Ileal Digestibility)

Nutrient (mg/hen/day)	Target Egg Mass 58 - 60 g/hen/day	Target Egg Mass 55 - 57 g/hen/day	Target Egg Mass 52 -55 g/hen/day
Lysine	830	800	770
Methionine	415	400	385
Meth + Cys	747	720	693
Threonine	581	560	539
Tryptophan	183	176	169
Arginine	863	832	801
Isoleucine	664	640	616
Valine	726	700	674

Knowing HOW to increase egg size is only PART of the puzzle.

Important considerations:

1. Are diets likely to be feasible and cost-effective?
2. Can thin shelled eggs be avoided?
3. Can injury to hens be avoided?

Why is eggshell quality a concern?

“The increase in egg weight is not accompanied by a proportional increase in shell weight so that the ratio of shell weight to egg weight (often referred to as percentage shell) decreases.”

“Dietary manipulations that decrease egg size may improve eggshell quality in older hens.”

(Roberts 2004, Journal of Poultry Science 41, 161-177)

AIM:

1. Reduce diet nutrient density as hens age by phase feeding
2. Increase Ca intake and reduce Available P intake as hens age.

Avoid injury to hens:
Do not push your luck!

Do not “overheat” diet nutrient density, especially if hens are under-weight at point of lay.

Consequences:

- Eggbound hens
- Prolapse
- Vent trauma and cannibalism.

Go back to pullet rearing and aim to get it right there!

Theory versus Reality ...

Mid Lay Mash	%	[Kg/T]
10000 Wheat 11.5%	59.693	596.93
10102 Barley 9.5%	3.333333	33.333
12000 Soybean 46.5%CP 2%Fat	8.166667	81.667
12173 Canola Meal Expeller 31%CP 10%Fat	8.766667	87.667
12227 Canola Seed 19% CP 44.5%Oil	2.666667	26.667
13163 Meatmeal 55%CP 12.5%Fat	1.666667	16.667
14003 Canola Oil	0.933333	9.333
15000 Millrum 15%	3.666667	36.667
17002 L-Lysine Sulphate 70%	0.24	2.4
17050 DL-Methionine	0.146667	1.467
17100 L-Threonine	0.03	0.3
17150 L-Isoleucine	0.05	0.5
17200 L-Valine	0.023333	0.233
19003 Choline Chloride 75%	0.076667	0.767
19112 Limestone Grits (4mm)	7.0	70.0
19113 Limestone Fine (1mm)	2.833333	28.333
19300 Salt	0.23	2.3
19400 Sodium Bicarbonate	0.18	1.8
21019 Layer pmx + Gut Health & Yolk Pigment	0.25	2.5
30005 Xylanase 8000 L	0.018	0.18
31034 Axtra PHY GOLD 5L (Layer 300FTU)	0.006	0.06
40059 Lysoforte FF Liquid	0.023	0.23
	100.0	1000.0



Major feedstuffs:

Wheat

Soyabean Meal



Sorghum

Canola Meal



Barley

Meat Meal



Major feedstuffs:

Maize
DDG's



Wheat Bran
Palm Kernal MI



Rice Bran
Sunflower MI



Ingredient Quality Considerations

- Analysis, consistency, continuity of supply?
- Anti-nutritive factors?
- Contaminants:
 - heavy metals, pesticides, toxins, weed seeds, mycotoxins?
- Under or over-processed e.g. SBM, DDG's?



Multi-grain mash diet: Wheat, corn, barley, pea, SBM, CM.



Conclusion:

- Cost/Kg of egg is more important than feed price. Stay abreast of shifting market ingredient costs and egg grade prices.
- Feed quality is critical – invest!
- Not just protein, but 32 essential nutrients must be right.
- Measure what you can, speculate about the rest to best adjust diet nutrient density, apply diets, assess and adjust again.
- Feed for resilience.
- Profit by applying complementary additives that improve digestion, absorption and uptake of nutrients, health and egg quality.
- Stressed or dead hens don't lay eggs!

The Argyle Sweater by Scott Hilburn



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MARK KNOPFLER AND ANOTHER GREAT MOMENT IN MUSIC HISTORY.

**Thank you
for your attention**