

Importance of rearing on later egg production period

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Longer laying cycles, greater persistency...

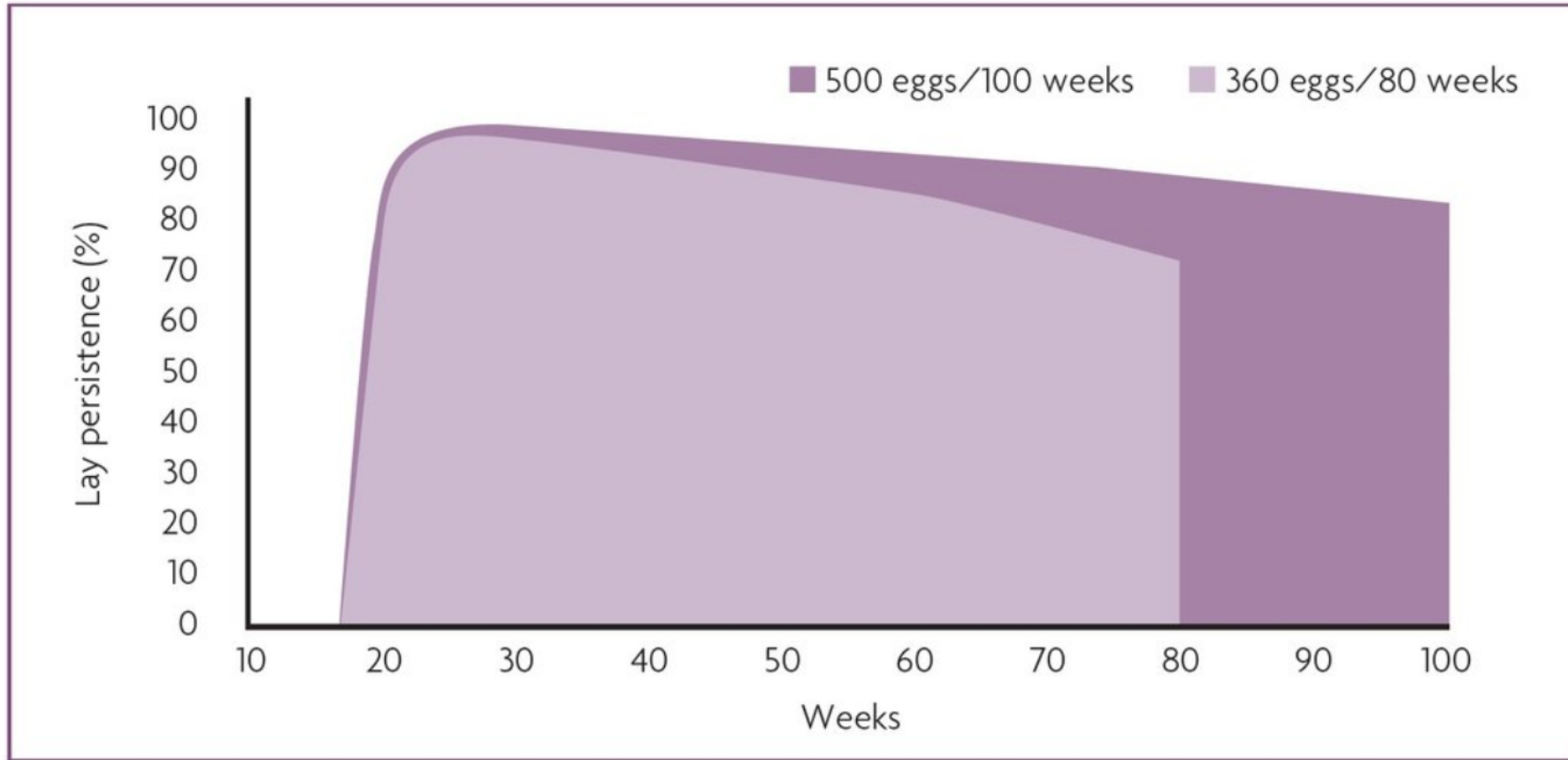


Fig. 1. Improvement in egg production and production period length (ISA white birds).

P. Rutten

www.dekalb-poultry.com/en/news/how-feed-layers-longer-production-cycle-and-high-performance/ ²

Start with the end in mind

- ▶ **What are the goals?**
 - **High peak**
 - **Good persistency**
 - **Long laying cycle**
 - **Egg size**
 - **Shell quality**
 - **Skeletal health**

- ▶ **How do we achieve these goals?**
 - **We must start with the pullet**



The pullet as an investment

- ▶ **What is the most profitable for the egg producer?**
 - ▶ **Least cost?**
 - ▶ **Maximum gross income?**



“Least-cost” diet formulation

► This is a true “Least-cost” pullet diet

CFC5 Buffered Least Cost Formulation - Plant: 1 (Plant 1)

Product: **LO-COST** Name: **Real least cost pullet di** Status: **Feasible** Help

Formulate End Edit

Use Costs: **Owning**
 Batch Size: **1,000.00**

Prod'n Formula Stored
 Version: 1 11/03/2003
 Trial: User Modified 03/02/2021
 Created By: Single Product Least Cost

Formula Owning Cost (\$/Tonne)
 Current: **85.00** Change:
 Previous: **105.00** **-20.00**
 Prod'n: **186.01** **-101.01**

Ingredients Nutrients Nutrient Ratios Ingredient Ratios Ingr Type Controls Matrix

Order Ingredients By: Code Amount Ingredient Units: Percent Kas

Add Ingredient **Remove Ingredient** **Load Ings From Template** Costs Prev Stored P-Min

IngrCode	Ingredient Name	OS	Sup	Formula Pct	Min Pct	Max Pct	Max Chg Pct	Rest Cost	\$/Tonne	Low Range	High Range
16	CANOLA MEAL	<input type="checkbox"/>	<input type="checkbox"/>					1.92	285.00	93.30	
41	FAT, VEGETABLE	<input type="checkbox"/>	<input type="checkbox"/>					10.65	1,150.00	85.00	
78	PEA SEED CULL	<input type="checkbox"/>	<input type="checkbox"/>					0.04	89.00	85.00	
101	Soybean Meal Deh - Plant 1	<input type="checkbox"/>	<input type="checkbox"/>					3.59	455.00	96.50	
107	WHEAT, HARD, GRAIN	<input type="checkbox"/>	<input type="checkbox"/>					1.08	205.00	96.70	
152	CALCIUM CARBONATE	<input type="checkbox"/>	<input type="checkbox"/>	100.000					85.00	29.00	89.00
156	DICALCIUM PHOSPHATE	<input type="checkbox"/>	<input type="checkbox"/>					6.15	700.00	85.00	
162	SALT, PLAIN (NaCl)	<input type="checkbox"/>	<input type="checkbox"/>					0.15	100.00	85.00	
200	L - LYSINE	<input type="checkbox"/>	<input type="checkbox"/>					22.35	2,320.00	85.00	
201	DL - METHIONINE	<input type="checkbox"/>	<input type="checkbox"/>					48.65	4,950.00	85.00	
202	L-Threonine	<input type="checkbox"/>	<input type="checkbox"/>					26.85	2,770.00	85.00	
203	L-Tryptophan	<input type="checkbox"/>	<input type="checkbox"/>					359.15	36,000.00	85.00	
205	Vitamin-Mineral Premix	<input type="checkbox"/>	<input type="checkbox"/>					75.15	7,600.00	85.00	

“Least-cost” diet formulation

- ▶ What do we actually mean when we talk about a least-cost formulation?
 - ▶ The lowest cost solution to meet specific criteria
 - ▶ i.e. the nutrient composition that will allow us to meet our goals

- ▶ Least-cost vs maximum profit

NUTRITION

Table 5: Recommendations for Nutrient Levels for LOHMANN LSL-CLASSIC Pullets/Layers

Diet type*		Starter**	Grower	Developer	Pre-Layer
Nutrient		Week 1–3	Week 1–8	Week 9–17	Week 18–5 % prod.
Metabol. Energy	kcal	2860	2750–2800	2700–2750	2700–2750
	MJ	12.0	11.5–11.7	11.3–11.5	11.3–11.5
Crude Protein	%	19.0–20.0	17.5–18.5	15.0–15.5	17.5
Methionine	%	0.52	0.46	0.31	0.42
Dig. Methionine	%	0.44	0.39	0.26	0.35
Meth./Cystine	%	0.88	0.81	0.56	0.76
Dig. M/C	%	0.75	0.69	0.48	0.63
Lysine	%	1.18	1.01	0.66	0.84
Dig. Lysine	%	1.00	0.86	0.56	0.70
Valine	%	0.92	0.79	0.53	0.74
Dig. Valine	%	0.78	0.67	0.45	0.62
Tryptophane	%	0.23	0.21	0.16	0.18
Dig. Tryptophane	%	0.19	0.18	0.13	0.15
Threonine	%	0.78	0.70	0.46	0.59
Dig. Threonine	%	0.66	0.60	0.39	0.49
Isoleucine	%	0.81	0.77	0.50	0.67
Dig. Isoleucine	%	0.69	0.65	0.43	0.56
Arginine	%	1.24	1.06	0.70	0.87
Dig. Arginine	%	1.05	0.90	0.59	0.73
Calcium	%	1.05	1.00	0.90	2.00–2.50
Phosphorus, total***	%	0.75	0.70	0.58	0.60
Phosphorus, avail.	%	0.48	0.45	0.37	0.40
Sodium	%	0.18	0.17	0.16	0.17
Chloride	%	0.20	0.18	0.17	0.18
Linoleic Acid	%	2.00	1.40	1.00	1.00

* The basis for switching between diet types is the hens' body weight development. The correct time for changing the diet is determined not by age, but by body weight. Chicks and pullets, should therefore be weighed at regular intervals.

** Chicks should be fed starter feed, if the standard body weight is not reached by feeding grower feed or if the daily feed intake is expected to be (too) low.

*** without adding phytase

“Least-cost” diet formulation

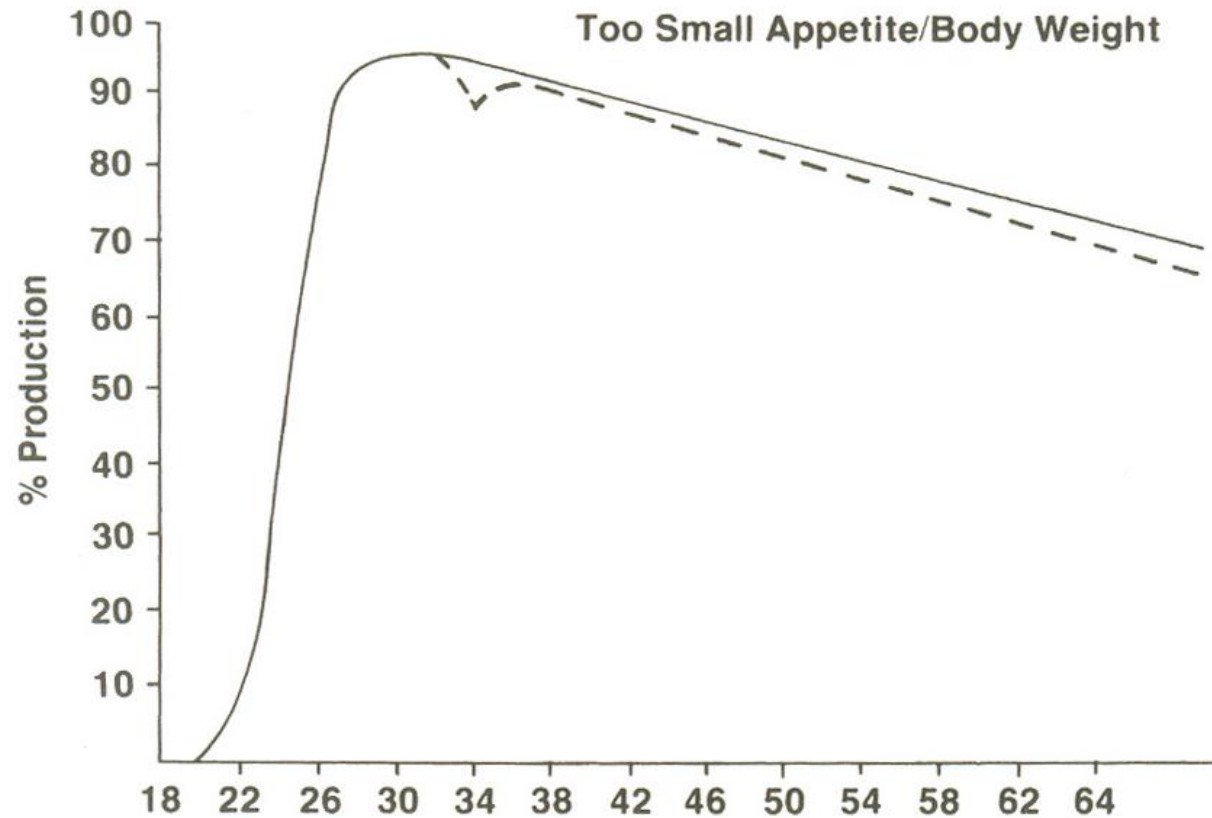
- ▶ What are our goals?
- ▶ An 18 week-old female chicken at 18 weeks of age



- ▶ A point-of lay pullet that is prepared for sustained, high levels of egg production



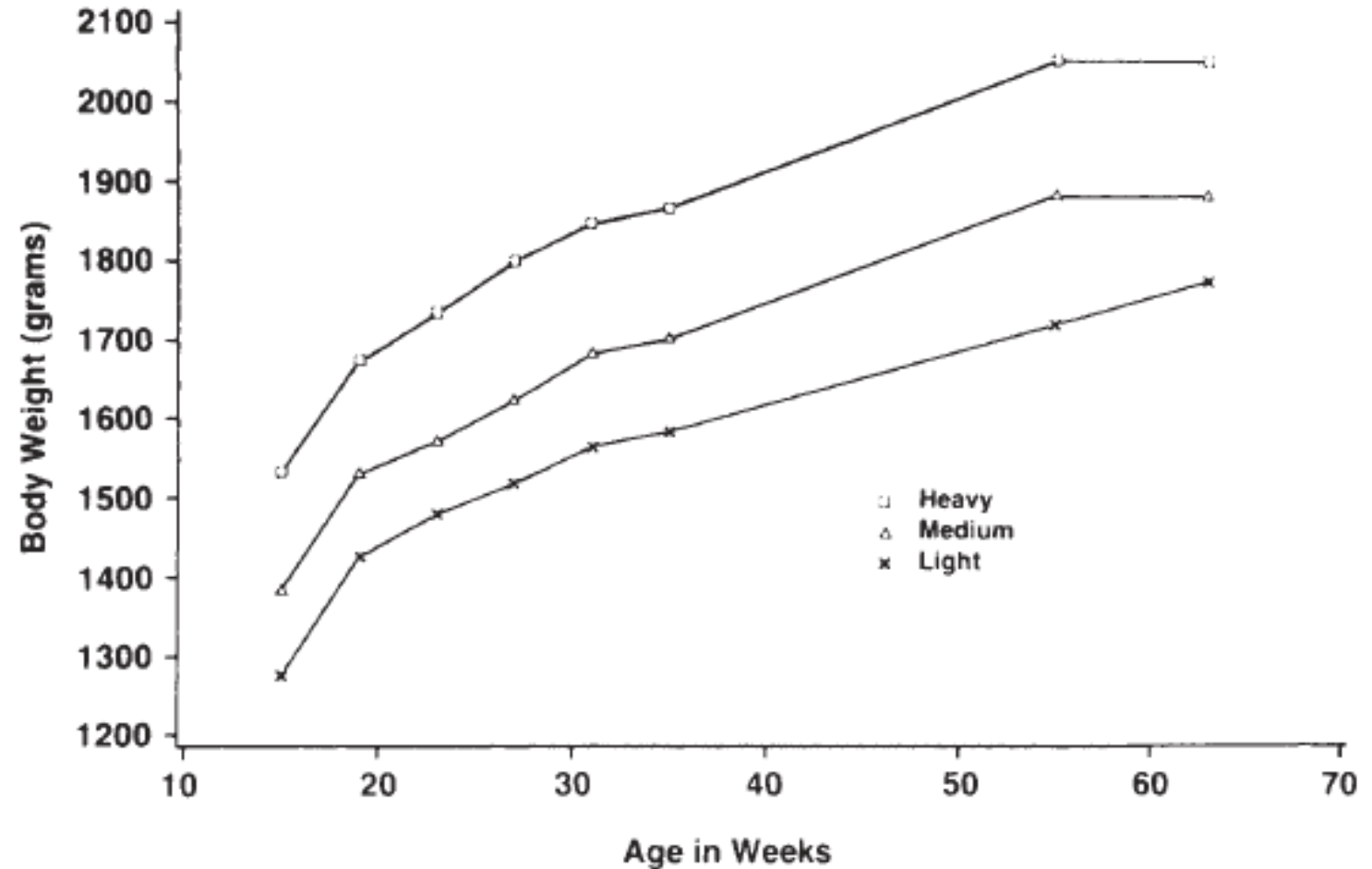
What happens if we neglect the pullet?



Leeson and Summers, 2005.
Commercial Poultry Nutrition (3rd ed.)

What happens if we neglect the pullet?

- ▶ **Difficult to change body weight trajectory in lay**
 - ▶ **Impact on egg size**



Leeson and Summers, 2005.
Commercial Poultry Nutrition (3rd ed.)

Pullet nutrition – key objectives

- ▶ **Weight for age**
 - ▶ With appropriate body composition
 - ▶ Adequate nutrient reserves at start of lay
 - ▶ Control of egg size – early and late
- ▶ **Body weight/physiological uniformity**
 - ▶ Feeding the “average” bird in the flock
- ▶ **Structural bone & medullary bone reserves**
 - ▶ Skeletal health, shell quality



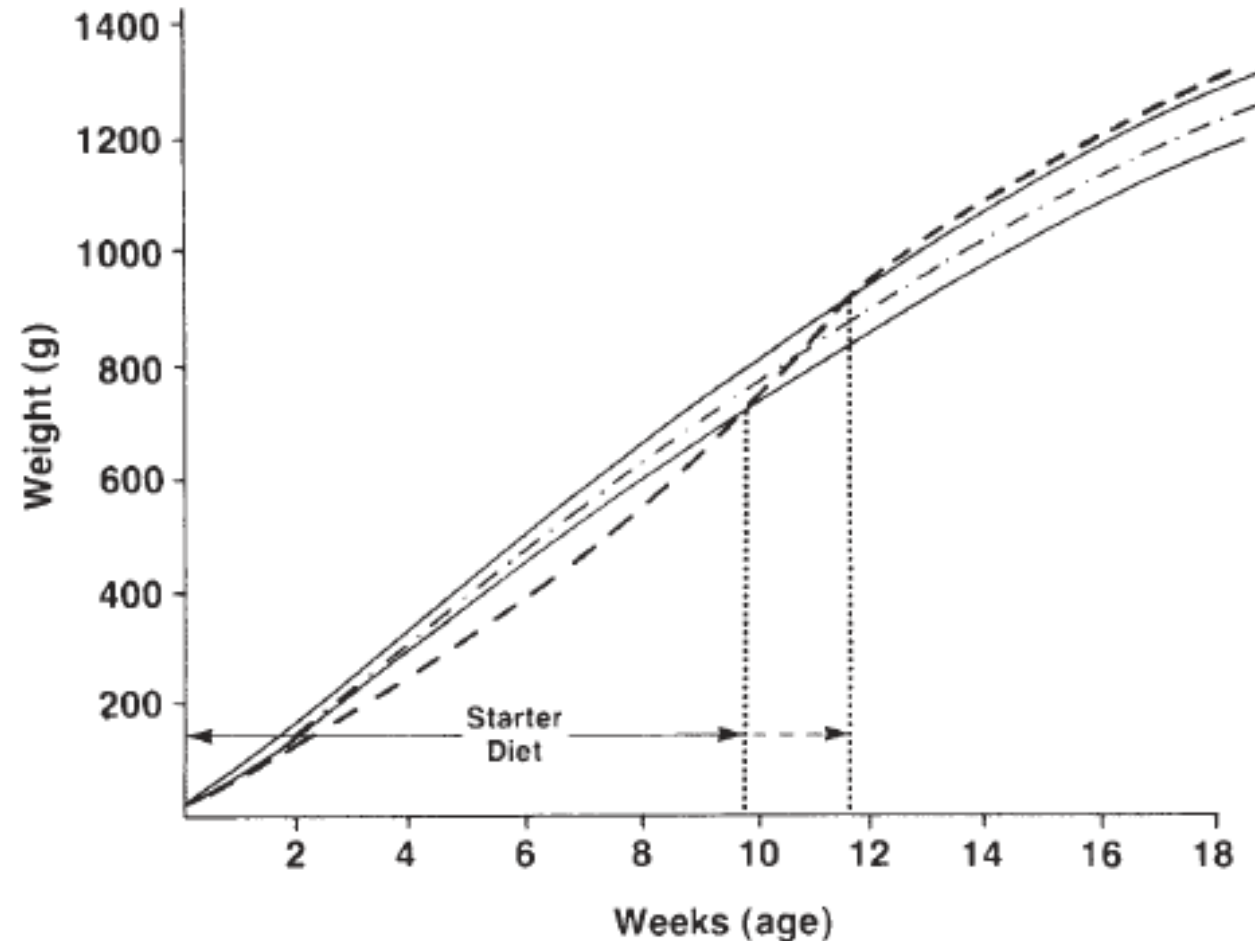
Common problems and practical solutions

- ▶ **Pullet management requires attention to detail:**
 - ▶ **Feed (nutrient) intake**
 - ▶ **Body weights**
 - ▶ **Body condition (fleshing)**

 - ▶ **Light management**
 - ▶ **Barn conditions**
 - ▶ **Differences among genetic strains**
 - ▶ **Vaccination**

Feeding for body weight – underweight

- ▶ Make diet changes based on bird requirements, not age
- ▶ Delay switch to next diet phase
- ▶ Identify problems, take corrective action as quickly as possible



Leeson and Summers, 2005.
Commercial Poultry Nutrition (3rd ed.)

Feeding for body weight – underweight

- ▶ **Stressful management techniques can decrease feed intake**
 - **Weighing**
 - **Vaccination**
 - **Beak trimming**

- ▶ **Feed a “stress diet”**
 - **Higher nutrient diet (i.e. an earlier phase)**
 - **Feed until target weight achieved**

Feeding for body weight – underweight

► Manage nutrient density

- If birds not achieving target growth because of a stress, revert back to a higher density diet



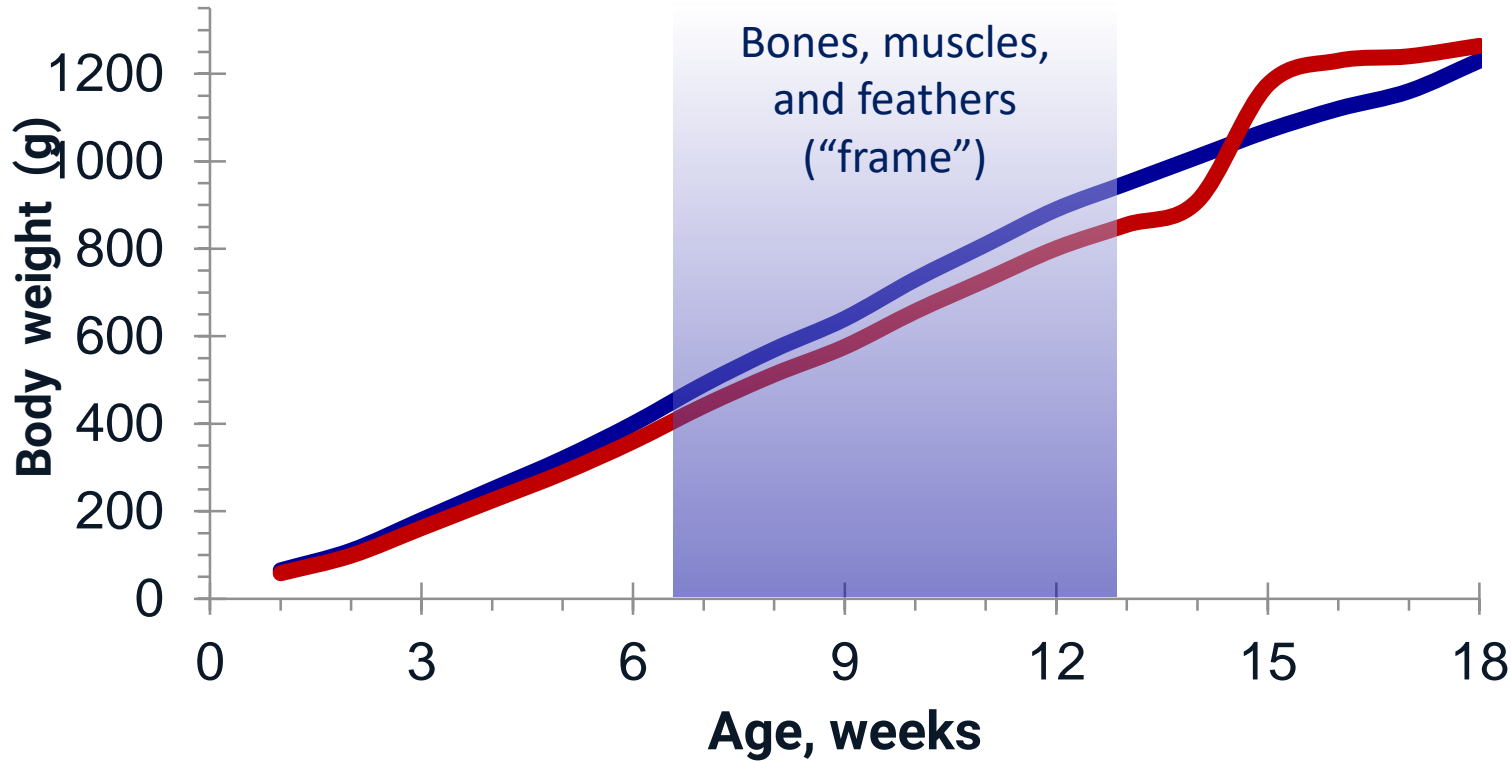
Vaccination Effect – Example

Age		Feed Intake		Diet
		Target	Actual	
Day	Weeks	lb/day		
101	14-3	13.2	13.47	5
102	14-4	13.2	13.07	6
103	14-5	13.2	12.85	6
104	14-6	13.2	13.81	6
105	15-0	13.2	13.56	6
106	15-1	13.4	10.46	2
107	15-2	13.4	12.11	2
108	15-3	13.4	13.02	2
109	15-4	13.4	12.92	2
110	15-5	13.4	10.04	2
111	15-6	13.4	11.18	2
112	16-0	13.4	10.08	2
113	16-1	13.5	11.80	7
114	16-2	13.5	13.85	7
115	16-3	13.5	13.29	7
116	16-4	13.5	13.69	7
117	16-5	13.5	13.60	7

Slide courtesy Marcus Kenny,
Hy-Line International

Revert to a higher nutrient density diet until weight is achieved

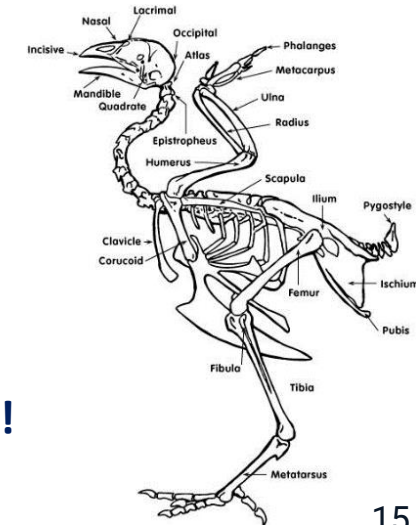
Feeding for body weight – underweight



Short, round 'fat' hen



Tall, lean hen

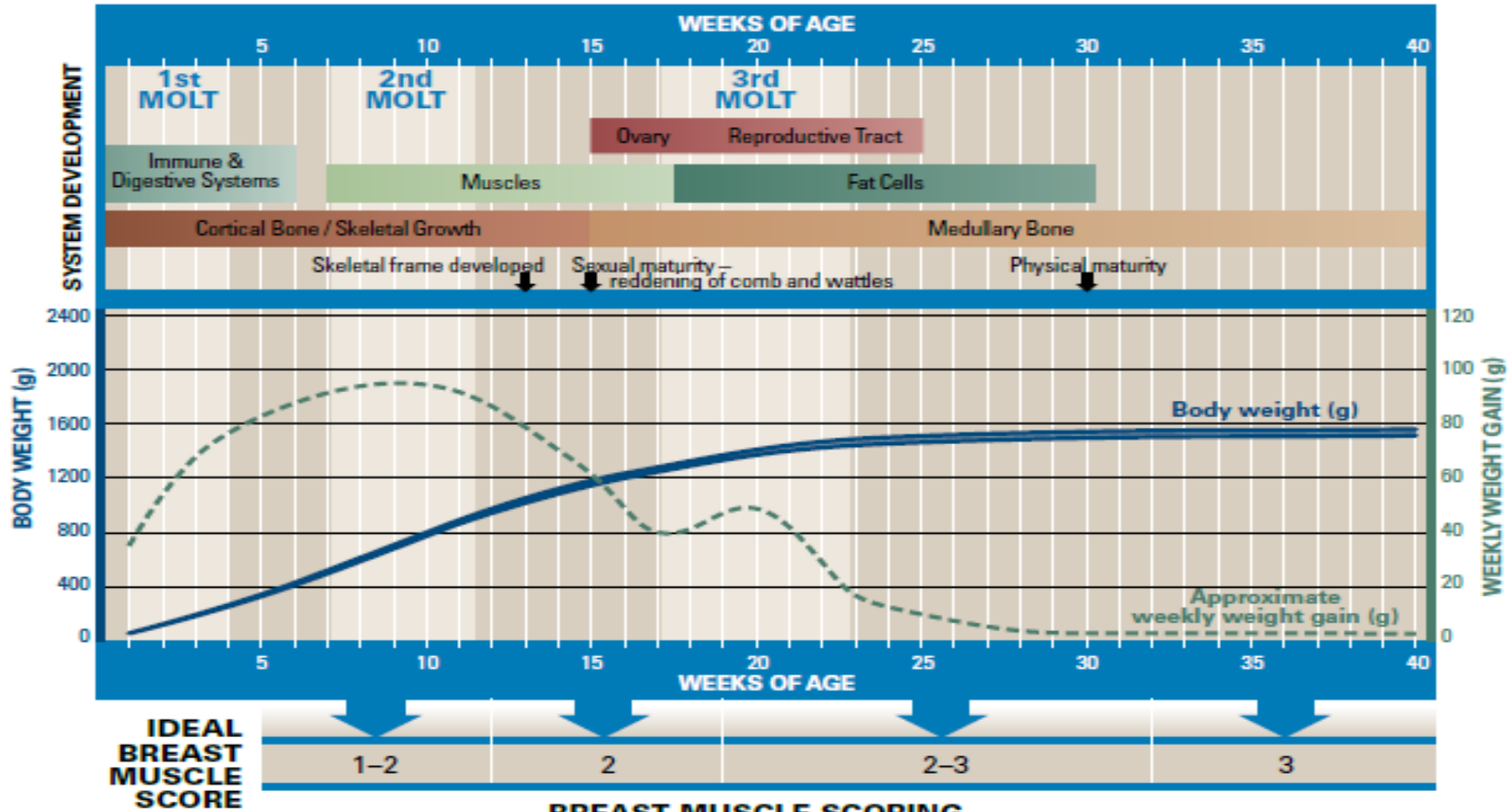


Slide courtesy Marcus Kenny,
Hy-Line International

Compensatory growth is not desirable in laying pullets = fat gain!

© Hy-Line International

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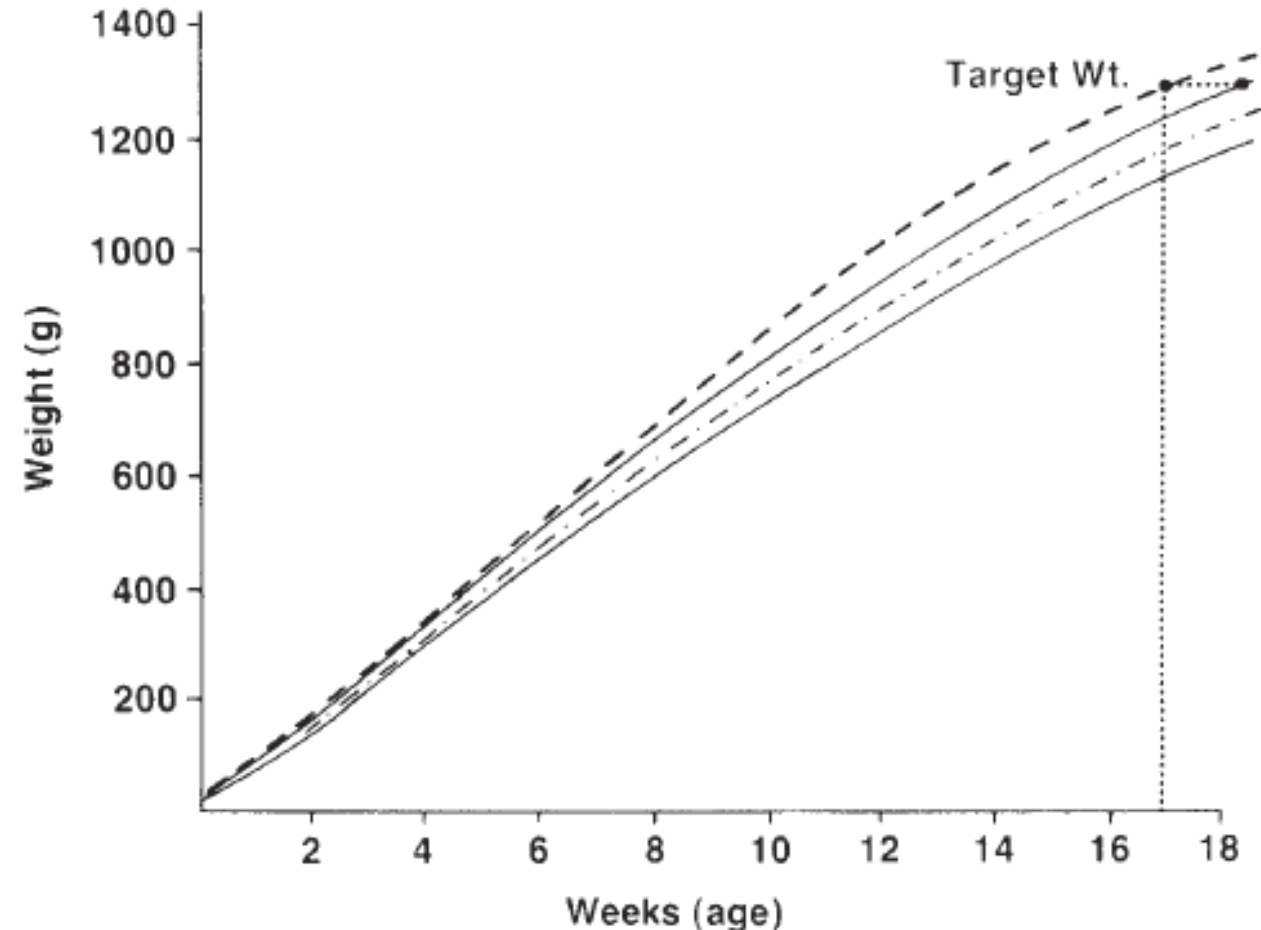


Layers with good muscle development are better able to sustain high egg production

Feeding for body weight – underweight

- ▶ **Make diet changes based on bird requirements, not age (management guide)**
- ▶ **Delay photostimulation if necessary**

Leeson and Summers, 2009.
Commercial Poultry Nutrition (3rd ed.)



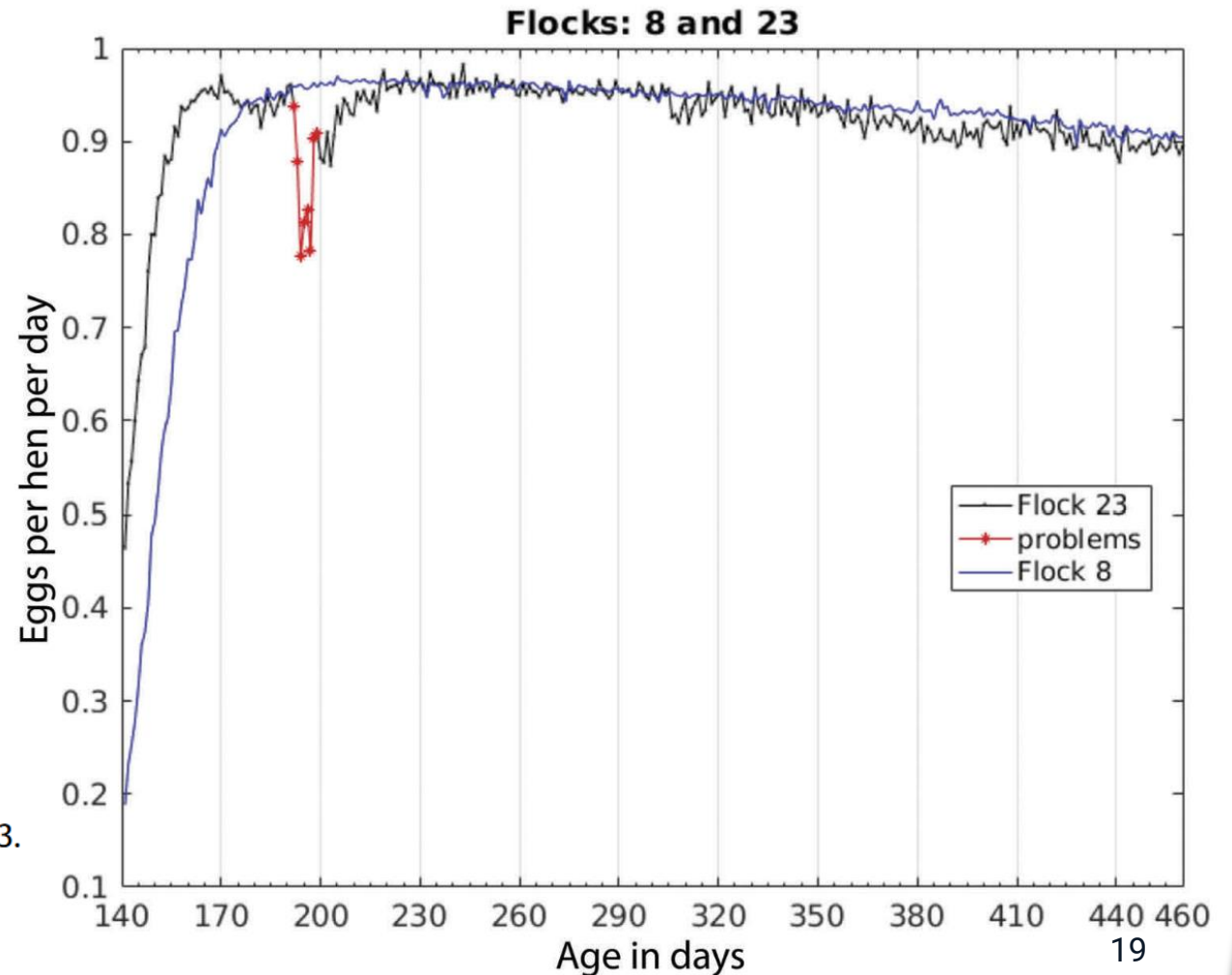
Feeding for body weight – underweight

- ▶ ...but if I delay photostimulation, I'll lose eggs!



Feeding for body weight – underweight

- ▶ ...but if I delay photostimulation, I'll lose eggs!



Ramírez-Morales et al. (2017).
British Poultry Science 58(6): 739-747.

Figure 3. Daily production per bird in representative flocks number 8 and 23.

Feeding for body weight & composition

- ▶ **Feed form – particle size**
 - ▶ Mash vs crumble?
 - ▶ Crumble if feed intake is a problem
- ▶ **Train the birds to eat more frequently**



Stack feeding program – automated barns



■ Feeding 1
 ■ Feeding 2
 ■ Feeding 3
 ■ Feeding 4
 ■ Feeding 5
 ■ Feeding 6
 ■ Feeding 7

Feeding for body weight

- ▶ **Prepare pullets for increased feed intake at lay**
 - ▶ **Higher fibre diets**
 - ▶ 3-4% fibre, up to 7% in Developer diets
- ▶ **Coarse fibre feeding**
 - ▶ Stimulate gizzard size, development
 - ▶ Gut microflora
 - ▶ Litter quality
 - ▶ Welfare

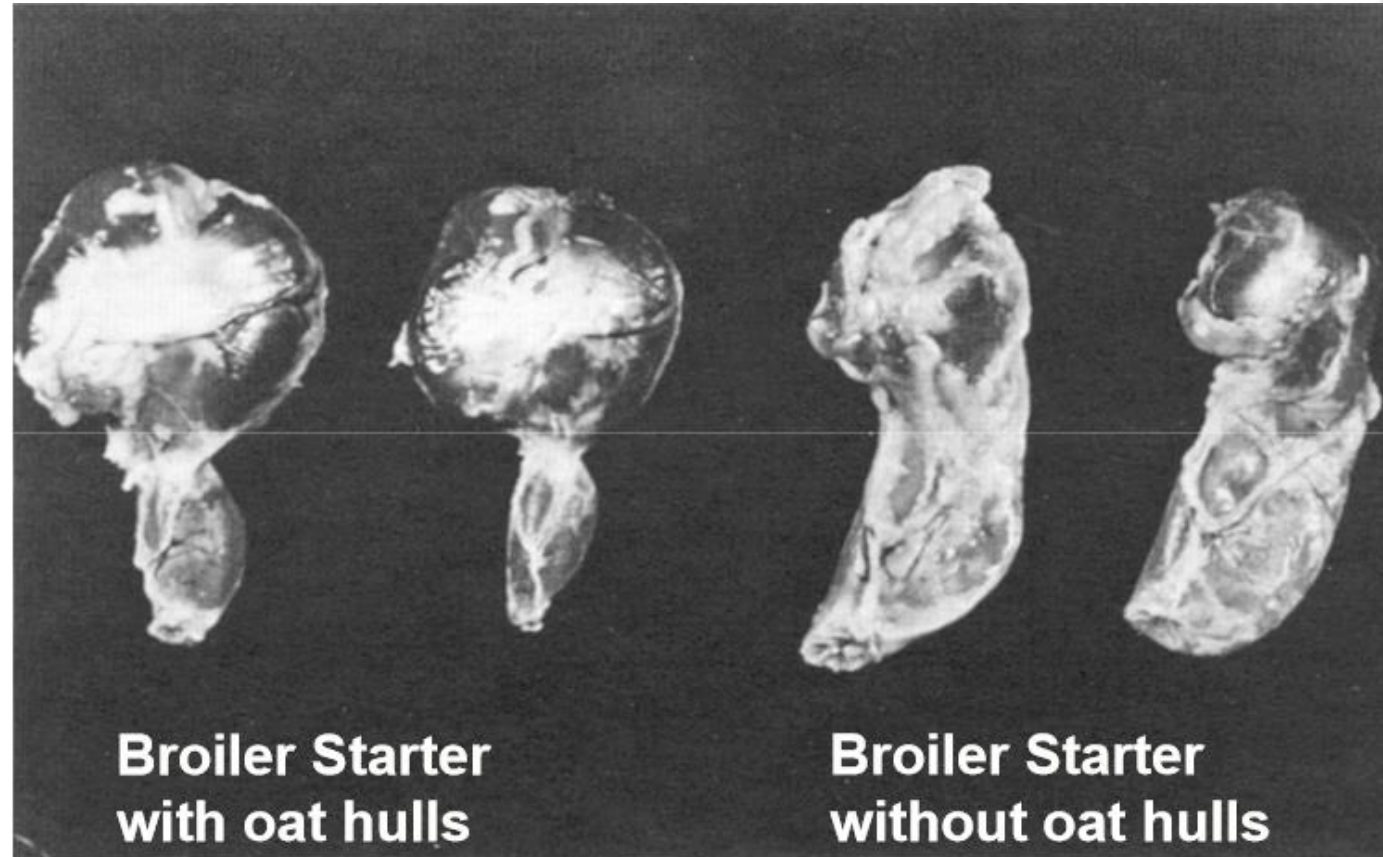


Image courtesy
Peter Ferket

Feeding for body weight – underweight

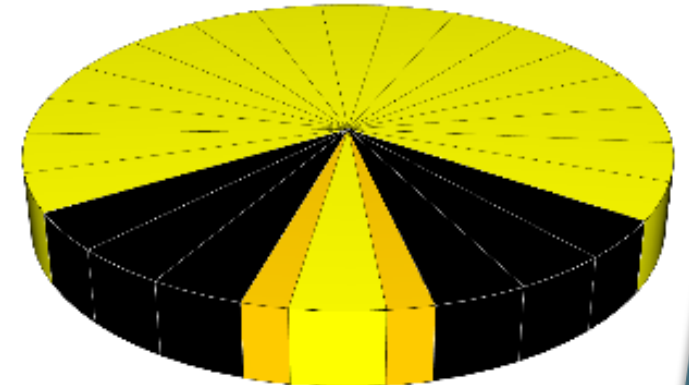
▶ Midnight feeding

- ▶ Maintain pullet growth, especially in hot climates
- ▶ A tool, not a required technique

▶ Key points:

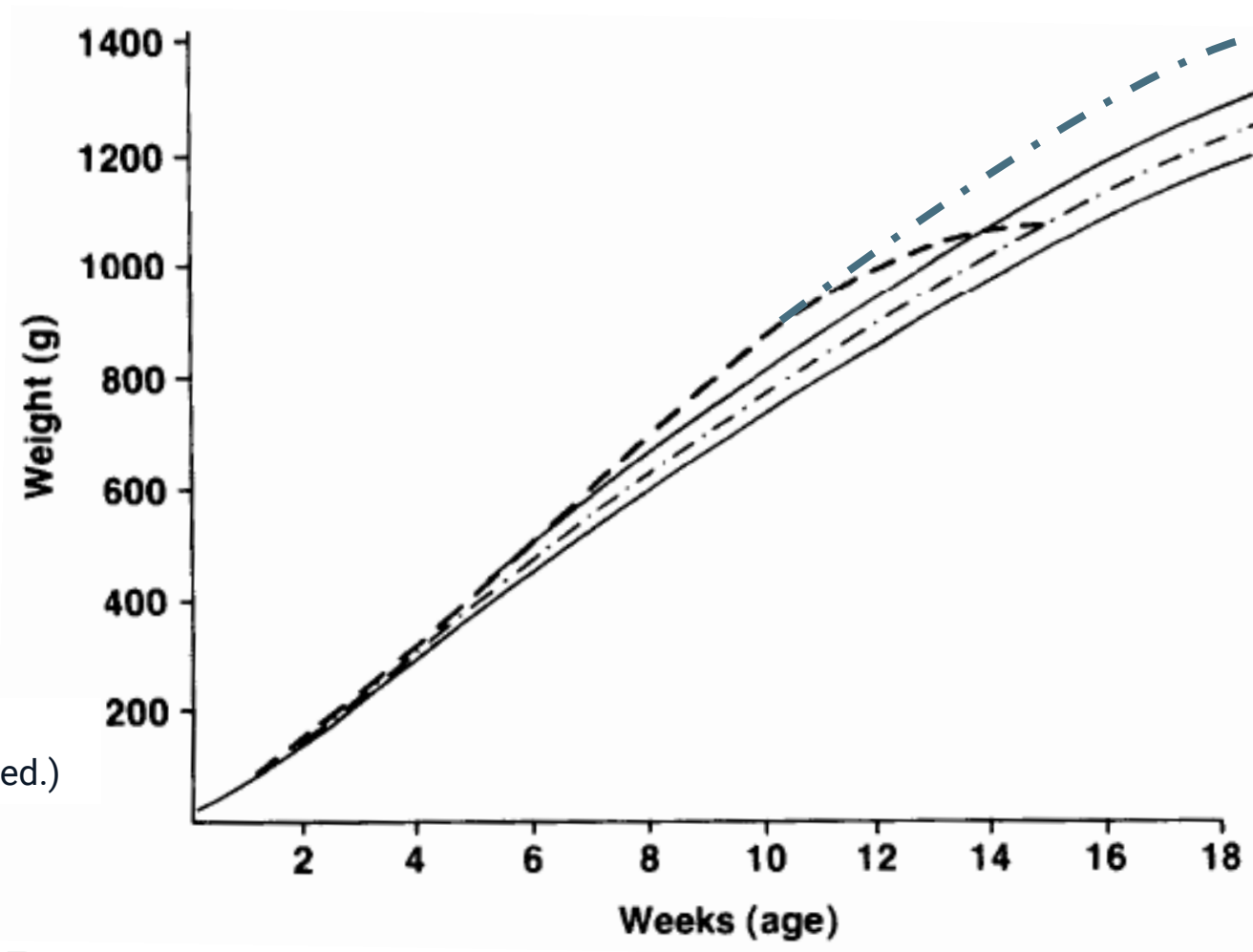
- ▶ Sufficient total length of darkness
- ▶ No more than 1 hour of light for pullets
- ▶ Sufficient length of dark period before and after 1 hour of light

This figure is for layers not pullets
Pullets – increase # of hours of dark before and after midnight feeding



Hy-Line International

Overweight pullets – what not to do



Leeson and Summers, 2005.
Commercial Poultry Nutrition (3rd ed.)

The importance of flock uniformity

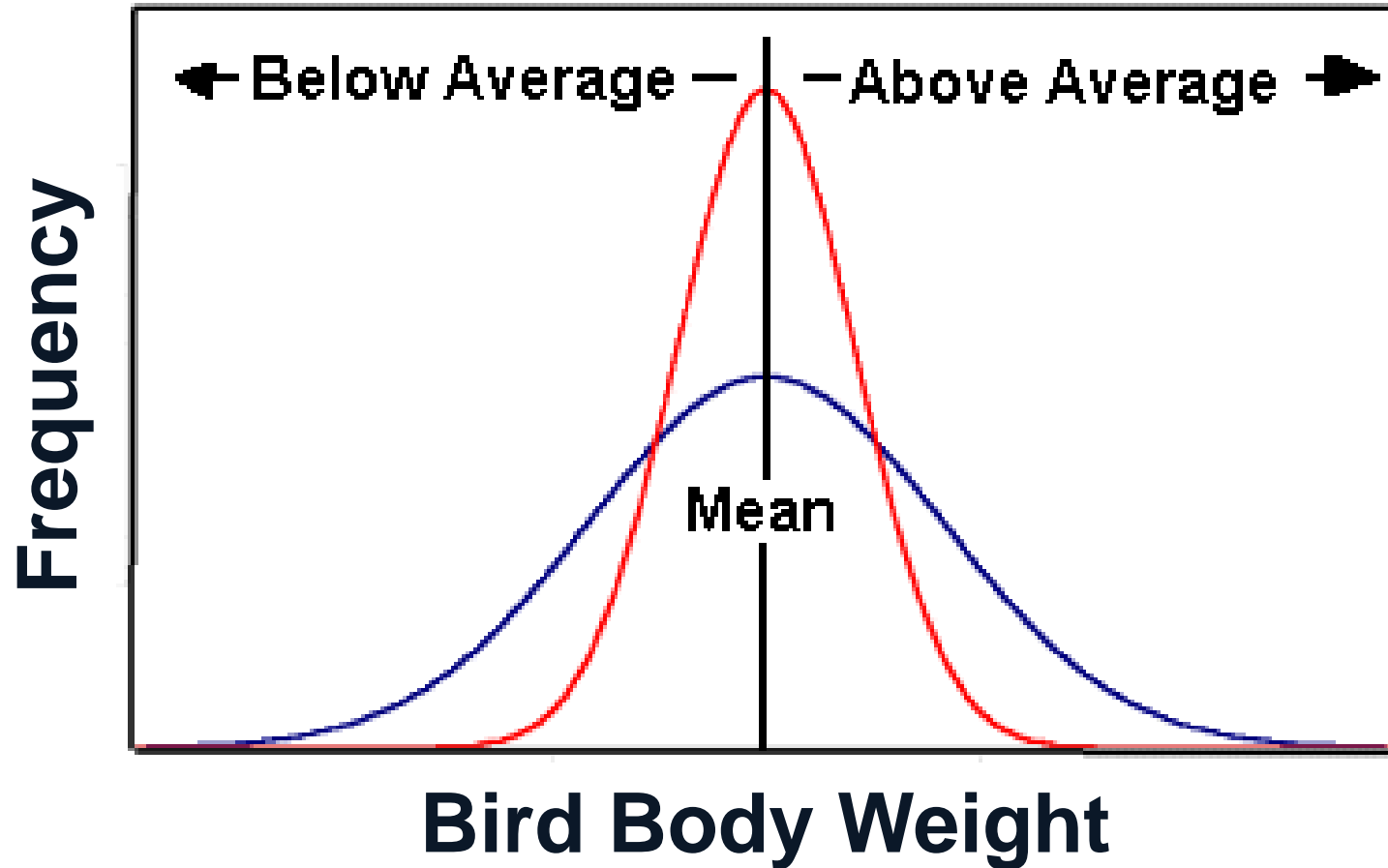
- ▶ **Flock is made up of individual birds, but we feed the group as if they are all the same**
 - ▶ Under target body weight
 - ▶ Delayed production
- ▶ **Over target body weight**
 - ▶ Early production
- ▶ **Birds entering production together**
 - ▶ Easiest to manage



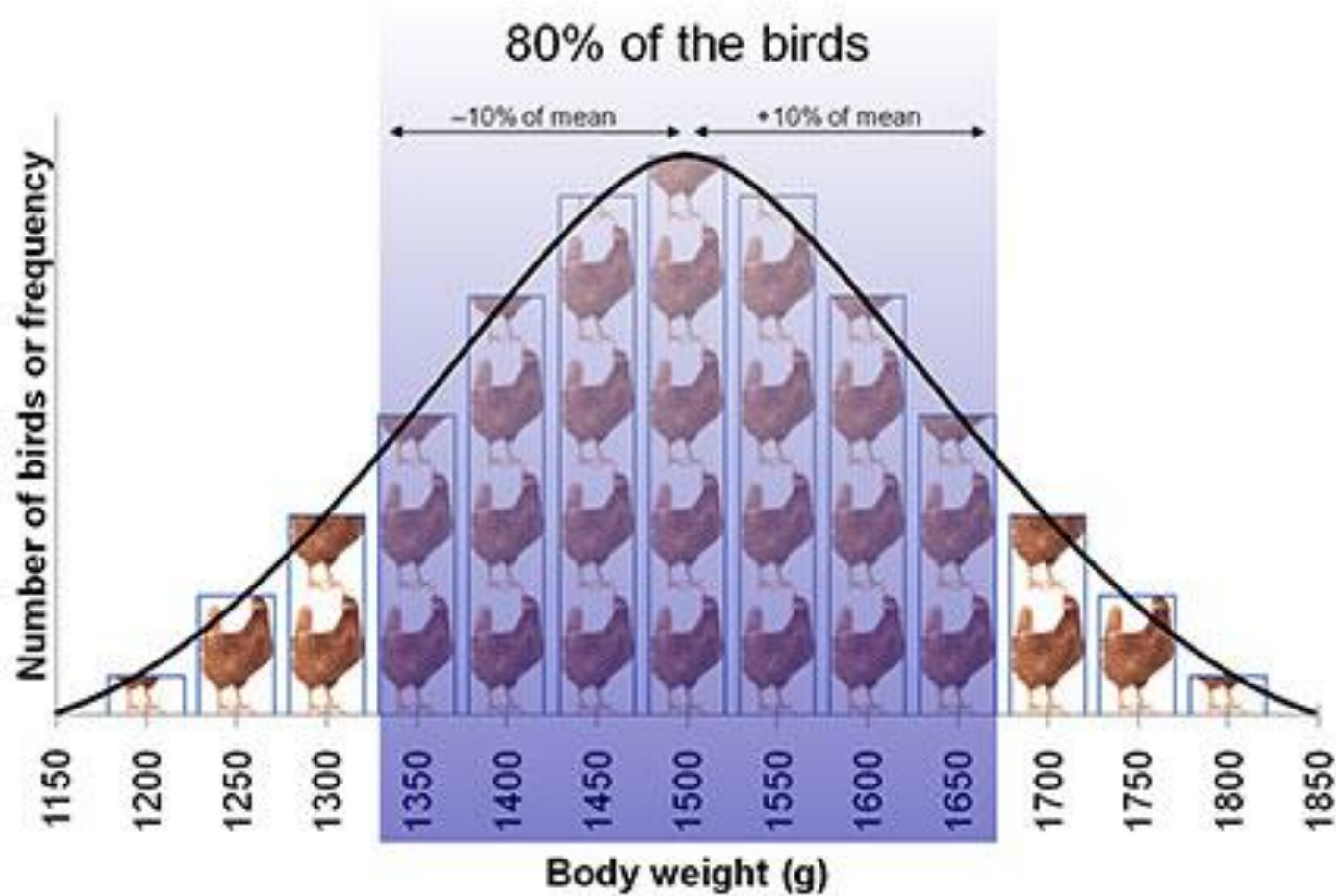
<https://www.wattagnet.com/articles/30323-how-to-turn-marginal-pullets-into-strong-adult-layers?>

Pullet uniformity

Normal Distributions



Pullet uniformity



http://www.hylinena.com/redbook/Management/BW_uniformity.html

Feeding pullets

- ▶ Use management, feed to get flock to the starting line



- ▶ Use photostimulation to start production

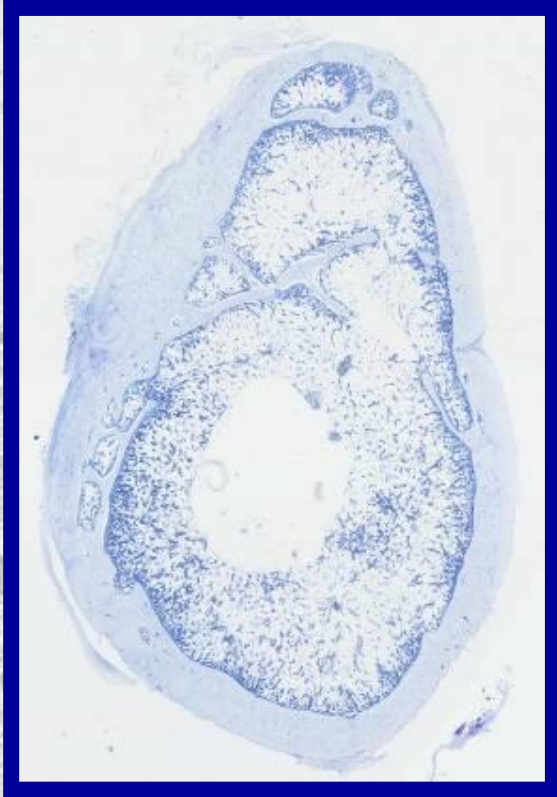
The point-of-lay pullet...



...the key to long production cycles

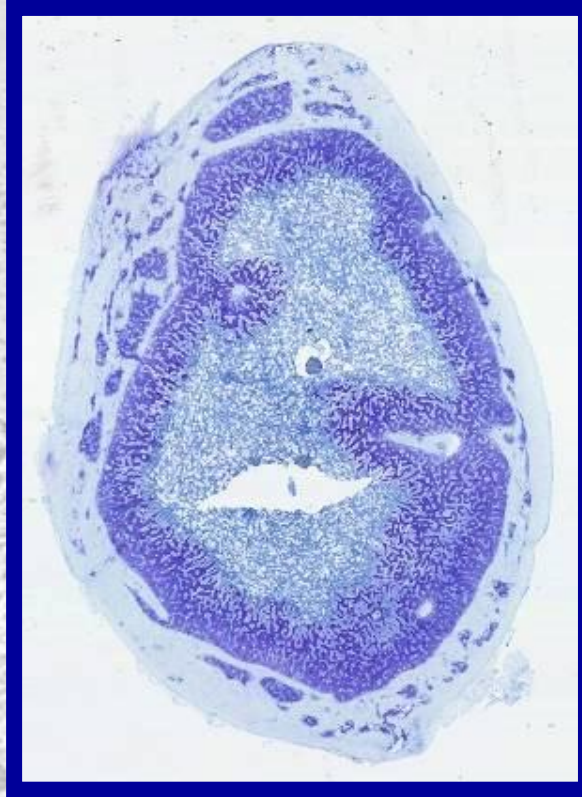
Pullet & hen bone tissue

16 weeks



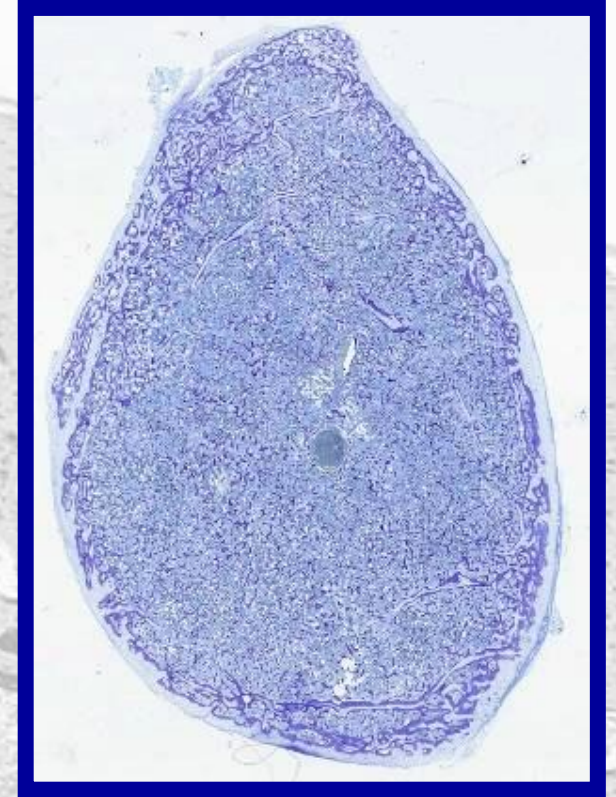
No MB
Thick cortex

1st egg (~20 wks)



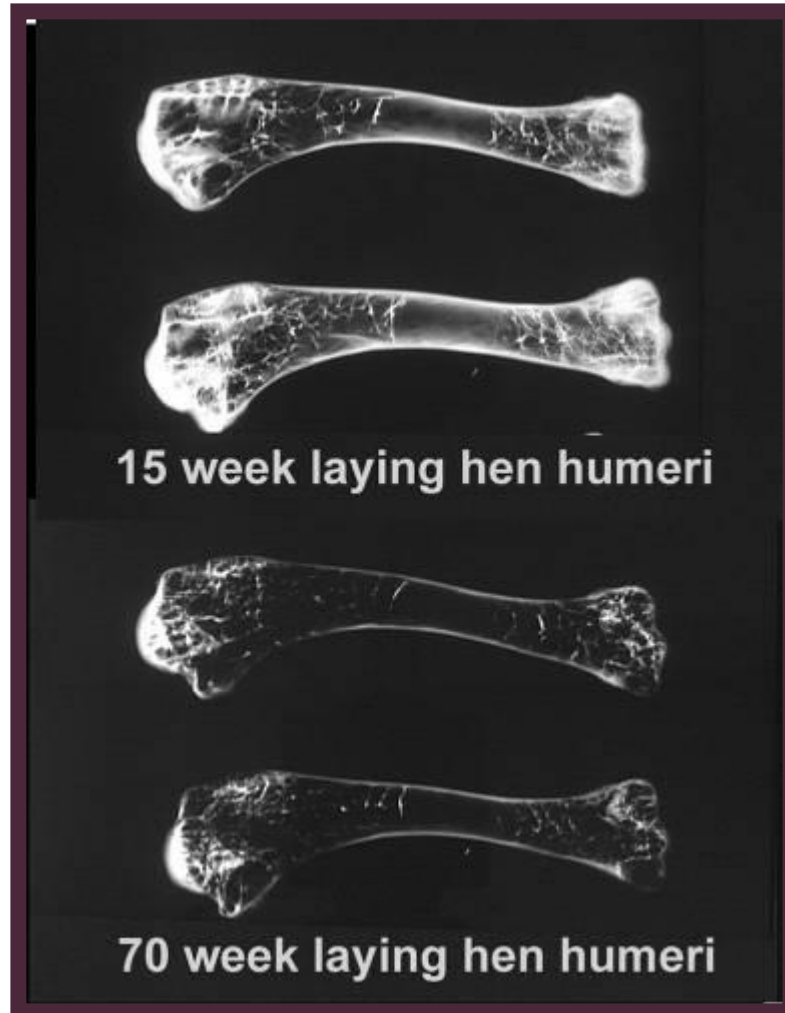
Dense lining MB
Thick cortex

67 weeks



Diffuse MB
Thin cortex

Structural bone depletion



Images courtesy of Bob Fleming

Feeding pullets – summary

- ▶ **Frequent weighing and fleshing**
 - ▶ Delay diet phase change if underweight or insufficient muscle development
 - ▶ Implement strategies to keep birds at or slightly above target weight
- ▶ **Delay photostimulation if target weight not achieved**
- ▶ **Estrogen surge depends on body composition and age**
- ▶ **Sufficient time to deposit medullary bone before first egg**

Feeding pullets – summary

- ▶ **Think in the long term:**
 - ▶ **What will provide the greatest return over the life of the flock?**
 - ▶ Bird health, productivity
 - ▶ **NOT**
 - ▶ How do I get my hens into lay as soon as possible?



Feeding pullets – summary

- ▶ **The pullet is an investment, not a loss**
- ▶ **The status of the point-of-lay pullet is the pinnacle**
- ▶ **Managing the hen from this point is often about maintaining the work done in the pullet house**



Thank you!

Questions?

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