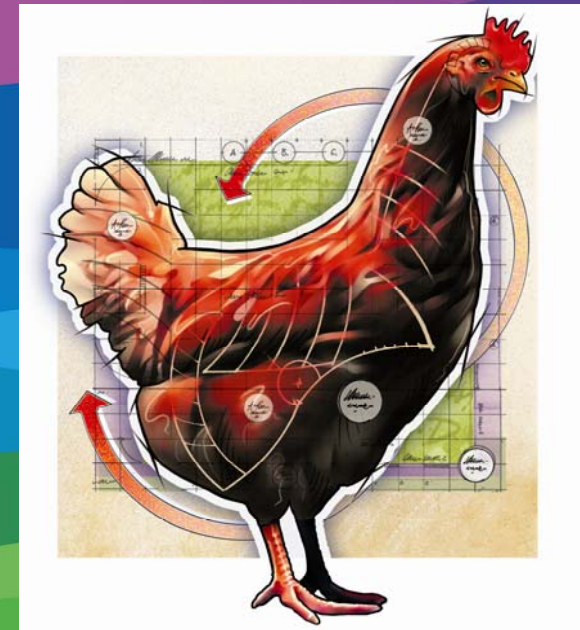


Effekte von ROVIMIX[®] Hy•D[®] auf die Produktivität von Legehennen – Grundlagen und neue Erkenntnisse

Jahrestagung 2011 der
Arbeitsgemeinschaft der
Fachberater der Geflügelwirtschaft
Rütti, Zollikofen

Dr. Gilbert M. Weber
DSM Nutritional Products, Basel

Mittwoch, 4. Mai 2011



Beneficial Effects of Hy•D on Laying Hens

What is 25-Hydroxy Vitamin D₃ ?

- First metabolite of vitamin D₃
- Absorbed differently from the fat-soluble vitamins A, E, K or D₃
- Major form of vitamin D activity in serum; used for determining vitamin D status
- Available from DSM Nutritional Products under the tradename ROVIMIX[®] Hy•D[®] 1.25%

Beneficial Effects of Hy•D on Laying Hens

Advantages of Hy•D

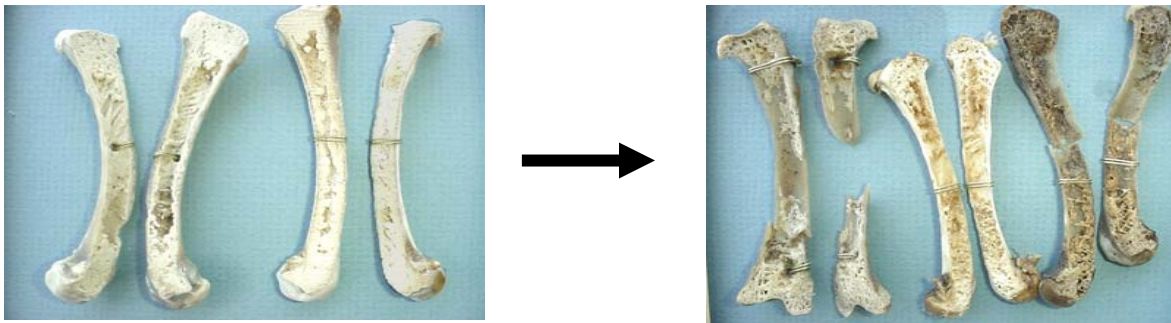
- Hy•D is more potent and effective in providing the classical nutritional benefits of vitamin D:
 - ✓ optimizes calcium and phosphorus homeostasis
 - ✓ improves bone mineralization
 - ✓ ameliorates leg problems, field rickets and TD (tibial dyschondroplasia) associated field problems in meat poultry
 - ✓ supports egg shell formation and hatchability
 - ✓ improves feed efficiency and body weight gain.

- Hy•D is an effective and more flexible source of vitamin D activity

Beneficial Effects of Hy•D on Laying Hens

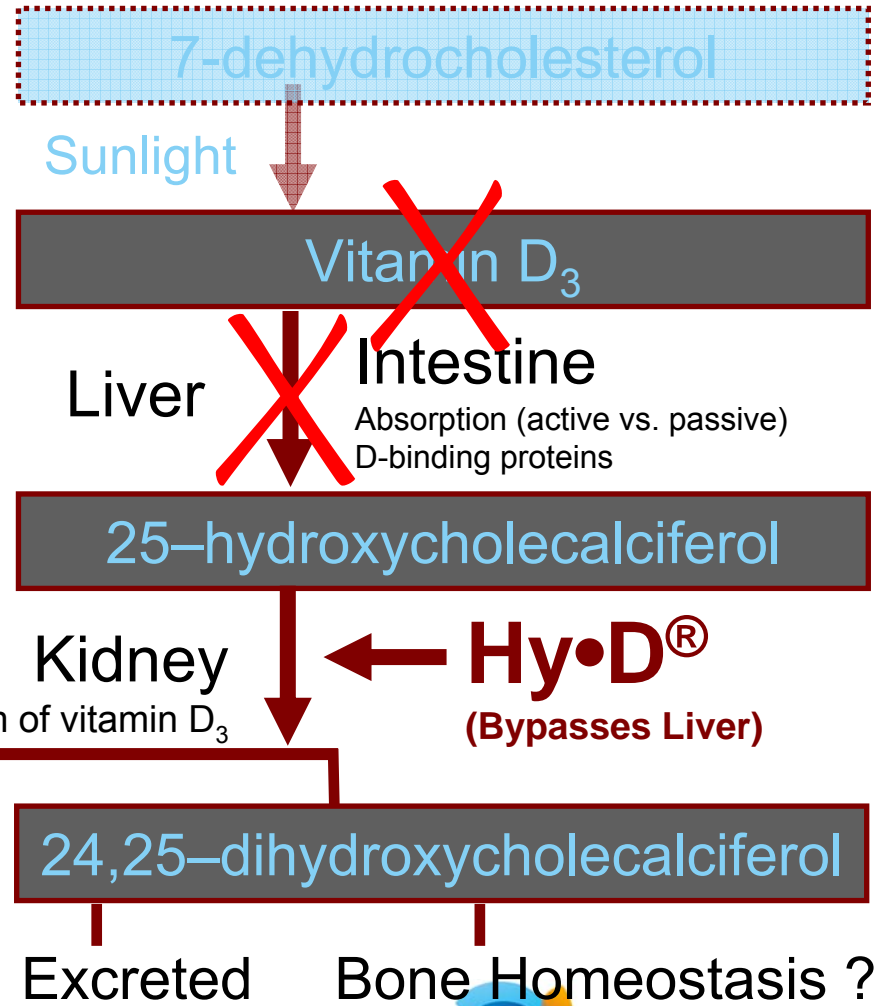
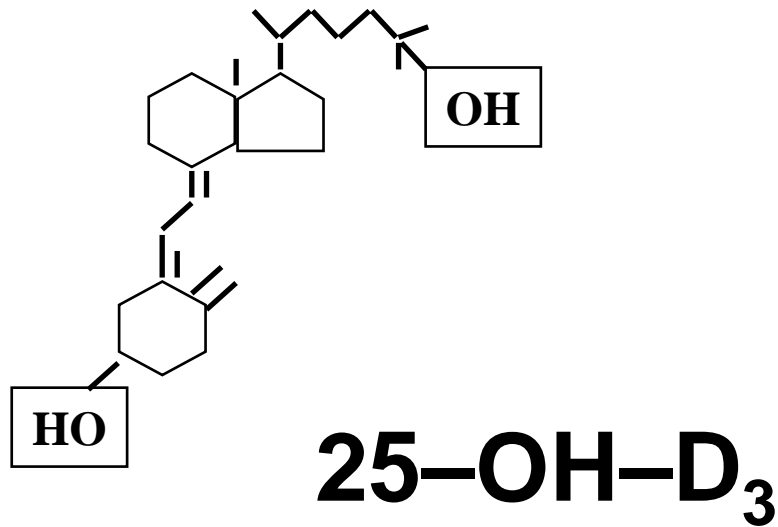
Layer Customers Buy Hy•D Because of ...

- Improved egg production (performance):
 - ✓ Less broken eggs
 - ✓ Sustained egg production over time
 - ✗ increased overall egg production
 - ✗ extended length of lay cycle
 - ✗ less flocks needed
- Longer maintenance of bone mass



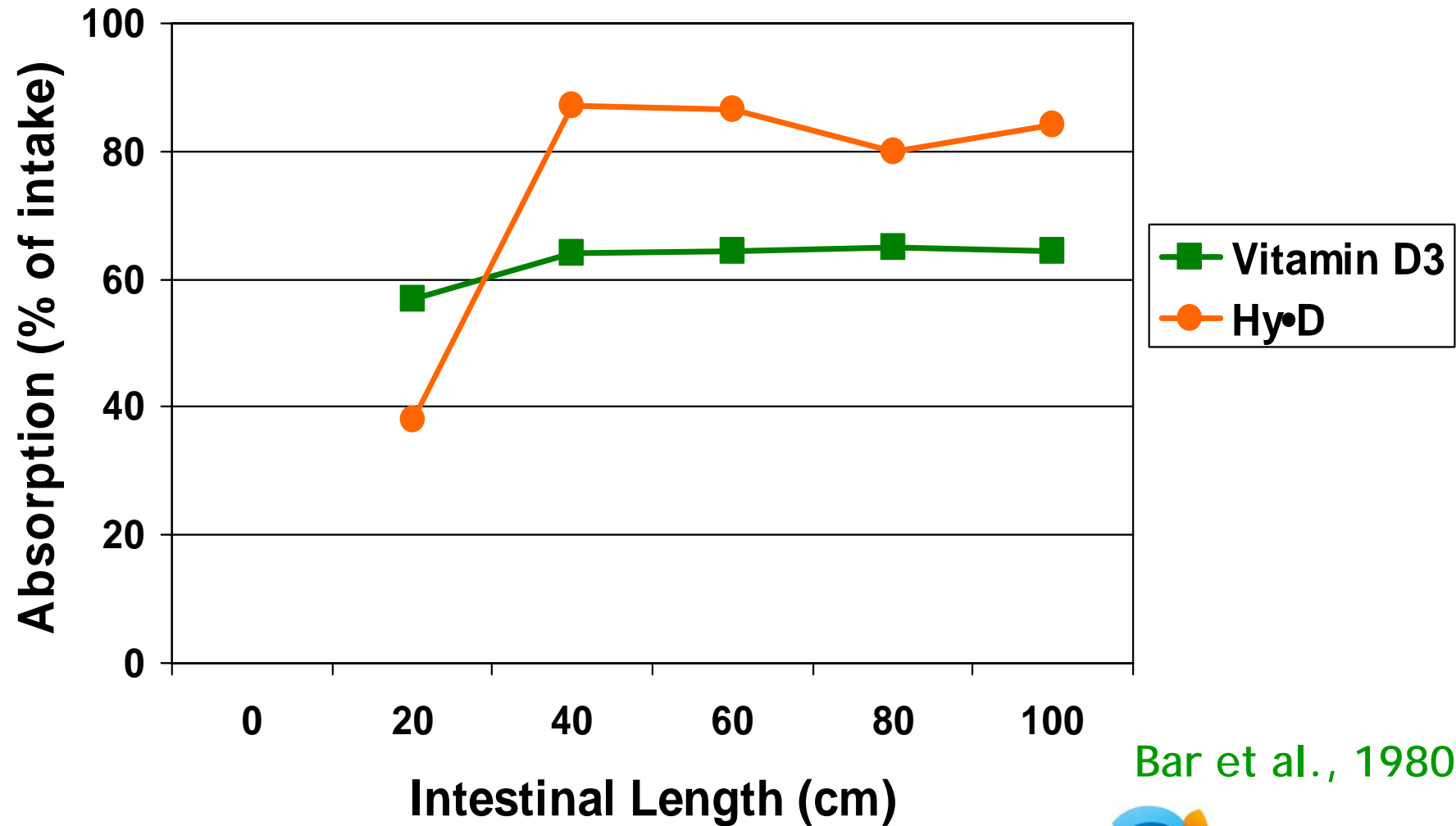
Beneficial Effects of Hy•D on Laying Hens

Normal Vitamin D Metabolism



Beneficial Effects of Hy•D on Laying Hens

Cumulative Absorption of Hy•D and Vitamin D₃

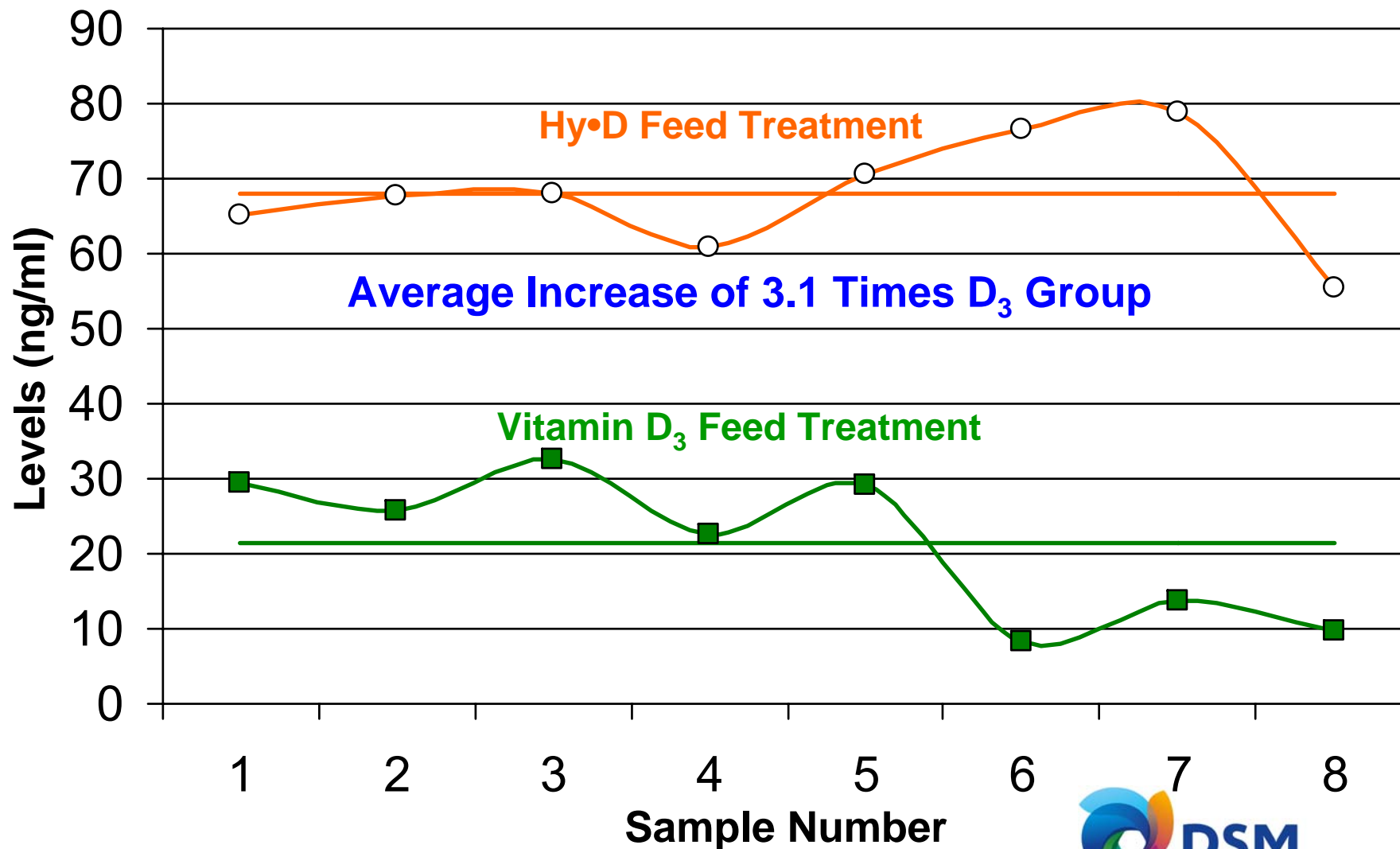


Bar et al., 1980



Beneficial Effects of Hy•D on Laying Hens

25-Hydroxyvitamin D₃ Blood Serum Content



Beneficial Effects of Hy•D on Laying Hens

Objectives for a Successful Layer Program

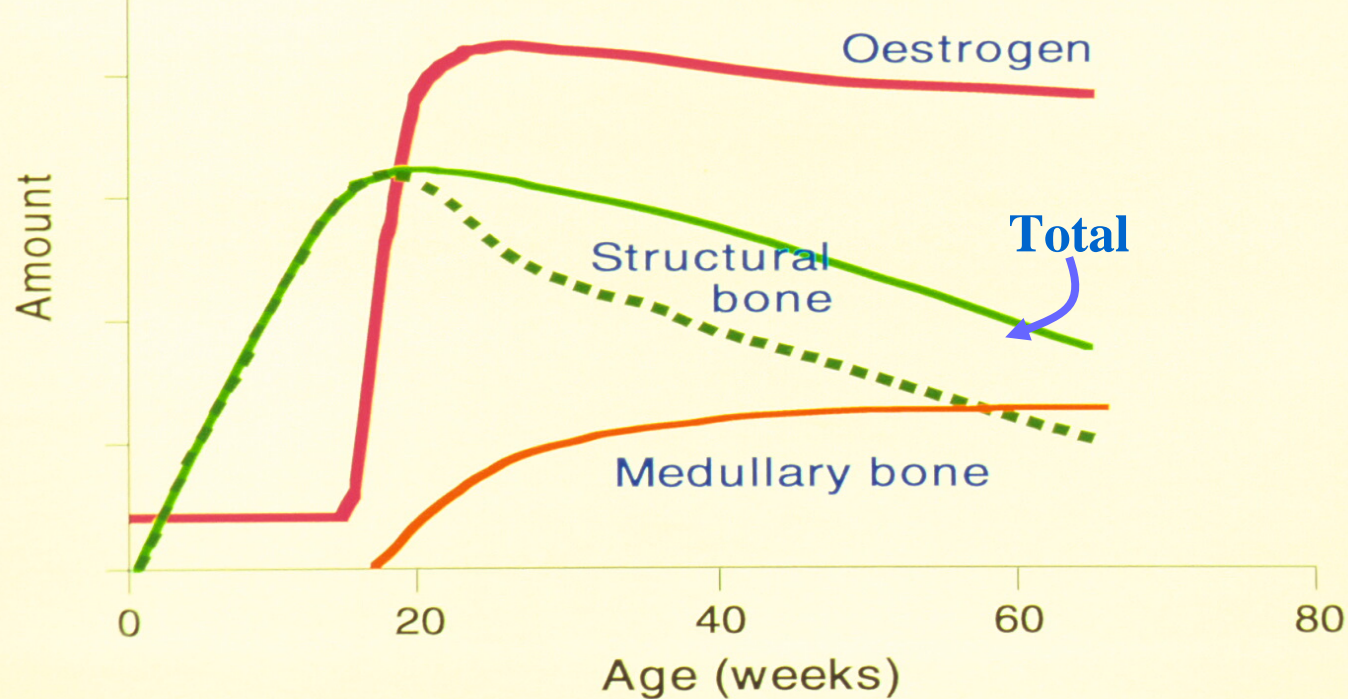
- Obtain maximum bone volume prior to sexual maturity
- Reduce early lay mortality
- Improve flock productivity through higher laying performance and better eggshell quality
- Maintain optimal structural bone volume through lay cycle for prolonged lay persistence

Beneficial Effects of Hy•D on Laying Hens

Bone Dynamics in a Laying Hen

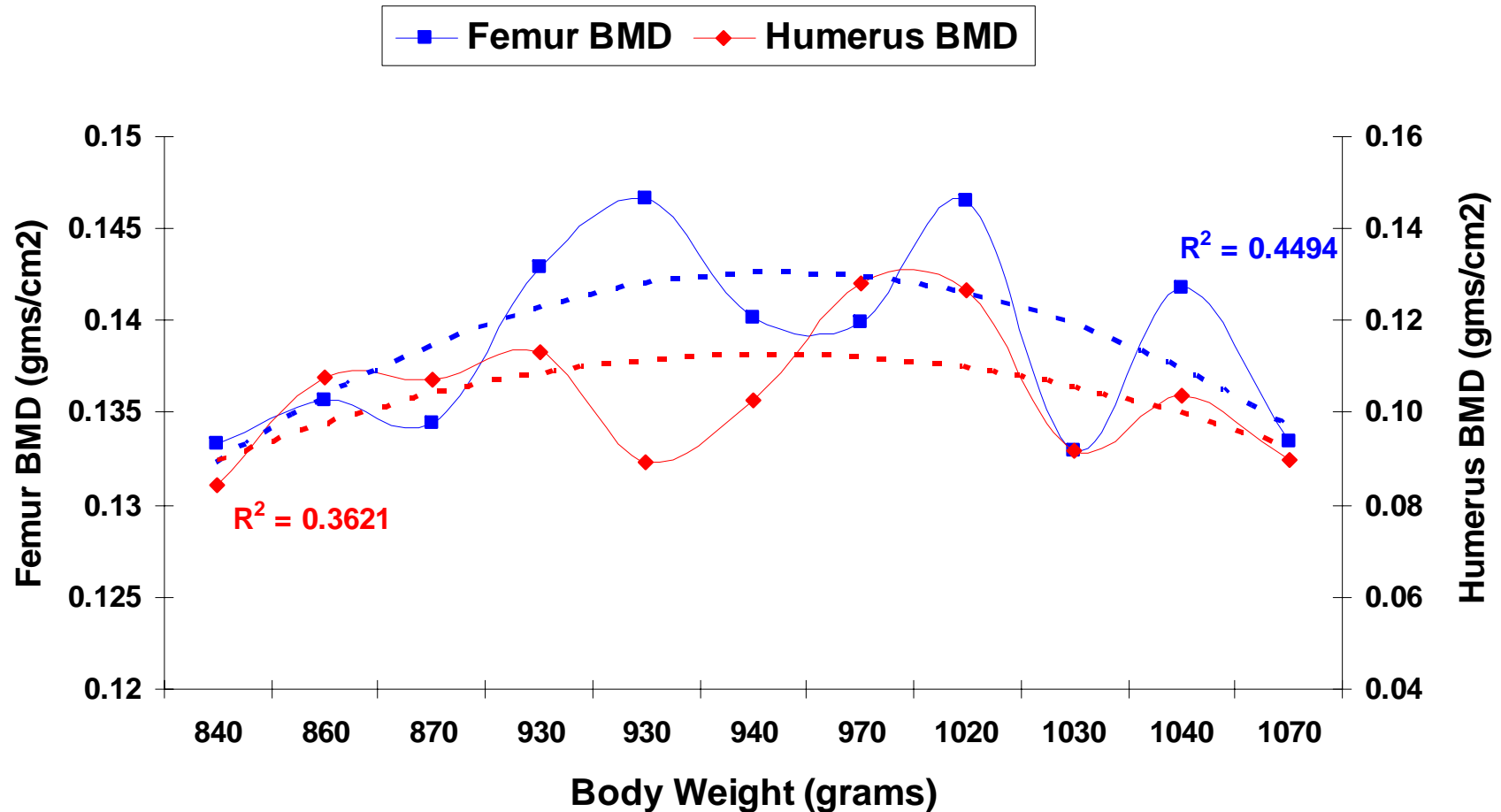
Changes in oestrogen and structural and medullary bone during the life of the hen

(With permission from Dr. Colin Whitehead - Roslin Institute, Scotland, 2000)



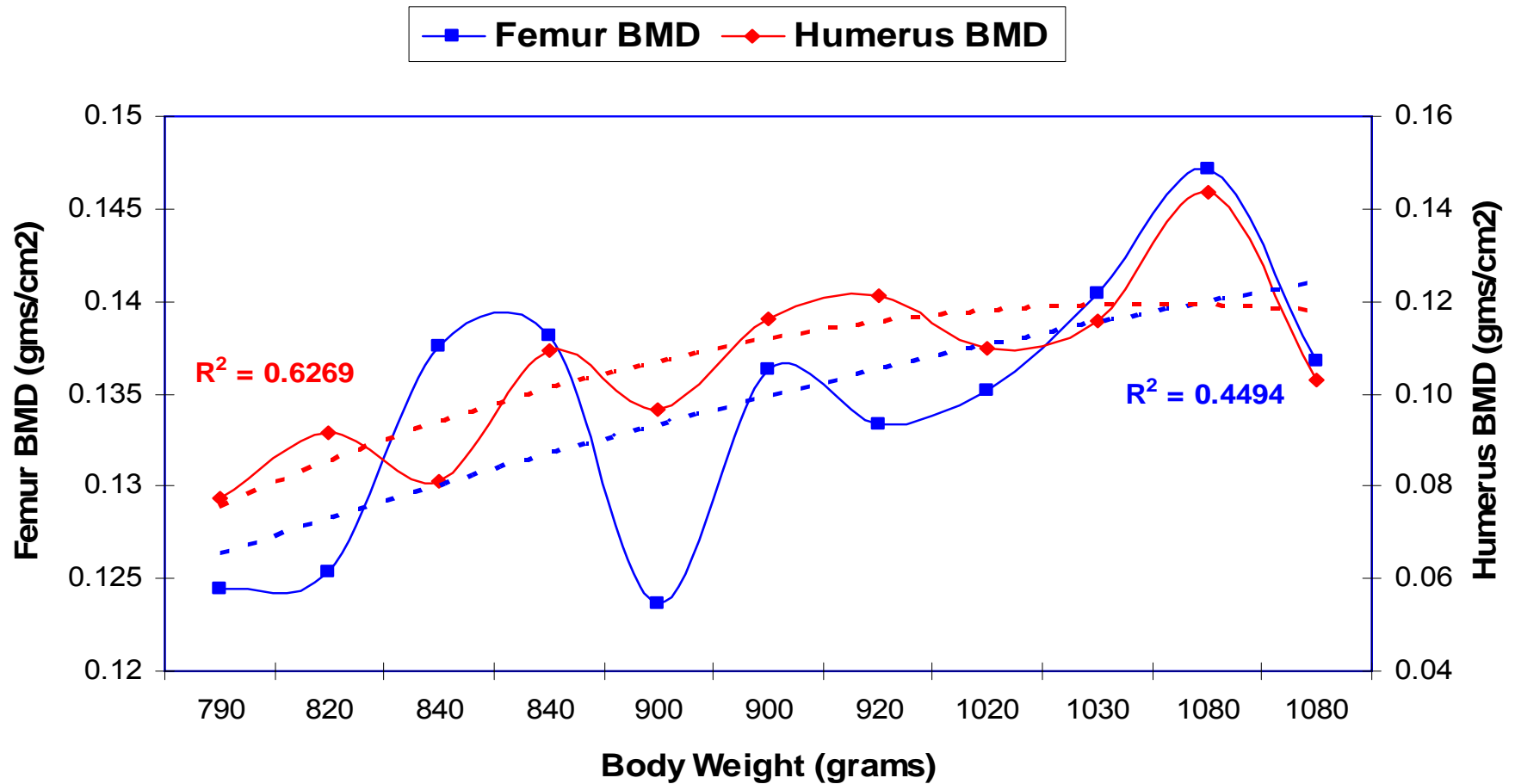
Beneficial Effects of Hy•D on Laying Hens

Bone Density of Pullets (week 12 - controls)



Beneficial Effects of Hy•D on Laying Hens

Bone Density of Pullets (week 12 - Hy•D)



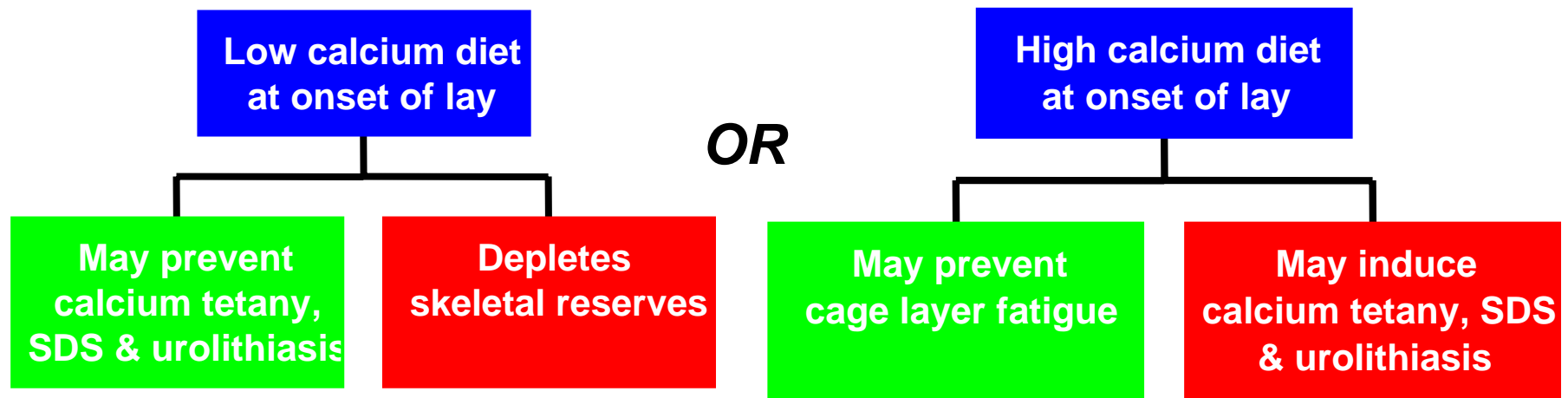
Beneficial Effects of Hy•D on Laying Hens

Objectives for a Successful Layer Program

- Obtain maximum bone volume prior to sexual maturity
- **Reduce early lay mortality**
- Improve flock productivity through higher laying performance and better eggshell quality
- Maintain optimal structural bone volume through lay cycle for prolonged lay persistence

Beneficial Effects of Hy•D on Laying Hens

The Calcium Dilemma with Laying Hens

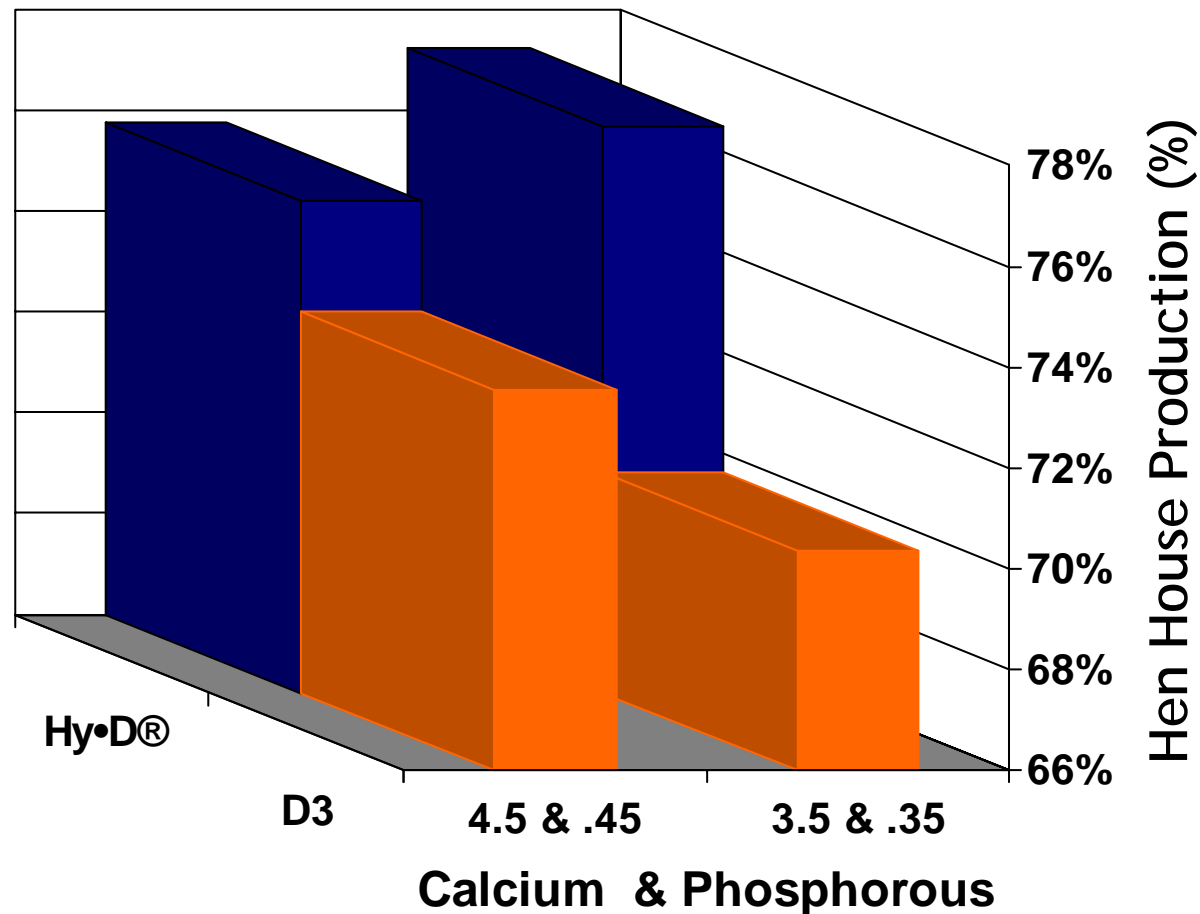


BUT

Hy•D helps the hen solve this dilemma

Beneficial Effects of Hy•D on Laying Hens

Hy•D and Calcium Phosphorous Ratios



(Data collected represents 48 weeks of lay) - M.E. Jackson and C. Zhong

Beneficial Effects of Hy•D on Laying Hens

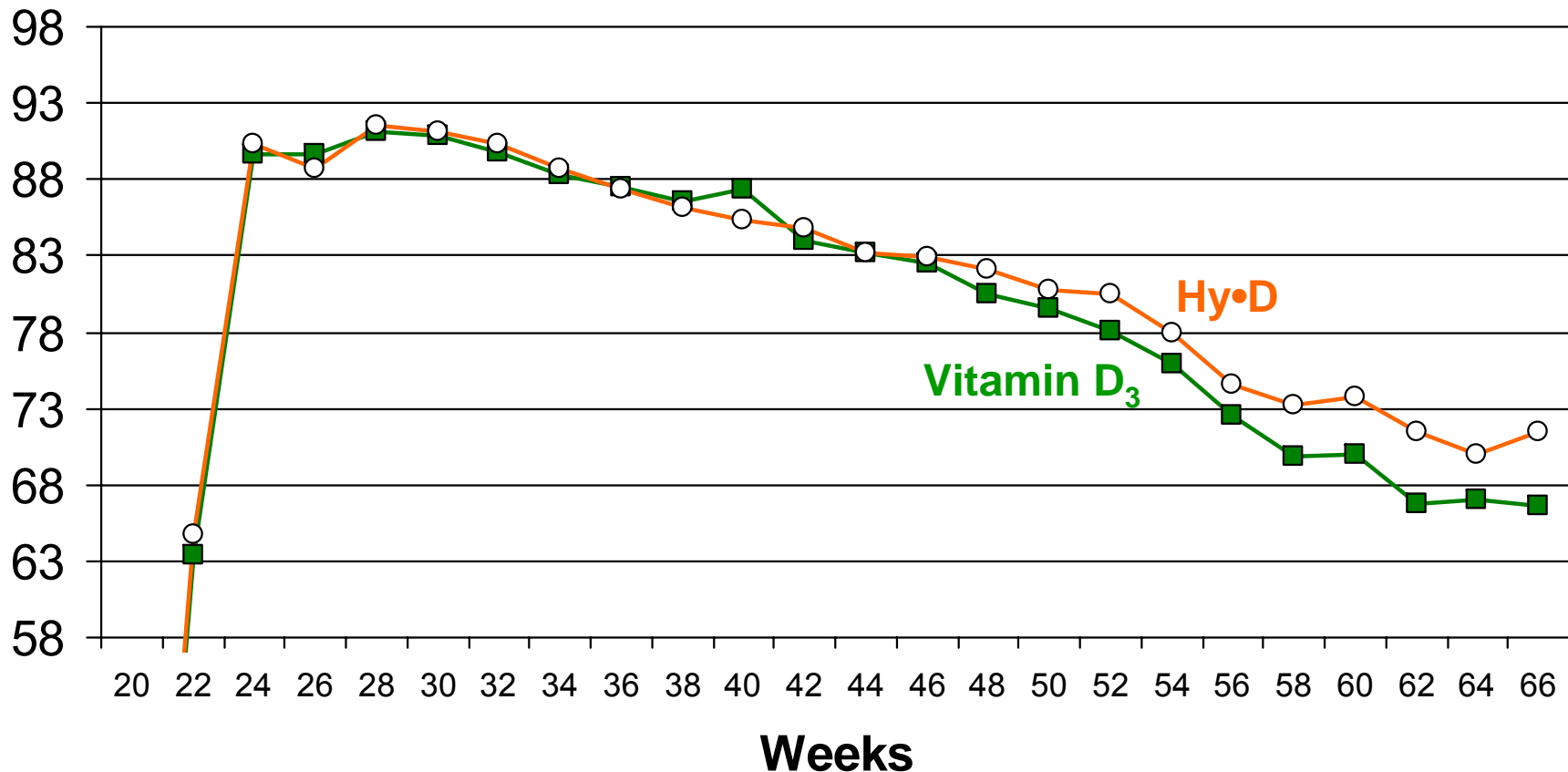
Objectives for a Successful Layer Program

- Obtain maximum bone volume prior to sexual maturity
- Reduce early lay mortality
- Improve flock productivity through higher laying performance and better eggshell quality
- Maintain optimal structural bone volume through lay cycle for prolonged lay persistence

Beneficial Effects of Hy•D on Laying Hens

Percent Hen House Production

Hy•D and D₃ during 1st Cycle Lay

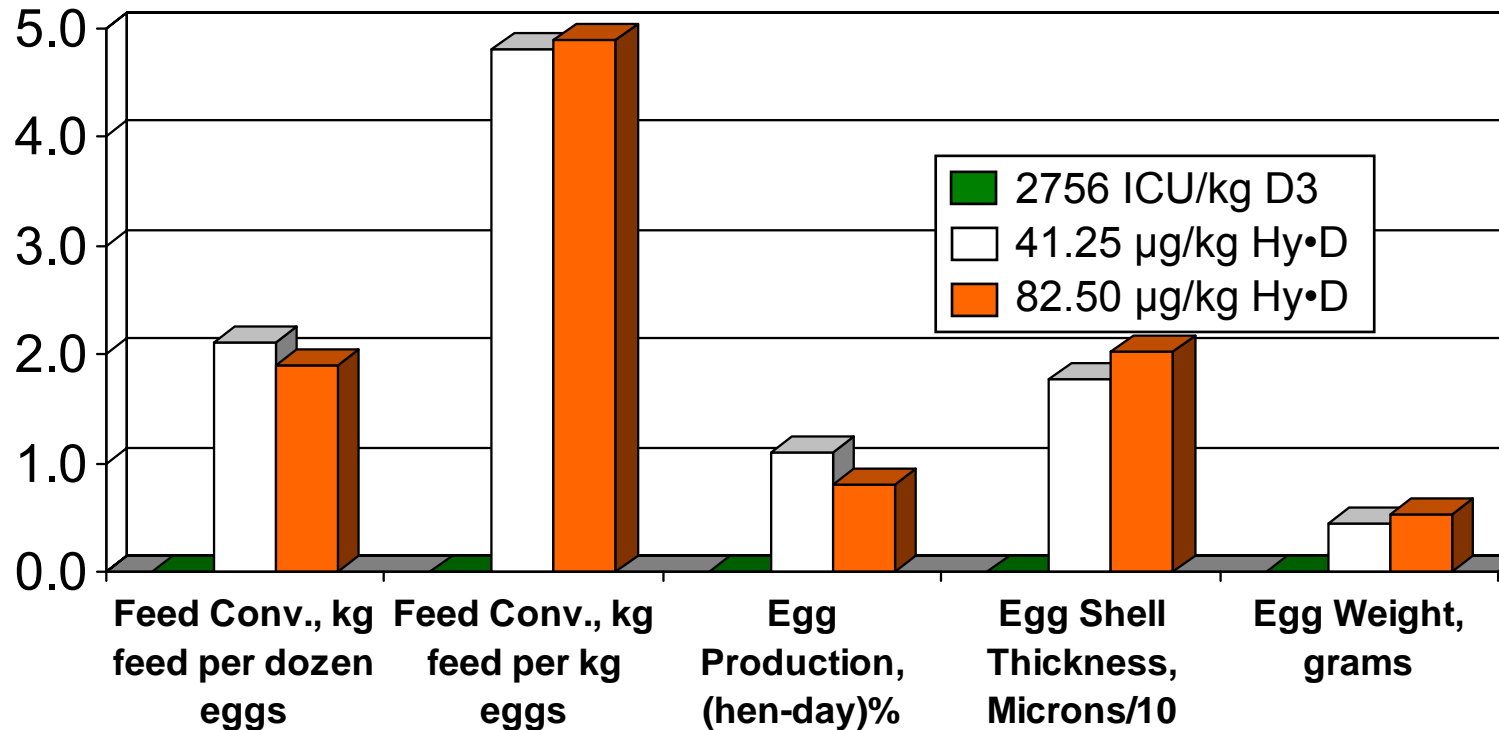


(Data collected represents 48 weeks of lay) - M.E. Jackson and C. Zhong

Beneficial Effects of Hy•D on Laying Hens

PARC Institute Study on Hy•D (1)

0-16 Weeks of Lay-Change from D3 Control

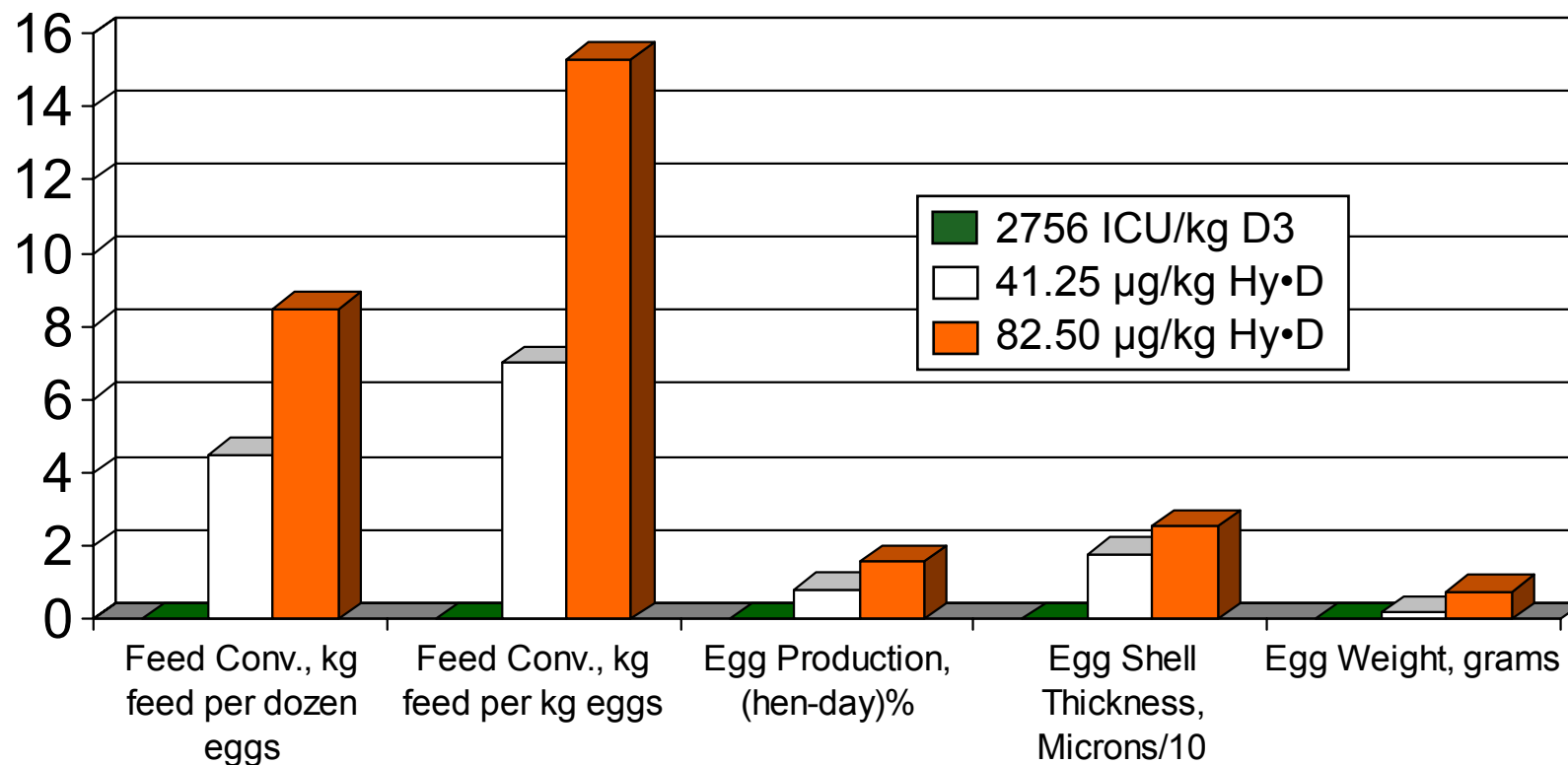


PARC Institute Evaluation: Effect of Hy•D® on Commercial Laying Hen (from 20-52 weeks of age) - Dr. James McNaughton, 1998

Beneficial Effects of Hy•D on Laying Hens

PARC Institute Study on Hy•D (2)

16-32 Weeks of Lay-Change from D3 Control



PARC Institute Evaluation: Effect of Hy•D® on Commercial Laying Hen.
(from 20-52 weeks of age) -Dr. James McNaughton, 1998

Beneficial Effects of Hy•D on Laying Hens

Performance of Laying Hens (41 - 67 weeks of age)

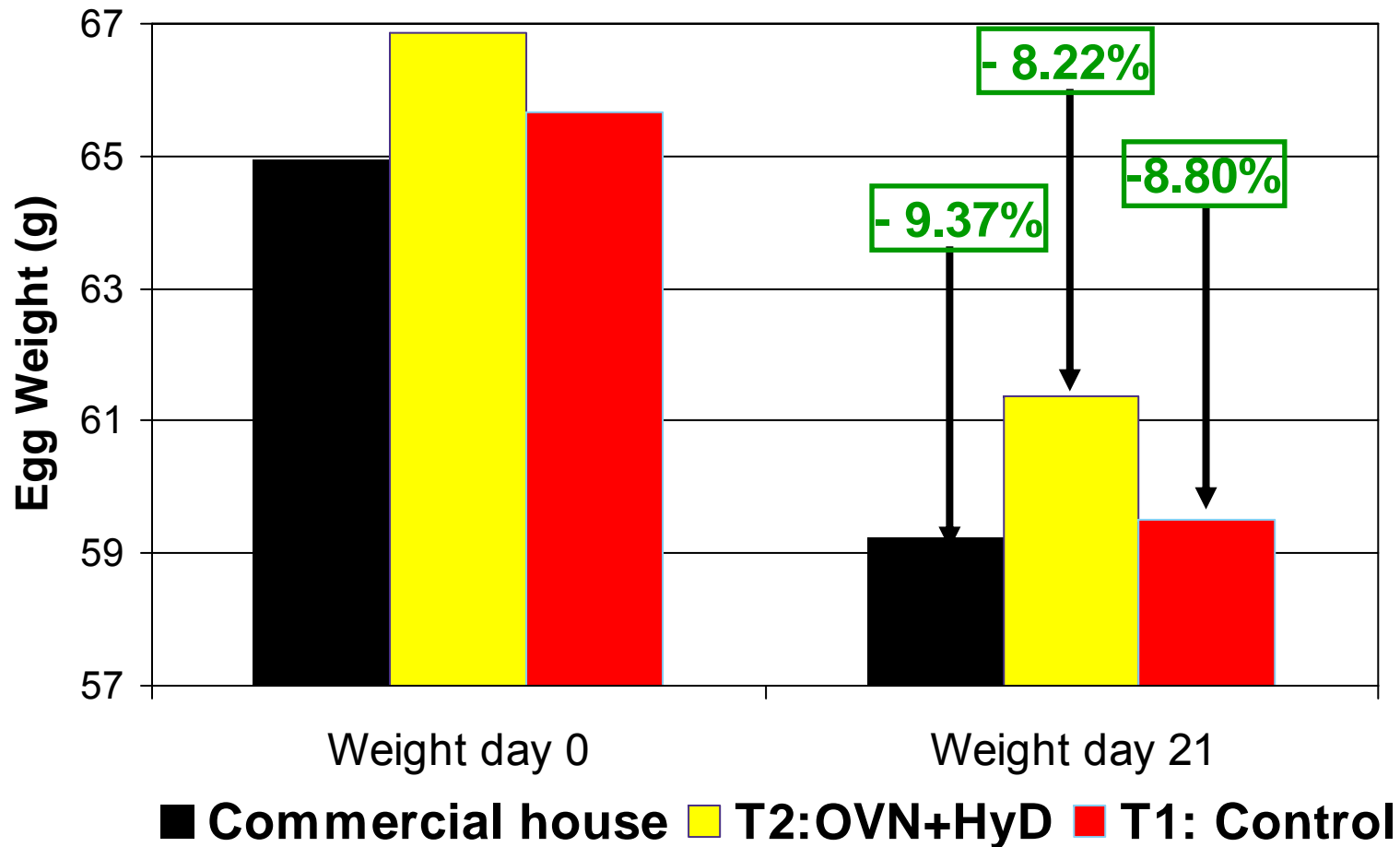
| | Control | OVN + Hy•D | Difference (%) |
|----------------------------|---------|------------|----------------|
| Lay (%) | 80.2 | 82.4 | + 2.7 |
| XL Eggs (%) | 7.5 | 10.1 | + 25.4 |
| Daily Feed Intake (g/d) | 117.2 | 114.5 | - 2.3 |
| Cumulative Feed Efficiency | 2.218 | 2.094 | - 5.6 |
| Egg Weight (g) | 65.88 | 66.36 | + 0.7 |
| Egg Mass (g/d) | 52.84 | 54.68 | + 3.5 |
| Broken Eggs (%) | 1.43 | 1.14 | - 20.3 |

Soto & Hernandez, 2004



Beneficial Effects of Hy•D on Laying Hens

Weight Loss of Eggs stored at RT for 21 Days (90 d trial)



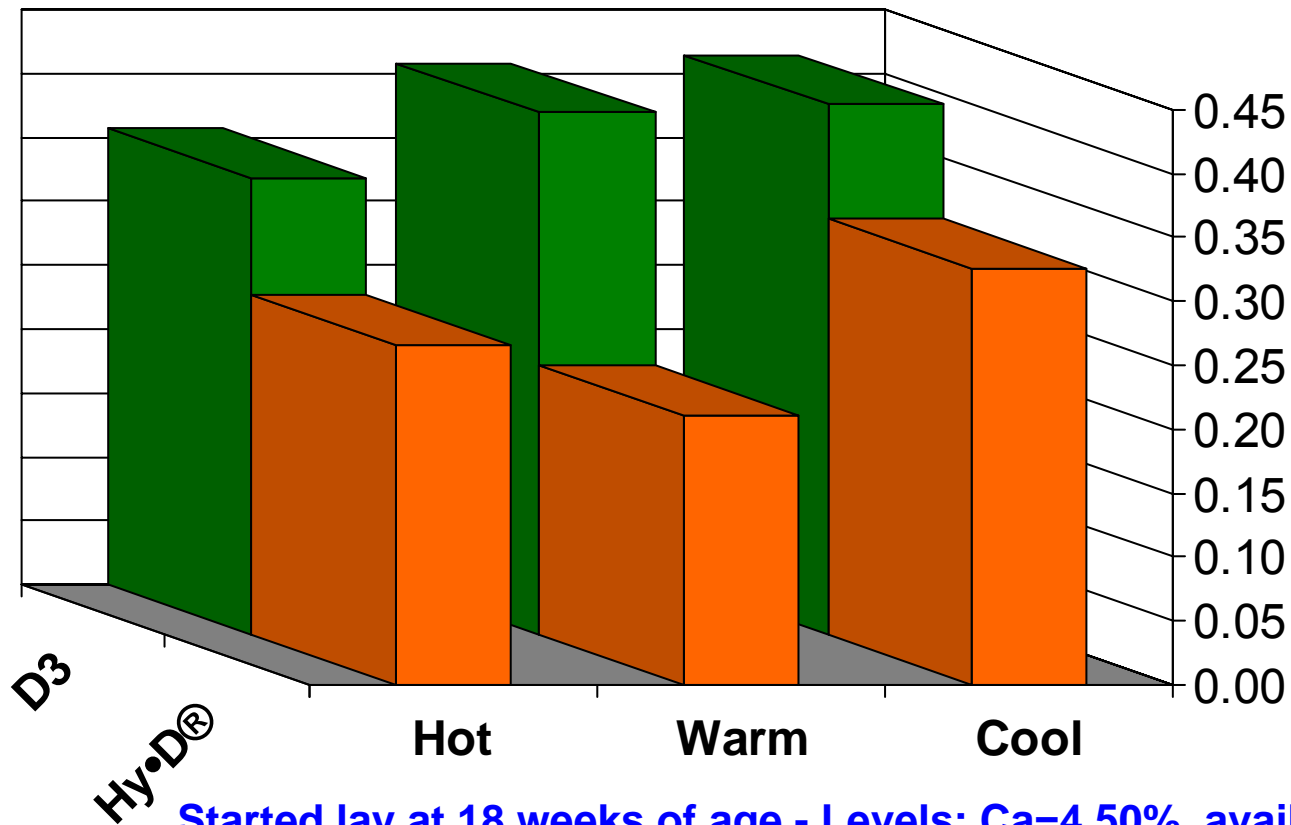
Soto & Hernandez, 2004



Beneficial Effects of Hy•D on Laying Hens

Egg Breakage with Young Layers

Egg Breakage

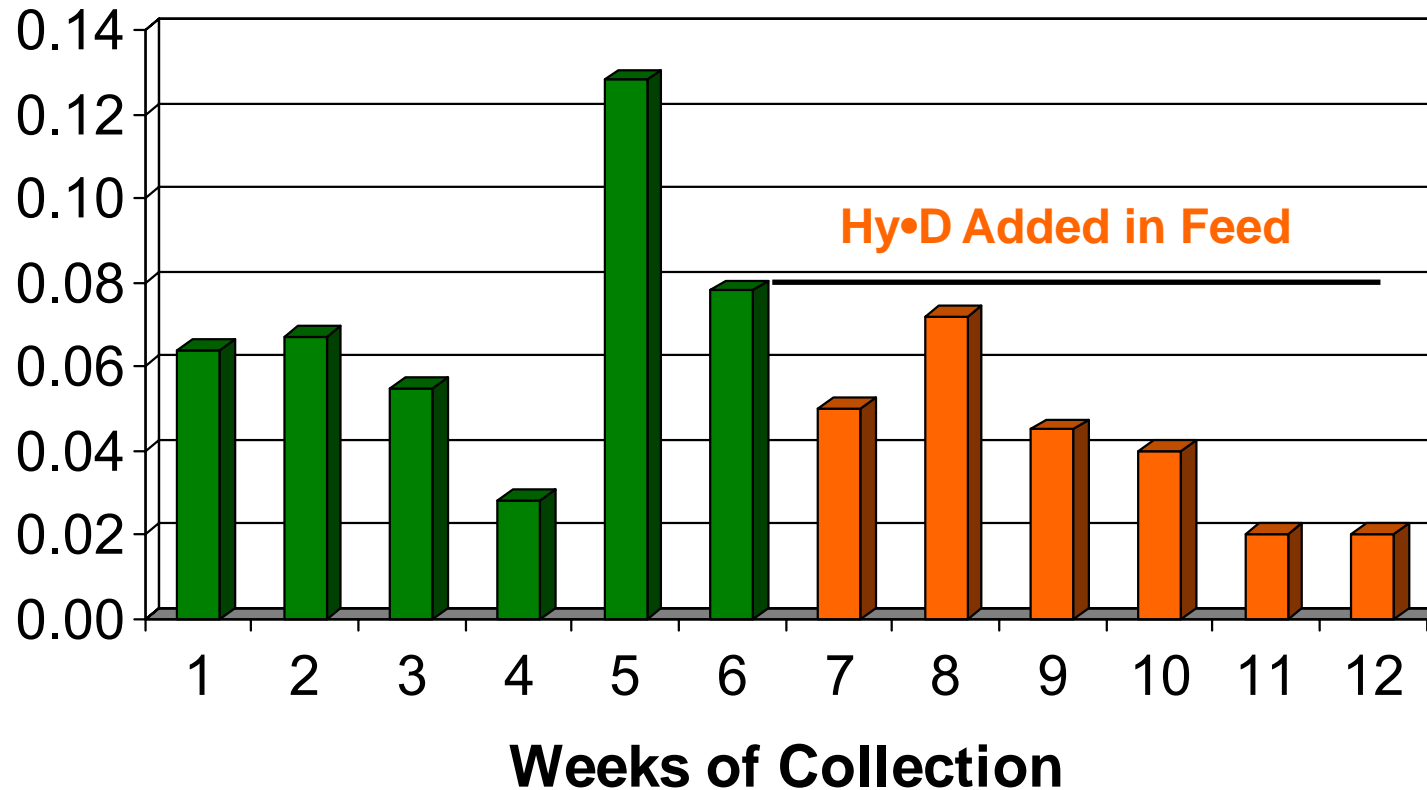


Started lay at 18 weeks of age - Levels: Ca=4.50%, avail. P=.45%
(D₃=3.0 Mio ICU/ton) - (Data collected represents first 12 weeks of lay)
M.E. Jackson and C. Zhong

Beneficial Effects of Hy•D on Laying Hens

Microscopic Cracks in Eggs

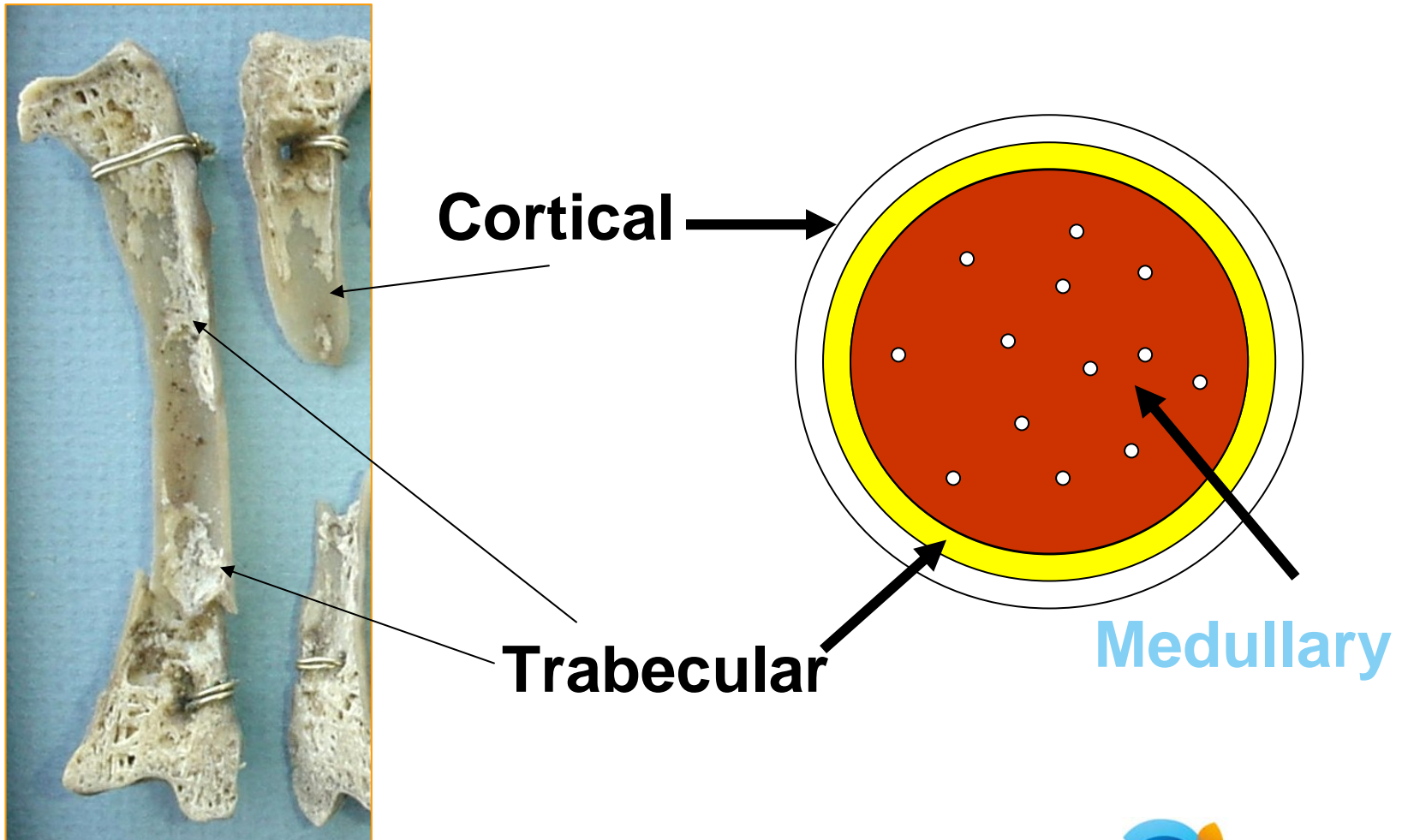
Percent Microscopic Cracks



European Field Trial - House unit #2 - Layer study ISO-L0621-VM
(1800 ICU/D₃ replaced by 45 µg/kg. Hy•D®)

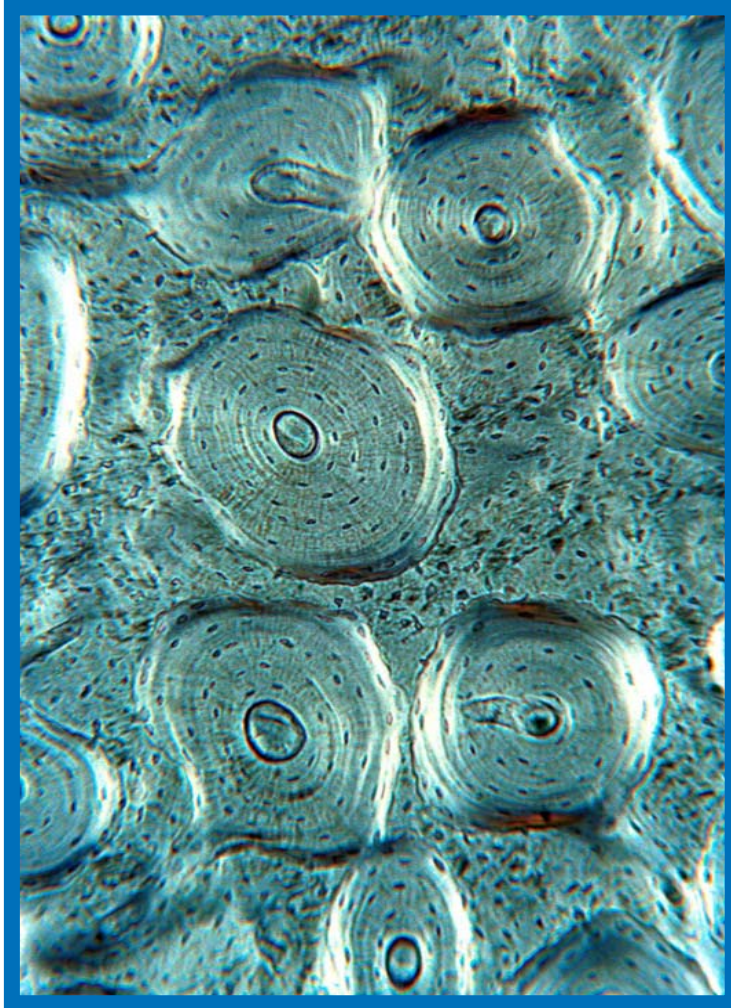
Beneficial Effects of Hy•D on Laying Hens

Bone Morphology in a Laying Hen



Beneficial Effects of Hy•D on Laying Hens

Constituents of Avian Bone (1)



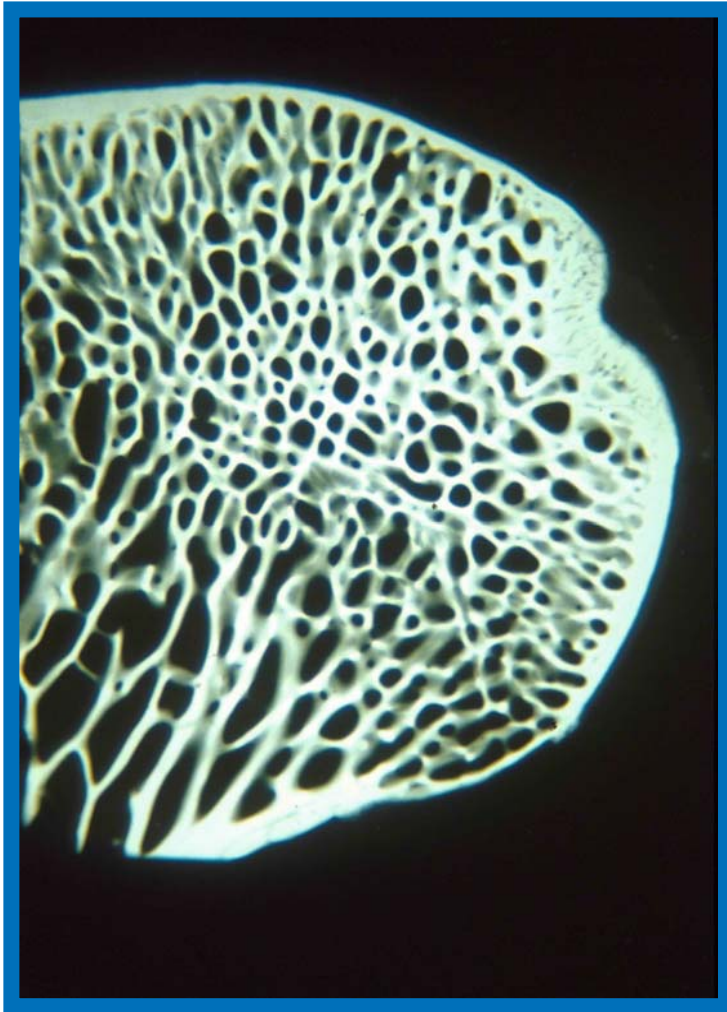
Compact Bone

- Structural bone (also named cortical bone)
- 80% of skeletal mass
- Outer surface of all bones but mainly found in long bones

© B. Fleming, Roslin

Beneficial Effects of Hy•D on Laying Hens

Constituents of Avian Bone (2)



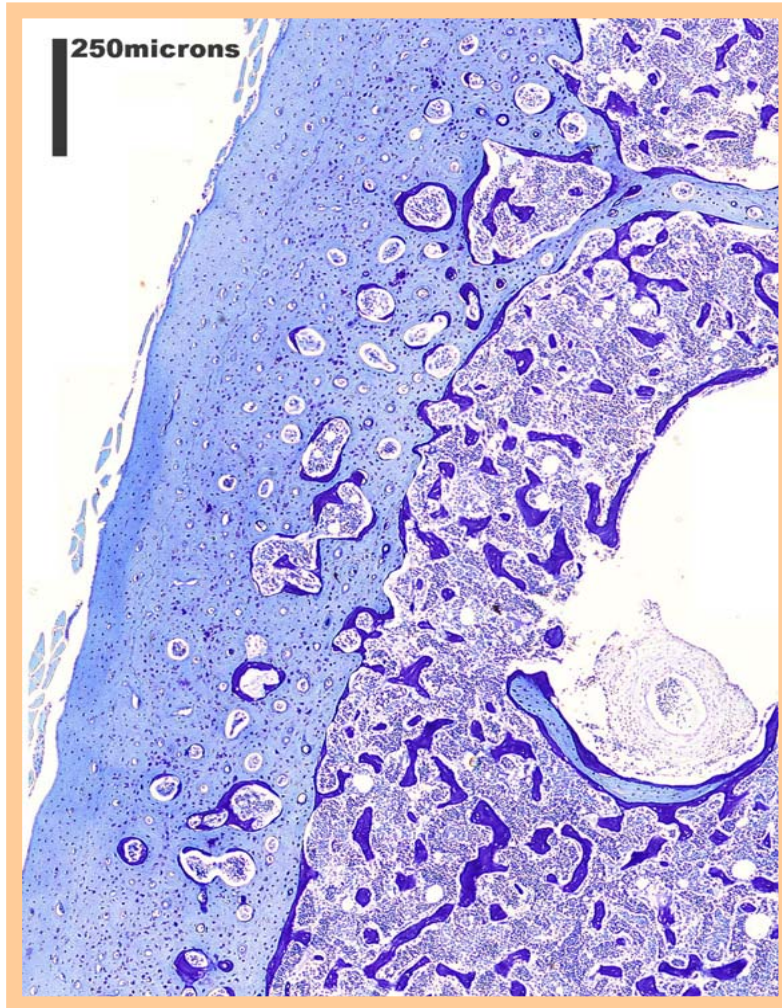
Cancellous Bone

- Structural bone (also named trabecular bone)
- 20% of skeletal mass
- Forms largest part of vertebral bodies
- Large surface area - most metabolically active part of skeleton (except in laying hens)

© B. Fleming, Roslin

Beneficial Effects of Hy•D on Laying Hens

Constituents of Avian Bone (3)



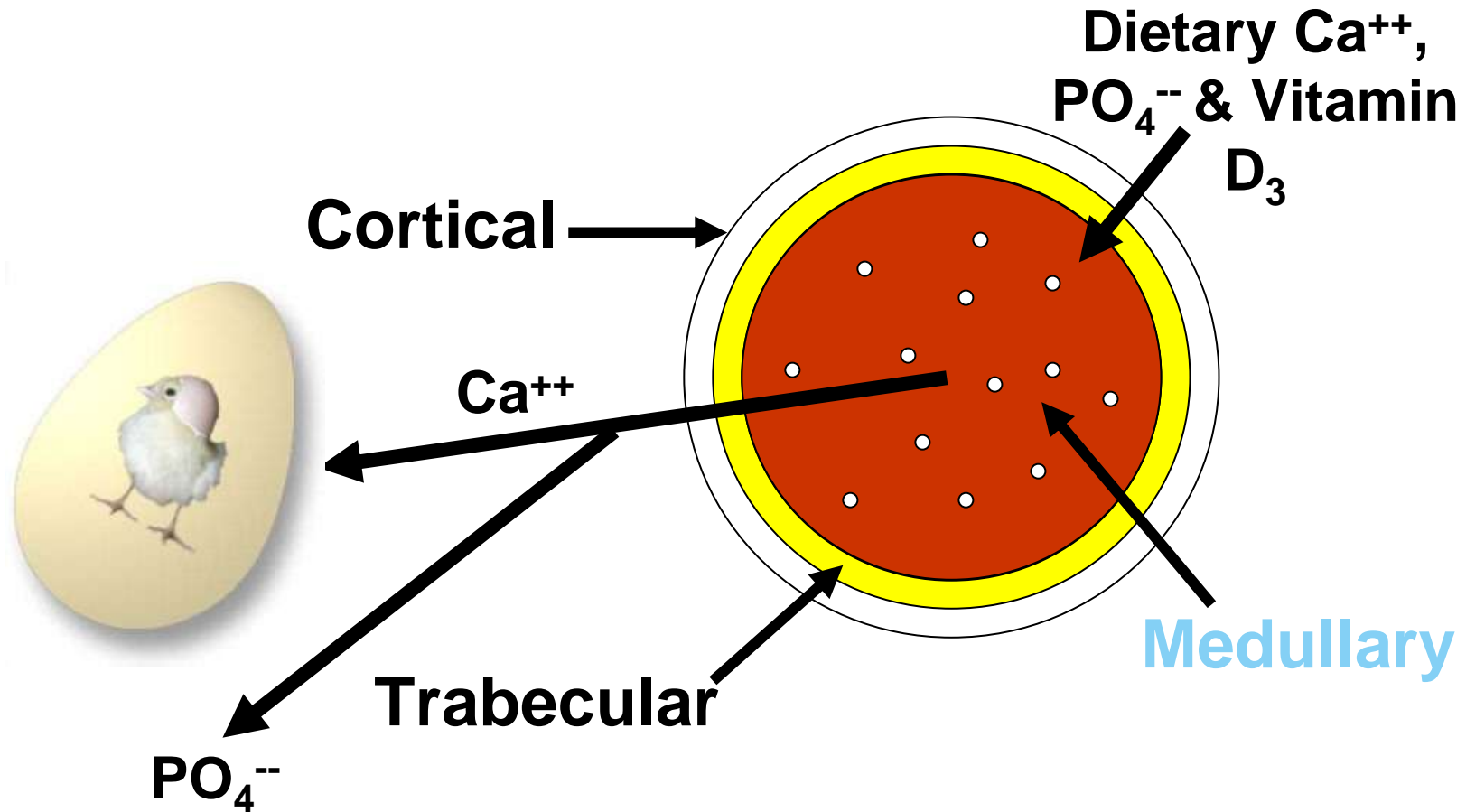
Medullary Bone

- Woven bone type similar to healing fracture callus
- Present in laying hens as a labile Ca^{2+} store
- Isotropic and spicular, usually very little structural function
- Large surface area + rapid turnover

© B. Fleming, Roslin

Beneficial Effects of Hy•D on Laying Hens

Calcium Flow for Egg Production



Beneficial Effects of Hy•D on Laying Hens

Objectives for a Successful Layer Program

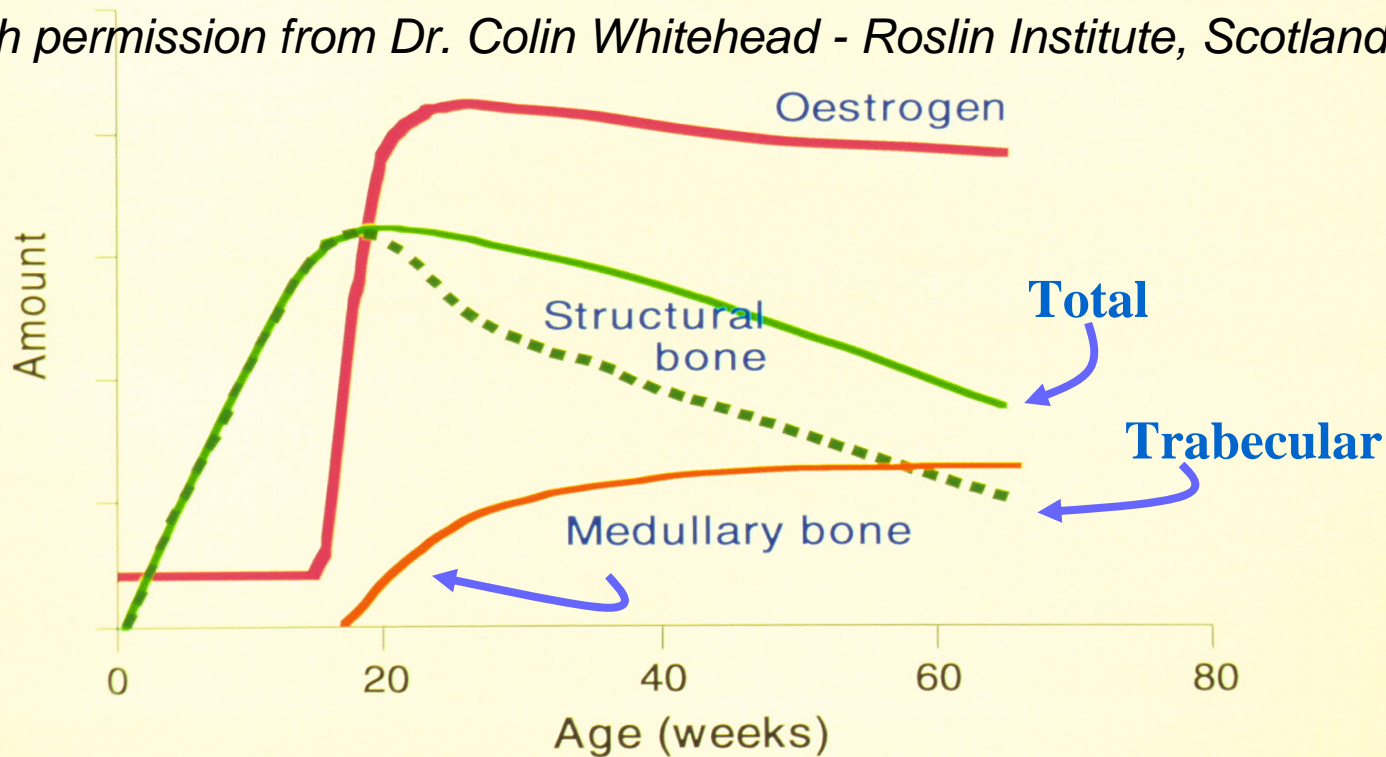
- Obtain maximum bone volume prior to sexual maturity
- Reduce early lay mortality
- Improve flock productivity through higher laying performance and better eggshell quality
- Maintain optimal structural bone volume through lay cycle for prolonged lay persistence

Beneficial Effects of Hy•D on Laying Hens

Bone Dynamics in a Laying Hen

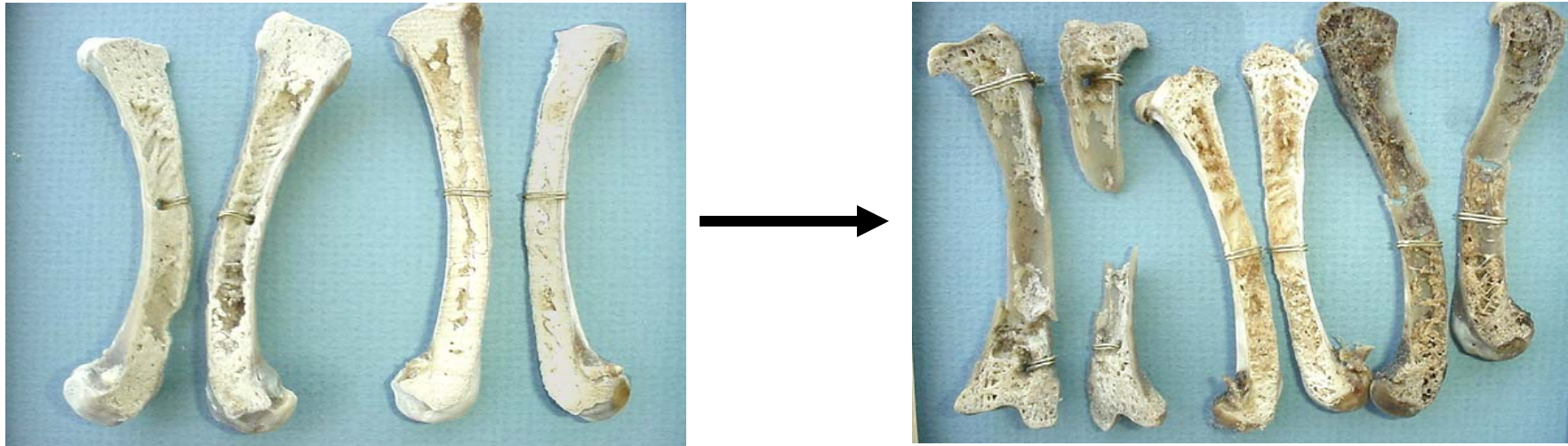
Changes in oestrogen and structural and medullary bone during the life of the hen

(With permission from Dr. Colin Whitehead - Roslin Institute, Scotland, 2000)



Beneficial Effects of Hy•D on Laying Hens

Osteoporosis/Cage Layer Fatigue in Laying Hens

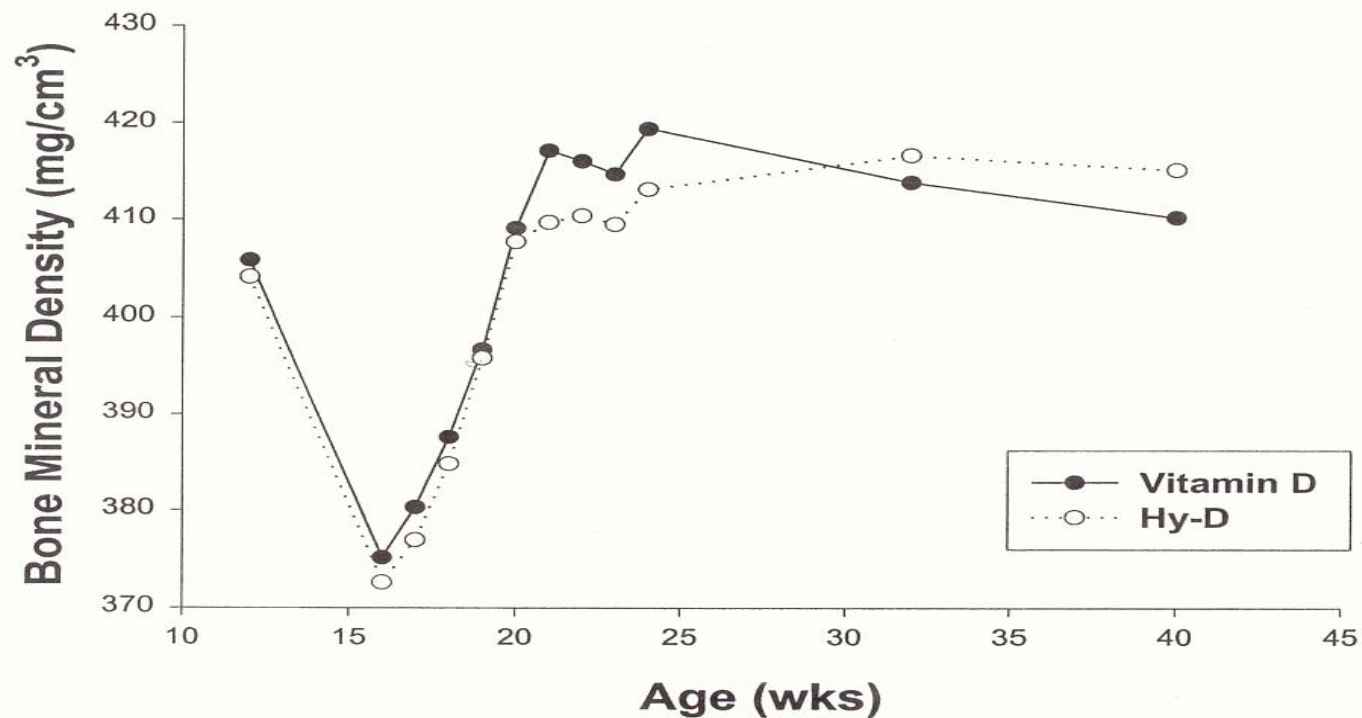


Continuous demineralization of the structural bone of layers, due to insufficient available calcium for eggshell production

Beneficial Effects of Hy•D on Laying Hens

Maintenance of Structural Bone during Lay

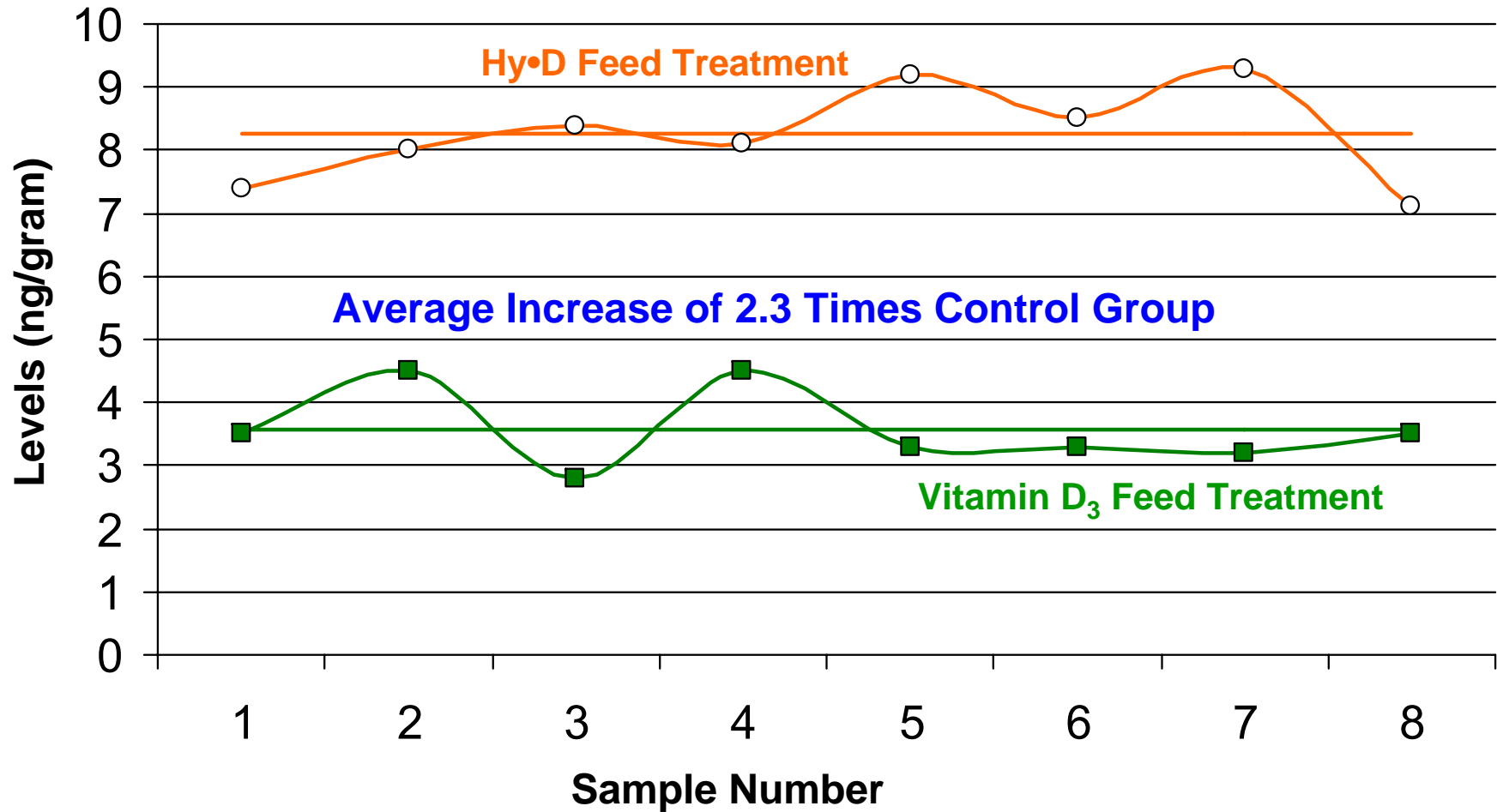
Bone Mineral Density by Diet



F.E. Robinson, University of Alberta-Canada (Hyline W-36 and W-98 Strains)

Beneficial Effects of Hy•D on Laying Hens

25-Hydroxyvitamin D₃ Table Egg Content



Beneficial Effects of Hy•D on Laying Hens

Summary of Available Data

- Improved performance
 - ✓ feed efficiency
 - ✓ higher egg production
- Increased egg shell thickness and better egg shell strength
- Improved bone mineralization and bone maintenance
- Less osteoporosis/cage layer fatigue



Beneficial Effects of Hy•D on Laying Hens

Conclusion

To get better and more eggs ...



... you must first build a better hen !

Laying Hen Trial at Aviforum

Heidi Schäublin, Susanna Käppeli, Sabine Gebhardt-Heinrich, Ruedi Zweifel and Ernst Fröhlich

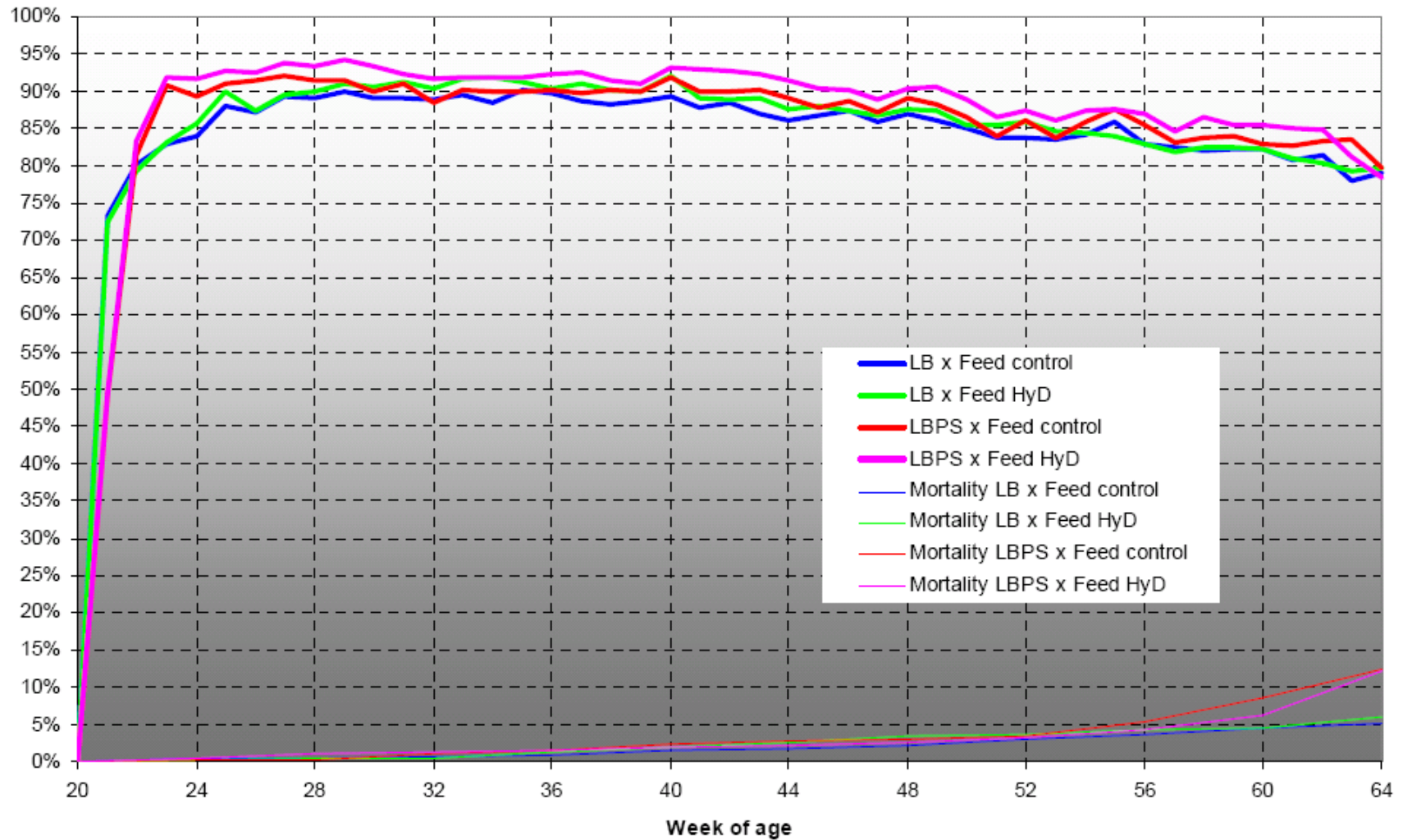
Beneficial Effects of Hy•D on Laying Hens

Laying Hen Trial at Aviforum: Experimental Set-up

- Birds and Housing:
 - ✓ LB (Lohmann brown) and LBPS (Lohmann brown parental stock)
 - ✓ 2040 chicks reared in pens of 510 each to week 18
 - ✓ Layers in floor pens with elevated perches; 156 pullets each
- Treatments:
 - ✓ 2 bird strains: LB and LBPS
 - ✓ 2 feeds: Control with vitamin D₃ (starter: 2'800 IU/kg; pullets: 2'000 IU/kg; layers: 2'500 IU/kg) / Hy•D with mixture of vitamin D₃+ Hy•D (1'400 IU + 35 µg/kg; 1'000 + 25 µg/kg; 1'250 IU + 31.25 µg/kg)
 - ✓ 2 perches: plastic or metal (Sanatherm)
- Parameters during Laying Phase:
 - ✓ Laying rate, feed conversion
 - ✓ Egg weight and egg grading
 - ✓ Egg shell breaking strength and shell thickness
 - ✓ Palpation of the keel bone

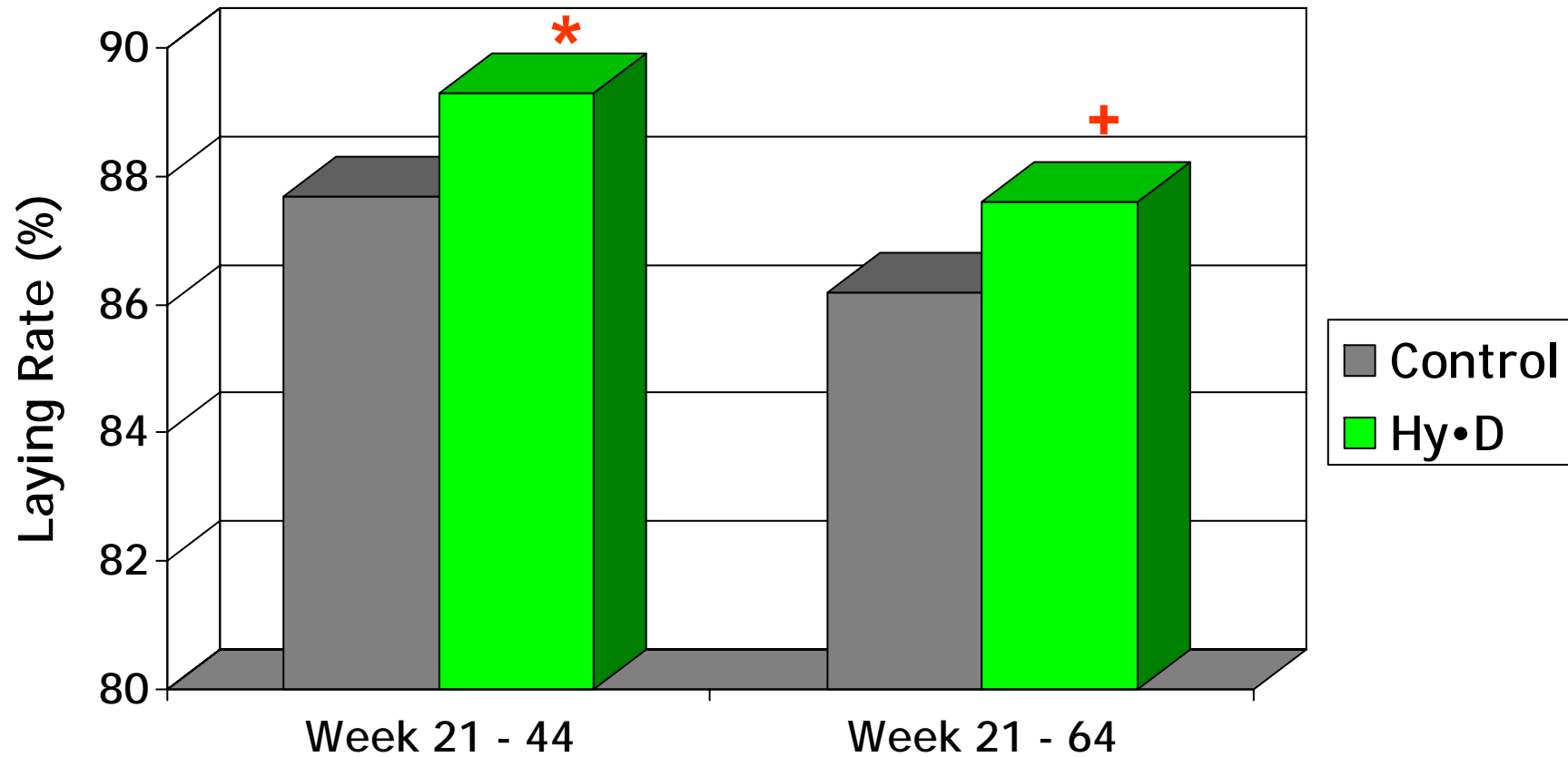
Beneficial Effects of Hy•D on Laying Hens

Laying Hen Trial at Aviforum: Laying Rate and Mortality



Beneficial Effects of Hy•D on Laying Hens

Laying Hen Trial at Aviforum: Laying Rate

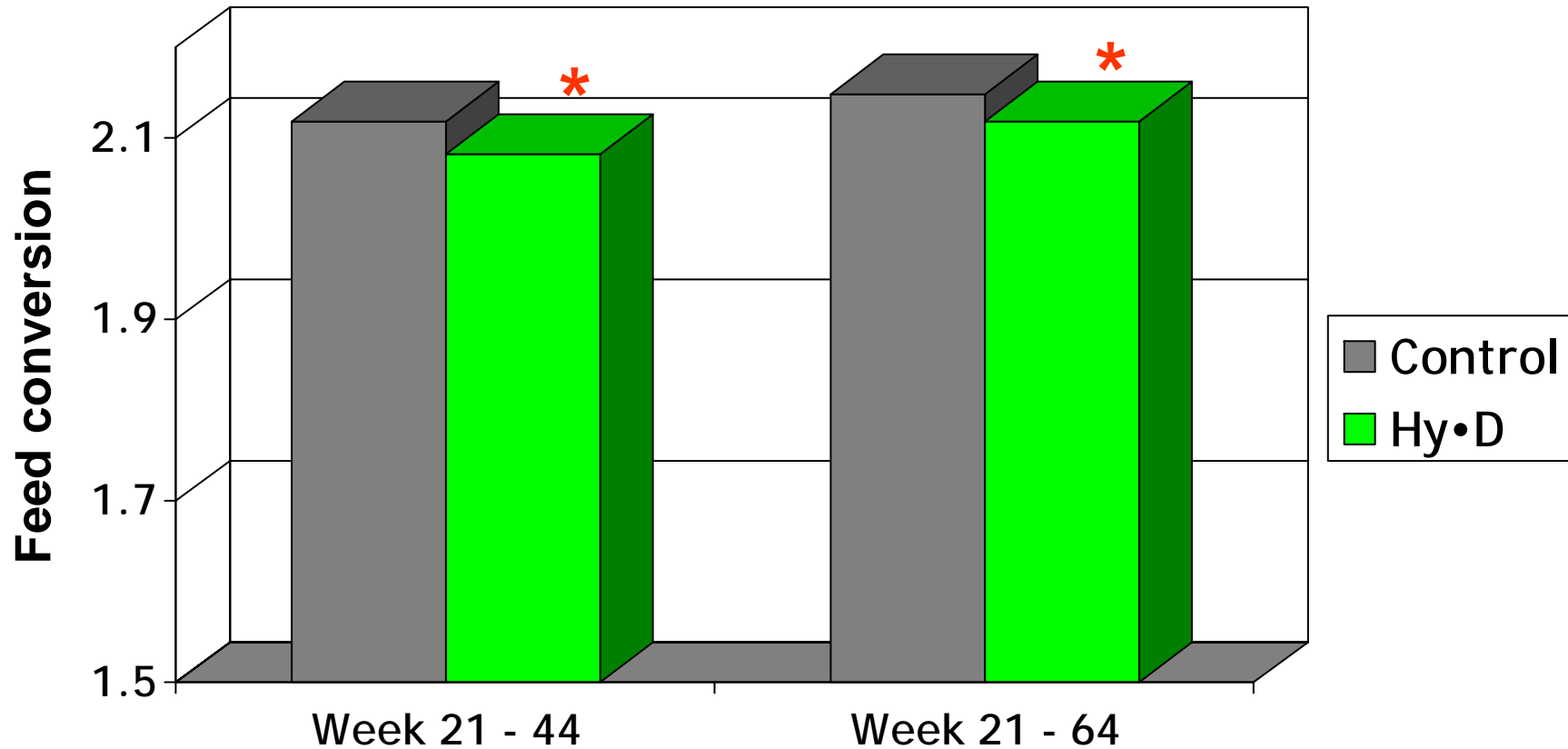


* $P < 0.05$; + $P < 0.10$

Schäublin et al., 2010

Beneficial Effects of Hy•D on Laying Hens

Laying Hen Trial at Aviforum: Laying Rate



* P<0.05

Schäublin et al., 2010

Beneficial Effects of Hy•D on Laying Hens

Laying Hen Trial at Aviforum: Egg Grading

| Experimental Phase | Egg Grades | Control | Hy•D | Significance |
|--------------------|---------------|---------|-------|--------------|
| Weeks 21 - 44 | <53 grams | 5.5% | 4.6% | P<0.05 |
| | 53 - 70 grams | 89.8% | 89.4% | n.s. |
| | > 70 grams | 4.7% | 6.1% | P<0.10 |
| Weeks 21 - 64 | <53 grams | 3.5% | 3.0% | P<0.05 |
| | 53 - 70 grams | 87.6% | 87.0% | n.s. |
| | > 70 grams | 8.8% | 10.0% | n.s. |

Schäublin et al., 2010



Beneficial Effects of Hy•D on Laying Hens

Summary and Conclusions

- 1) LB hens had a significantly lower laying rate, consumed more feed and laid significantly heavier eggs than LBPS hens.
- 2) Compared to the control feed a partly replacement of vitamin D₃ with Hy•D significantly improved the laying rate in the first laying period and numerically improved it over the whole laying cycle.
- 3) A replacement of vitamin D₃ with Hy•D resulted in a significantly more favorable feed conversion ratio compared to the control.
- 4) LB hens had significantly more deformities of the keel bone compared to LBPS hens. There was no significant difference for the keel bone status between the two feed treatments.
- 5) In compartments with plastic perches, the hens had significantly fewer moderate and severe deformities of the keel bone.



BRIGHT SCIENCE. BRIGHTER LIVING.™