Optimizing Broiler & Breeder Performance

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Broiler & Broiler Breeder

1. Performances are inter linked
2. Broiler breeder nutrition –DOC Quality
    - Ca,
    - Phosphorous,
    - Minerals(Organic/Inorganic-Heavy metals)
3. Vaccination schedule in Breeders-MAB titers in DOC
    - ND
    - IBD
    - IBH
    - IB
4. Health status of Breeders-DOC Quality.

Broiler Breeder

1. Performance of Broiler Breeders - Huge economic impact
2. Advances and progress in broiler nutrition – Peak/saturated….
3. Broiler Breeders …Lot needs to be achieved

THIS PRESENTATION IS FOCUSED ON

OPTIMISING BOILER BREEDER PERFORMANCES

Broiler Breeder

1. There are many points to consider
    - Management
    - Feeding
    - Health care,
    - Photoperiod, etc.,

Which can have a affect economics of production, BUT……

This presentation attempts to explain –

precise feeding to meet the **energy** and **protein** requirements of the modern day **broiler breeder** to **Optimize performance**

Body weight and condition

1. Body weight recommendations:-Manual
2. Information on how to keep problematic flocks close to these targeted weights:-Missing

6 week CB(F):- 1800g
while
6 week broiler breeder pullet:-600g

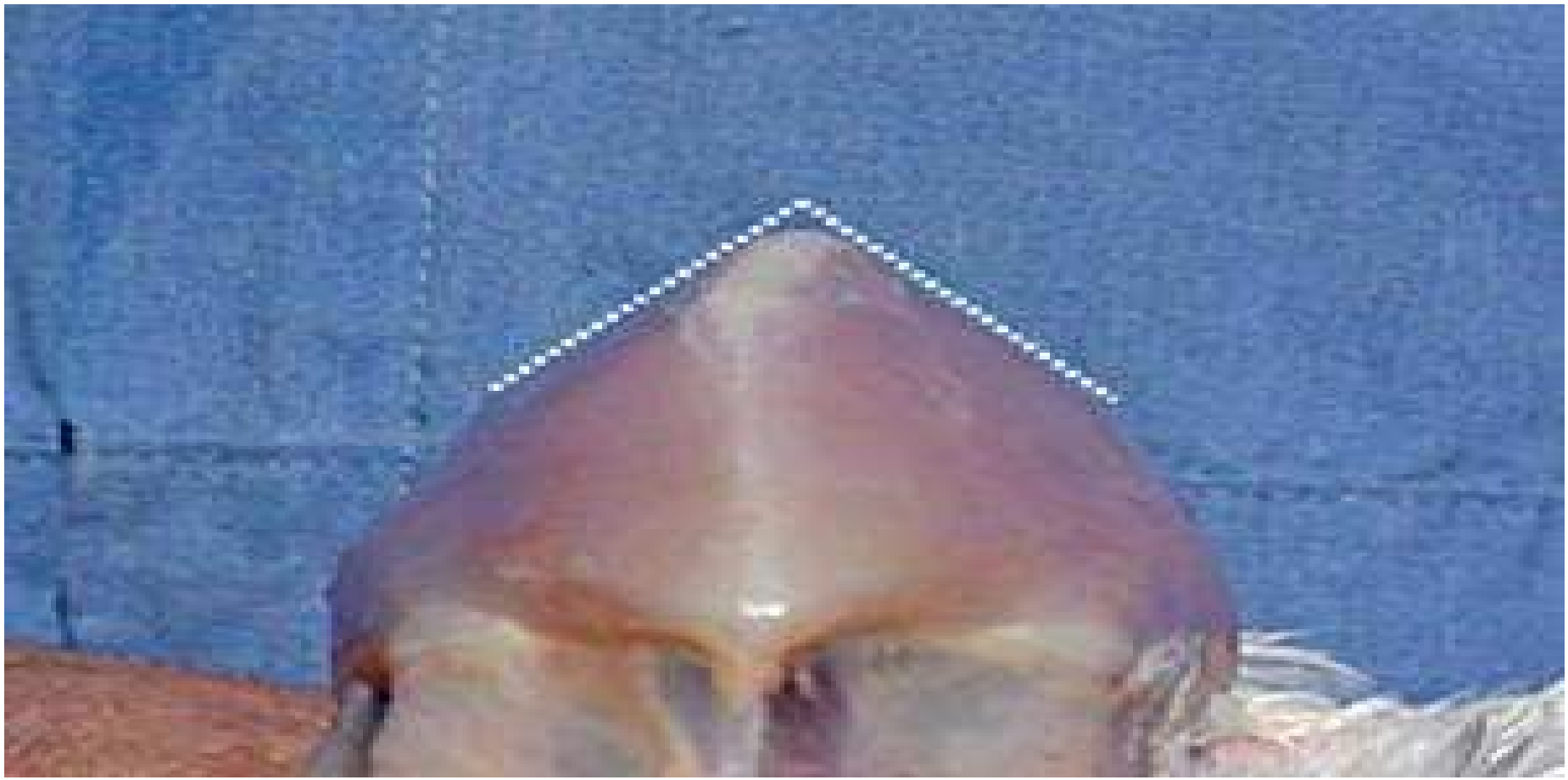
Hence, it is evident that **overweight,** not underweight **pullets** are usually the **problem during the growing** period

Important points: Rearing period

1. Overweight Pullets - Feed should not be reduced
2. Feed should be held at the same level until body weight comes as recommended for a given age
3. Then adjustments in feed allowance should be made to hold pullets to the desired weight curve

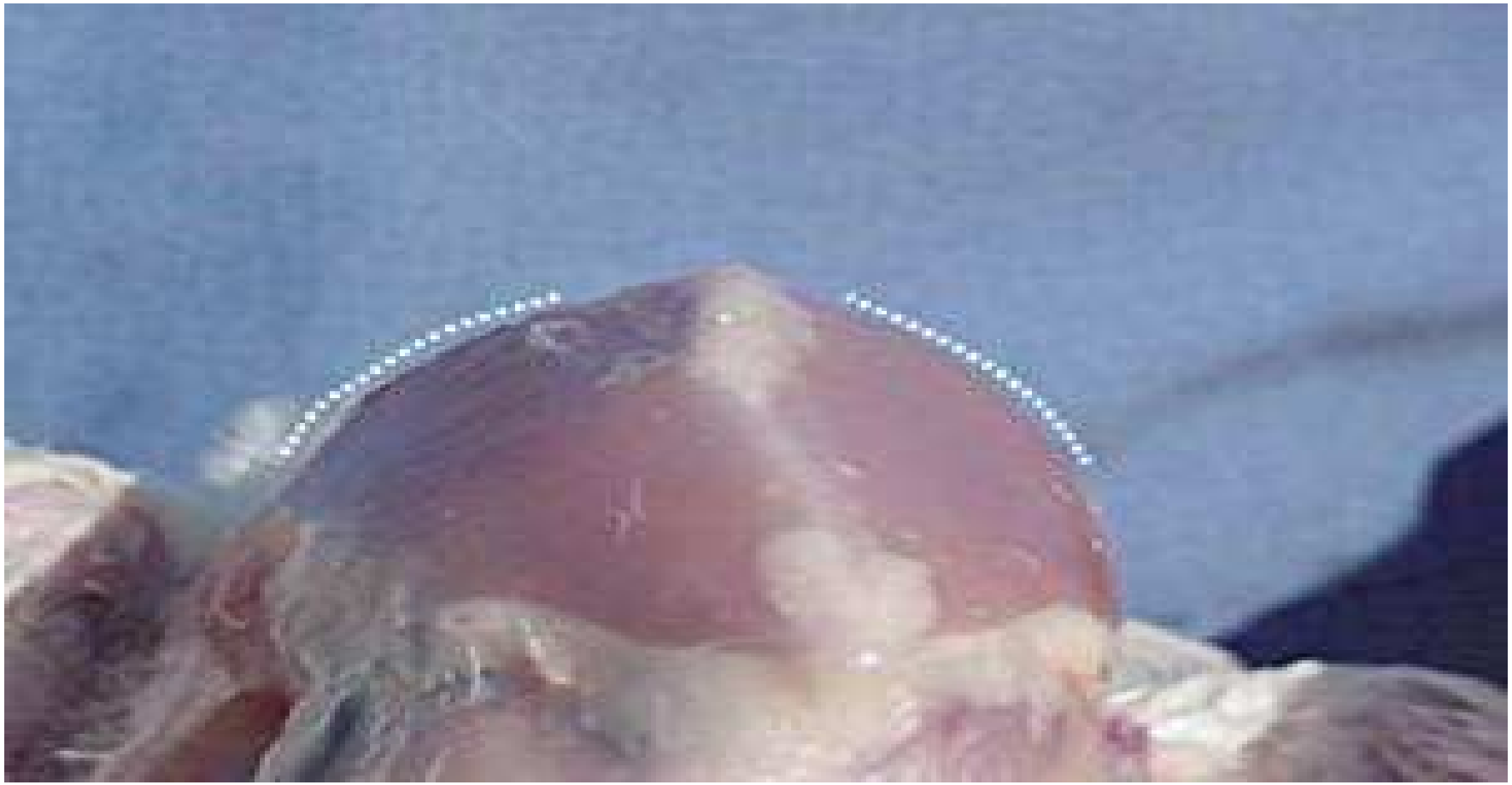
Important points: Rearing period

Proper fleshing at 10 weeks



Proper fleshing at 16 weeks

Proper fleshing at 20 weeks



Important points: Rearing period

- Ensure pullets attain **mature pullet weight**
- Carry sufficient body flesh - **fleshing over the keel**
- Pullets lacking in flesh - **immature birds** will have delayed **production**.
- Increase feed, if necessary, to ensure well fleshed pullets and delay light stimulation of the flock until proper body condition is achieved
- Delay light stimulation of the flock until proper body condition has been achieved, even though body weight may be slightly in excess of the weight guide

Correct amount of fat before light stimulation

Energy requirement of the breeders

Two major and costly nutrients

- **Energy** - First limiting nutrient
- **Protein**

Important point to think upon

While ***PROTEIN*** requirements have often been the major consideration of most producers

USUALLY…..

It is ***ENERGY,*** the most costly dietary nutrient, which has the most influence on performance

INFLUENCE OF ENERGY AND PROTEIN INTAKE ON PERFORMANCE PARAMETERS OF BROILER BREEDERS

ENERGY INTAKE Kcal/day	60 weeks	Eggs/bird	Egg wt
449	3960	157.5	65.3
385	3580	156.6	64
315	2890	140	62.9
270	2680	101	61.6
PROTEIN g/d			
27	3298	136.3	63.7
23.2	3284	137.4	63.6
19.5	3293	139.3	63.6
16.5	3258	142.1	63

SELECTED AND REARRANGED DATA FROM PEARSON AND HERRON(1982)

Influence of energy and protein intake on performance parameters of broiler breeders

Table demonstrates that
1. varying energy intake by approximately 40% has marked effect on production parameters ,
2) Similar change in protein intake has little effect on performance.

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Selected and rearranged data from Pearson and Herron(1982)

Energy – Fire for life

Feed supplies energy, is required for

1. Growth
2. Egg production
3. Maintenance
4. Vital life functions and activity

This may include a growth component but the main consideration is egg mass output

Factors that influence maintenance energy requirement of broiler breeders

1) Body size
2) Environmental temperature
3) Production
4) Growth
5) Egg Mass Output

The energy requirement for maintenance

- Makes up by far the greatest percentage of the birds total energy requirement
- A number of equations have been developed which give reasonable estimates of the total energy requirement of a broiler breeder
- However, as with any predicted estimate, such values must be evaluated for each and every situation

Ref: Dr John D. Summers

Predicted energy requirement of broiler breeder pullet to 20 weeks of age

	AGE WEEKS									
	2	4	6	8	10	12	14	16	18	20
	BODY WEIGHT (g)									
	200	360	600	820	1050	1250	1480	1700	1950	2150
	PREDICTED ENERGY REQUIREMENT (Kcal/day)									
TOTAL	70	120	140	165	190	218	235	250	265	290
MAINT	40	80	100	125	146	165	185	200	220	245
% MAINT OF TOTAL	57	67	71	73	74	76	78	80	83	84

Energy Requirements for Pullets

The above Table reveals…

- As the bird increases in age (larger body size) the maintenance energy requirement increases as a percentage of the total energy requirement until, by the later part of the growing period, over 80% of the energy consumed is used just to maintain the pullet.

- This period from say 16 weeks to onset of production is very critical and the decisions during this period will have a long term effects on overall production and economics of the breeding…….

Predicted energy requirement of broiler breeder hens from 20 weeks to 68 weeks

	AGE(WEEKS)												
	20	24	28	32	36	40	44	48	52	56	60	64	68
	BODY WEIGHTS(Kg)												
	2.16	2.5	3.15	3.3	3.48	3.58	3.62	3.7	3.75	3.8	3.82	3.85	3.9
	EGG PRODUCTION												
	0	5	60	85	82	77	73	68	63	58	52	48	45
	AVERAGE EGG WEIGHT												
	0	47.2	54.4	58.6	61.1	63.3	65.2	67.1	68.4	69.5	70.3	71.1	71.5
	AVERAGE DAILY EGG MASS(g)												
	0	2.4	33	49.8	50.1	48.7	47.6	45.6	43.1	40.3	36.6	34.2	32.2
	PREDICTED ENERGY REQUIREMENT (Kcal/day)												
TOTAL	300	350	400	450	450	450	450	445	440	440	435	435	435
MAINT	250	285	300	335	343	350	350	352	353	353	354	354	354
% MAINT	83	81	80	74	76	78	78	79	80	80	80	81	81

Energy Requirement for Broiler Breeders

Key points to be noted

1) Maintenance energy requirement is around 80% of total energy intake
2) This decreases noticeably at peak production and continues to peak egg mass when the hen would be partitioning a significant proportion of its' energy intake to meet its requirement for egg mass output
3) During this period feed increments and reduction need to be decided based on the total energy requirement of the hen

Energy Requirement for Broiler Breeders

4. Total energy requirement peaks around peak egg mass production and then declines as the requirement for egg mass production is reduced as egg production decreases

5. The fact is around 20% of the energy intake of the hen is diverted into egg production and increased body weight (fairly small)

6. Since the hen will preferentially partition nutrients to meet her requirement for maintenance, if her feed allowance is not sufficient to meet her total energy requirement, egg mass output and thus egg production and/or egg size will be reduced.

Reducing Feed Intake Post Peak Production

- **Important Observations:**

1. Common practice: Reduce feed allowance to a flock shortly after peak production is attained .This may lead to drop in production shortly after peak is attained
2. Peak egg mass output is not attained until several weeks after peak egg production
3. Another error that we make is to reduce feed allowance in relation to the drop in egg production, (eg.) if production drops 5%, feed allowance is reduced by a similar amount

Let's Calculate

- An average egg = 65g=140 kcal ME.
- If feed allowance = 160g/b/d at peak production,
- Diet containing 2800 kcal/kg,
- Intake of 448 kcal ME/b/d.
- If 140kcal are required for the production of one egg this means that approximately 31% of the hen's Energy is going towards egg production this time

- Egg mass out put@85% production with 65g egg wt=55.3 g/h/day

- If production drops to 80% and egg wt increases by 1g;egg mass out put would be 52.8g/h/d

Let's Calculate

- $\frac{55.3 - 52.8}{55.3} \times 100 = 4.5\%$

  Hence, the energy required per hen per day for egg production should drop;

  $\frac{4.5 \times 140}{100} = 6.3$ kcal

  Thus for a 4.5% drop in egg mass output total dietary energy requirement has only dropped

  $\frac{6.3}{448} \times 100 = 1.4\%$

- And not the 5% that one might estimate from the drop in egg production....

Example suggests that

- Decrease in feed intake after peak production has to be precisely calculated as the hen's requirement is not related directly to the drop in egg mass output

- There is a strong possibility that the broiler breeder is deficient in energy intake up to and perhaps beyond peak egg mass production

- As already mentioned any deficiency in energy intake will readily translate into reduced egg numbers or smaller eggs or both

Protein

- Little attention is paid to the amount of protein consumed by the hen
- Most breeder diets contain between 16 and 18% protein
- With variable feed intakes during the laying period, daily protein intake obviously varies
- Many breeders are fed up to 168g of feed per day (or more)
- Thus protein intake could range from 25.6 to 28.8g per day, (and in many cases higher)

Protein Required for Egg Production

- Using values generated for commercial layers
- The protein required to produce a 65g egg (containing 7.8g of protein) should be around
- 7.8÷0.55 (suggested efficiency of dietary protein utilization for egg production) = 14.2g

Protein Required for Maintenance

- With an estimated total endogenous loss of nitrogen, including feather loss, to be 280 mg/kg of body weight to the 0.75 power,
- A 3.5kg hen= 3.575 X 280 = 717mg of nitrogen per day to meet her maintenance requirement.

- Converting this to protein required = (0.717 X 6.25)
  = 4.48g of protein.

(with 55% efficiency in converting dietary protein to body proteins)

- The hen would require = 4.48 ÷0.55 = 8.15g of protein intake per day to meet her maintenance protein requirement.

Total Daily Protein Requirement of a Broiler Breeder

- Egg production + maintenance
- 14.2 + 8.15 = 22.4g/h/d. This should be sufficient for a hen to lay a 65g egg every day
- No allowance has been made for body weight gain (minimal after peak production)
- Much of this gain will be fat deposition and thus a minimum of body protein would be deposited
- Not every bird in a flock is laying an egg a day
- Protein required for egg production per day is only the 14.2g of protein* % production(65g)
- The daily protein required of a flock of broiler breeders is less than 22.5g

Partitioning the Breeders Protein Requirement

- Around 80% of the energy consumed is partitioned to meet the hen's requirement for maintenance (including weight gain and activity)
- Approximately 64%(14.2/22.4*100) of the protein intake of the breeder is going to meet it's requirement for egg mass production
- Thus the main factor influencing the protein requirement of the broiler breeder is egg mass output, not body maintenance as with energy

Importance of minerals in breeder nutrition

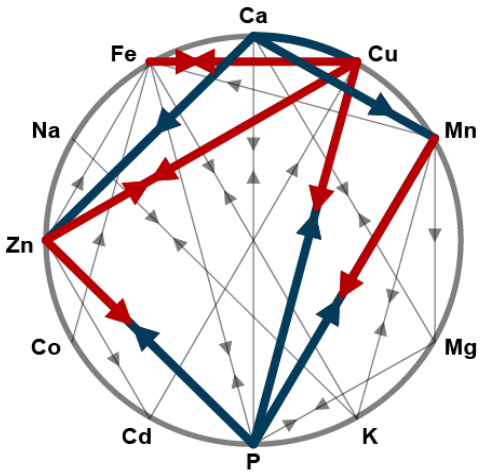
- **Health & immunity –** antibody response & phagocytic cells
- **Structural integrity – egg shell strength, increased sternum weight**
    - Synthesis of collagen & keratin
    - Collagen & elastin crosslinking
    - Cartilage development
    - Formation of organic matrix for bone
    - ossification & calcification for eggshells

Importance of minerals in breeder nutrition

- **Performance Efficacy**
  - Synthesis of DNA & protein to enhance
  - cell division and growth
  - Growth promotion
  - Development of the skeletal and reproductive systems
- **Progeny Benefits**
  - Increased embryo development (bone thickness)
  - More viable chicks (hatchability)
  - Progeny Benefits
  - Supports embryo development

Different sources

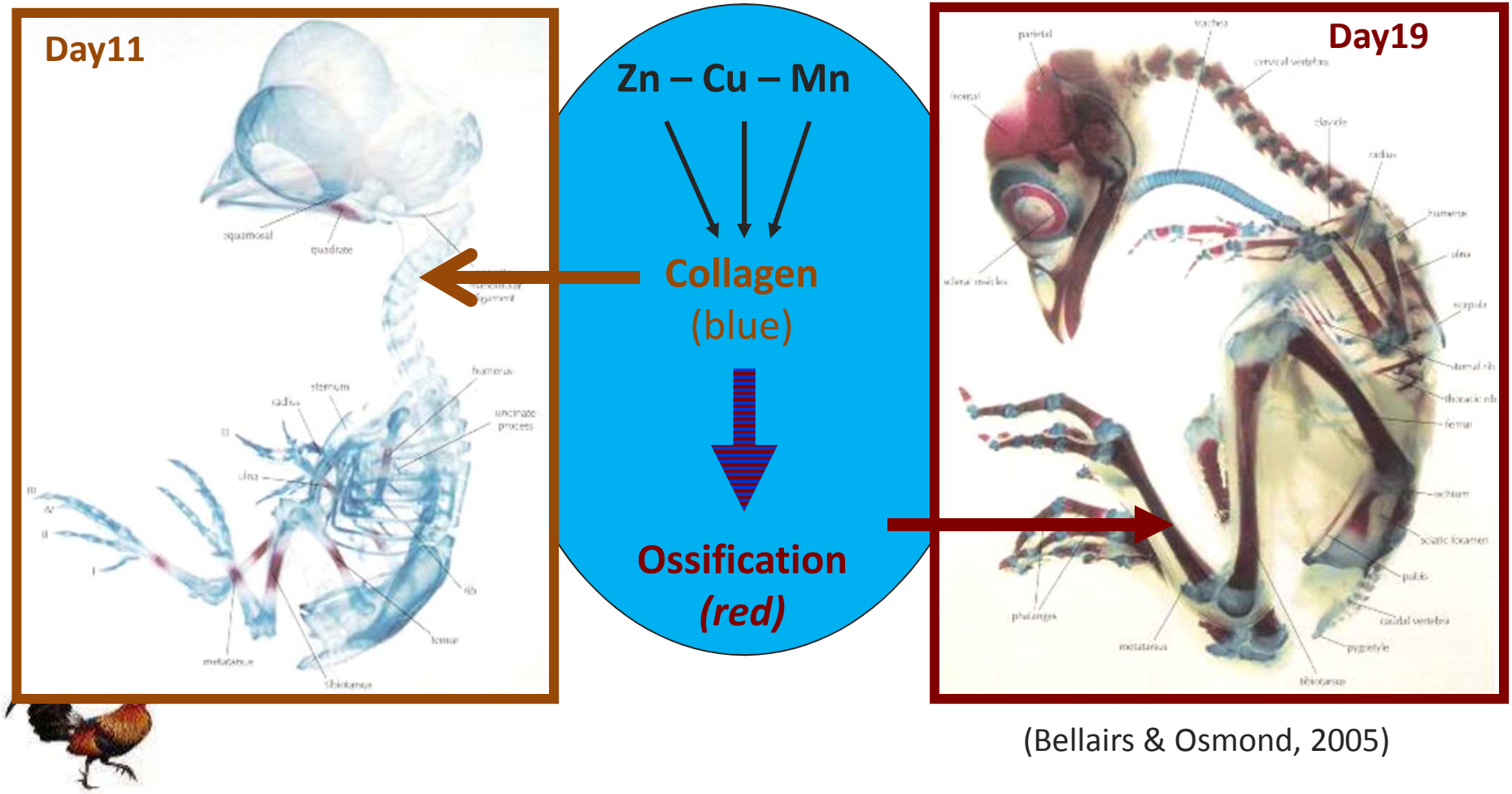
- **Inorganic trace minerals**
  - Mineral antagonism
  - Bioavailability
  - Environmental concern
- **Organic trace minerals**
  - Better absorption
  - Epigenetics benefits



Embryos develop on egg reserves

Bones develop on a collagen matrix

Zn, Cu and Mn coenzyme



(Bellairs & Osmond, 2005)

Conclusions

- Body weight control of the breeder hens during rearing and productive phase is very imp.
- As body size/weight increases , maintenance energy requirement also increases.
- Designing precise feeding programme in relation to the energy requirement of the hen in given condition is key to optimize breeder performance.
- It’s energy(the first limiting nutrient)than protein, is important in optimizing the breeder performance


Thank you. . . . .