Staining baby chicks in order to study bone development

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Is bone development important? Yes, it is!!

» Diseases of chicken bone and joints are a worldwide problem in the broiler production!
» It has an economical impact to the producer because birds don't gain weight as they don't eat well
» It also has an implication on bird welfare because birds have pain

Did you know...

» That bone development can be studied by colouring the bones of the body of baby chicks?
» » The hard (calcified) part of the bone, for example, can be visualized by red colour. The joints and soft (non-calcified) part of the bone can also be seen by blue colour

What do we know?

» We know that as the chicken mother gets older heavier baby chicks are hatched [1];
» We also know that baby chicks depends on nutrients from the mother in order to develop within the egg. For example, minerals such as copper, zinc and manganese are important for proper bone formation [2].

Organic sources of dietary trace minerals (chelated) can have higher bioavailability than inorganic sources (sulphates)

What do we want to know?

Does mother age and mineral form in her diet influence bone formation of baby chicks?

Young vs. Old mothers

What did we do?

» 2 different forms of copper, zinc and manganese minerals (sulphates and chelates) in the mothers diet
» Embryos at 20 days of incubation and hatched baby chicks from the same mother when she was Young (33 weeks), Mid (46 weeks) and Old (60 weeks)

Their eggs were individually incubated and pedigree hatched

Embryos 20days

% of calcified bone

Bones (femur and tibia) from the embryos were coloured with Red and Blue stain for evaluation of % of calcified bone. Bone height and width were also measured.

Hatched baby chicks

Hatched baby chicks were weighed. Their bones were cleaned, weighed and bone height and width (mm) were measured with a digital calliper.

We found....

<u>That mother's age influence bone formation:</u>
» When the hens were Young, their embryos had lower % of calcified tibia and femur relative to embryos from when they were at Mid and Old ages
<u>We also learnt that mother's nutrition can influence this process</u>
» Supplementing more available forms of minerals to the mom's diet can increase bone thickness in newly hatched chicks from Young and Mid hens

What does that mean?

Strong bones take more than just calcium to grow properly and we have shown that mother's age and the mineral form in the diet affect bone growth inside the egg.
The results of our research will be useful to producers who may be able to grow chickens with stronger bones, and to scientists interested in understanding how chicken bones develop.

Project sponsors
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References
[1] 2001. Worlds Poult. Sci. J. 57:127
[2] 2007. J Appl Poult Res 16:126-137