## FOOT COLOR

## By Bill Mackowski, May, 2023

Last summer, Ivy reposted an article on the CI website (being her I assumed it was tongue in cheek) about feeding chickens marigolds to darken their egg yolks. I had to chuckle because I had just been dealing with an issue that led me through the marigold maze. Only my concern was foot color in my Cochins.

I have been working with several rarer varieties of Cochins for the last 14 years and thought I had put the lack of bright yellow feet way behind in my lines (with the exception of my Wheaton line, a willow footed bird still pops up occasionally).



As a matter of fact, bright yellow feet are one of the traits I focused on very early in my breedings, and an important one that I look for in newly hatched chicks. Anything that appears to have lighter yellow is noted to double check at banding (6 weeks). Last hatching season almost all my chicks at hatch showed yellow feet and shanks (pic #1 of yellow chick foot). There were a few with lighter yellow or color restricted to the shank and metatarsal pad, but overall, nothing of concern. Since foot color will often darken in early chick development, I just so place them in the brooders.

Just to set the stage for the foot issue, I feed a medicated chick starter for the first 2 weeks. Then I switch to a non-medicated starter so a coccidiostat can be added to the water at an elevated level. (I've learned over the years that I have several very virulent strains of cocci that require special treatment, but that's for a different article).

I buy my medicated chick starter by the bag from one supplier and non-medicated in bulk 1000 lb. bags from a different supplier. As each week's hatch starts to feather out (5 or 6 weeks) I go through them for early culling, I move them to grow out pens. I also, at that point, start transitioning to a grower feed.

During the move I go over the grow outs and cull for any DQ s or undesirable characteristics. I started to notice a lack of yellow foot color in birds that were hatched with at least acceptable foot color (light yellow foot photo #2) and It was across several varieties. I was pretty concerned, knowing that they had the proper yellow footed genes in their background, so I was unsure why it wasn't being expressed. My first thought was that a recessive gene was showing up, but that made no sense as the issue was in several varieties.



Being as genetically challenged as I am, I turned to several more knowledgeable friends. Their suggestion? Let's take a close look at the feed.

This was all happening about the time feed was taking exponential price jumps every week. I started researching feeds and mixes and soon found out most feed recipes are formulated on what is called a least cost basis. This means the recipes are adjusted to a final level of, say protein, using the least cost ingredients available at the time or what may have been previously contracted for.

As an example, this may involve several different protein sources. This holds true for other ingredients and additives as well. So, I started checking the ingredients levels and sources in different feeds, comparing pre and post price increases. (photo #3 &4) Sure enough, most had decreased the level of corn and increased ingredients like soybeans. Most of them covered the change by listing the adjustments as grain products, processed grain products and or plant protein products. Compare these ingredient tags on the same product





Ok. So how did that affect the foot color in my Cochins again due to my glaring lack of genetics proficiency. I'll try to explain what I learned in layman's terms.

Foot color in poultry is a combination of several genes or lack of and involves both the epidermis (outer layer) and dermis (underlying layer) of skin on the feet and shanks. The final foot color is determined by the combination of genes and where the color is deposited in the skin.

David Soderquist has a great article on these combinations. The article can be found on the CI Facebook page under the "Files" link:

https://www.facebook.com/groups/Cochinsinternational/permalink/945398692187489

If you want to dig deeper this European article is another great read via Dave Soderquist: <u>http://www.aviculture-europe.nl/nummers/09E05A09.pdf</u>

So, what happens if you have the right genetic combination for good yellow legs but the color is not there? Yellow foot color is the result of the proper plant-based pigments being available to the birds so the color can be expressed. For yellow, this is carotenoids.

These are pigments contained in grasses, assorted vegetables, flowers, and corn. Bingo! As it turned out, my feed was being least cost reformulated due to ingredient price increases. The corn carrying the important carotenoids was being cut back. And since poultry cannot synthesize carotenoids, they must be provided in feed either naturally or as supplements. This directly affects the foot color.

Next question was how do I correct this? As always, being given the opportunity to learn something new is interesting and challenging. I have a friend, Richard Higgins, who is Director of Hatchery Operations for Perdue. I contacted him about my issue and he in turn contacted Perdue's poultry nutritionist, who knew exactly what I was dealing with! It seems Perdue used to use a specialty all-natural carotenoid to add skin color to whole chickens for several broad markets, and he just happened to have a few pounds available. Three days later, my friend Richard showed up with several pounds of the additive for me to try.

Digging a little deeper, it seems carotenoids are not all equal. There are hundreds of different types, but only a handful relate to poultry. Some impart yellow color (marigold extracts) others orange (paprika extracts). Often a combination of them is used to get the proper egg yolk color depending on geographic color preferences. Anyway, my interest was in improving skin color. Seems there are 2 carotenoids that will affect yellow skin color: Apo-ester, a synthetic formulation, and Lutein/zeaxanthin, a natural marigold extract. Both only require a minimal amount (2 lbs./ton) mixed in the feed to enhance the expression of the yellow gene in the feet and shanks.

I feel pretty certain that when the feed formulations changed and corn was decreased, an additional carotenoid source was not incorporated in the feed. And that would explain the loss of color in the feet of my Cochins. When I added the supplement to the feed, my birds readily ingested the processed marigold powder. Within a matter of a few weeks, I could see a definite improvement. (Foot pic # 5,6,&7)









After I had used all the original powdered extract, it had made such a difference I wanted to continue mixing it in lower levels in all my feed. I searched online and found that both marigold (Calendula) petals and processed powder are available. (Pic #8,9) Since then, I've learned that some feed companies do incorporate additional

carotenoids in their premium lines of feed, but with what's available, I have found it's much more economical to mix your own.

An important takeaway is to know your feed ingredients. (Pic#11) If corn is not primary, ask if there is any supplemental Zeaxanthin in the formula. If not, a little added marigold powder (¾ oz to the 50 lb. bag) can make a big difference in foot color.





If your birds don't have at least some yellow pigment in the metatarsal pad and the shank, then lack of color is probably genetic. (Pic #2,#10)



There is always so much more to learn about poultry. Consequently, the challenge of trying to breed the perfect bird will never end!