Feeding Hens Grain from High-Carotenoid Corn Could Increase Eye Health Benefits of Eggs

Nearly one in four adults over the age of 65 are at risk of developing age-related macular degeneration (ARMD), which gradually destroys the macula of the eye and is the leading cause of blindness in older adults. According to the National Eye Institute, medical options for treating or reversing ARMD are quite limited; however, eating a diet rich in dark leafy-green vegetables may lower your risk.

Why eat dark leafy-green vegetables? Quite simply, they are high in the potent antioxidants lutein and zeaxanthin, which are depleted from the macula in ARMD sufferers. Corn grain is among the few foods, in addition to dark leafy-green vegetables, which are relatively high in lutein and zeaxanthin. But unfortunately, the solution is not as simple as eating more dark leafy-green vegetables or corn. How a food item is prepared and what the food is consumed with greatly impacts the body’s ability to extract and absorb nutrients from the food. This concept is referred to as bioavailability, and for carotenoids like lutein and zeaxanthin, bioavailability is greatly increased by the presence of oil. This is why eggs are an ideal food for getting lutein and zeaxanthin into our diet. The yolks contain lutein and zeaxanthin, giving them their characteristic yellow color, and they are high in oil, making the carotenoids far more bioavailable than from other high-carotenoid foods such as spinach or even lutein supplements.

High-lutein eggs are currently available to the North American consumer; the result of supplementing laying hens’ diets with marigold petals imported from Latin America. An alternative strategy, one that could potentially result in eggs high in both lutein and zeaxanthin, would be to replace marigold petals with corn high in lutein and zeaxanthin. A new capstone, proof-of-concept study in the March–April 2013 issue of *Crop Science* examines this potential.

This research builds upon previous studies detailing the development and genetic characterization of high-lutein and high-zeaxanthin corn varieties. Conventional plant-breeding techniques, exotic germplasm, and simple selection for orange kernels allowed useful alleles to be moved from the Argentine Orange Flint race of maize into conventional North American corn, thereby generating corn lines with lutein and zeaxanthin levels higher than previously documented. In the current study, grain from two of these lines, one high in lutein and one high in zeaxanthin, were fed to laying hens. Carotenoid levels in the egg yolk were followed and compared with levels in egg yolks from two “control diets”: a diet using standard number 2 yellow corn and a diet supplemented with a lutein extract from marigold petals.

Encouragingly, the two high-carotenoid corn diets consistently resulted in egg yolks that were higher in lutein and zeaxanthin than the number 2 yellow corn diet. Unfortunately, the highest lutein levels in egg yolks were from the diet supplemented with lutein extract from marigold petals. The authors say while this is truly the first proof-of-concept trial of this nature, it illustrates the promise of targeted breeding for functional food properties and the potential for delivering those enhanced nutritional properties to improve human health.


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