

## New method to increase egg nutritional quality and yolk color

**Areas:** Biotechnology, Agriculture, Food, Nutrition, Consumer

**Collaboration Opportunity:** Available to license

**Summary:** A number of different hybrid varieties of maize producing high amounts of antioxidants were developed by a team of researchers at the University of Lleida, led by Dr. Paul Christou. Hens raised on feed based on the optimized maize varieties produce high quality eggs. In particular, hens lay eggs with an intense golden yolk when compared to diets complemented with commercial nutritional additives. Eggs accumulate high-content of carotenoids and ketocarotenoids (astaxanthine). These eggs might have a better acceptance by consumers due to strongly pigmented yolks and healthier nutritional composition. In addition they may also find use in high value specialty processed foods and as novel ingredients.



**Need:** Hens (and poultry, in general) cannot synthesize carotenoids, and these have to be provided through the feed. Commercial feed does not attain the color standards required by consumers and/or specialty food manufacturers. Thus, egg producers have to complement feed with pigment additives from other sources, increasing the cost of production. Consumers and the specialized high value food industry have specific preferences for yolk color and enhanced nutritional quality of food products.

**Market:** The total demand for animal products in developing countries is expected to more than double by 2030. Egg consumption in China

alone is very high - more than double the average for developing countries and even above the industrial country average - and will rise from 15 kg/ person/p.a. in 1997/99 to 20 kg in 2030. China, USA, Japan and India are the top world egg producers and 80% of worldwide production is led by USA and Asia, while Europe represents 16% of the global market. In the USA, egg production during the year ending 2015 totaled 96.4 billion eggs.

**Commercial Applications:** Feed for hens / other animals with high nutritional requirements of carotenoids and ketocarotenoids.

**Competitive Advantages:**

- ✓ Cheaper than commercial supplements
- ✓ Higher levels of carotenoids and ketocarotenoids (astaxanthin) in eggs
- ✓ Higher consumer acceptance due to carotenoid load in yolk (DSM scale 12)

**Funding received:** ERC Proof of Concept Grant (EU Funding)

**Development status:** concept validation

**Intellectual Property:**

A Spanish patent granted (ES201531699); other related technologies are also protected close to this technology.

Literature cited:

- C. Zhu et al (2008) Proc Natl Acad Sci USA 105: 18232-18237; doi: [10.1073/pnas.0809737105](https://doi.org/10.1073/pnas.0809737105)
- JA Moreno et al., (under review)