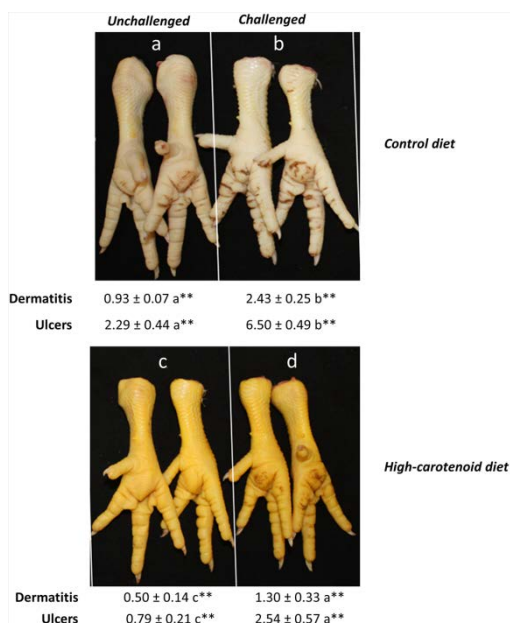


# Method based on a nutritional intervention to fight coccidiosis

**Areas:** Agrifood, Biotechnology, Animal Disease Control, Nutrition

**Collaboration Opportunity:** Available to license

**Summary:** A novel genetically engineered (GE) variety of maize, Carolight™, accumulating extraordinary levels of carotenoids (β-carotene, lycopene, zeaxanthin and lutein) was developed by a team of researchers at the University of Lleida, led by Dr. Paul Christou. Poultry raised on this corn were healthy and exhibited substantially higher levels of resistance to coccidiosis, less foot pad dermatitis, reduced number of ulcers and less excretion of pathogen oocysts in feces. Carotenoids accumulate in several tissues (skin, dermis, muscles and fat), conferring high nutritional value and greater consumer acceptance.



**Need:** One of the most important and potentially devastating diseases in commercial poultry production, coccidiosis, is caused by microscopic protozoa (coccidia) that disrupt the normal gut environment of infected animals. This causes malabsorption of essential nutrients and often results in unnecessary suffering or even death. Subclinical symptoms, manifested as poor growth and feed conversion, are a problem in commercial broiler production, and this accounts for 20% prevalence of coccidiosis. The cost of coccidiosis and

impact on poultry production is mainly due to the cost of control through medication and vaccination which are non-optimal solutions with several disadvantages.

**Market:** USA and India represent ca: 80% of worldwide chicken production. In the USA, the value of broilers produced during 2014 was \$32.7 billion, up 6 percent from 2013. The total number of broilers produced in 2014 was 8.54 billion. Coccidiosis is a significant source of economic losses for the global poultry industry, estimated at \$2,4 billion.

**Commercial Applications:** Feed for poultry

**Competitive Advantages:**

- ✓ Cheaper than commercial supplements
- ✓ Extraordinary levels of β-carotene and other pro-vitamin A carotenoids (170-fold)
- ✓ Substantially less pathogen oocysts in feces (4-fold)
- ✓ Substantially lower foot pad dermatitis lesions (2-fold)
- ✓ Reduced number of foot ulcers (2-fold)
- ✓ Reduced use of anticoccidial drugs
- ✓ Greater consumer acceptance

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

**Development status:** concept validation

**Intellectual Property:**

1. Granted Spanish patent ES2340119 (B1)
2. Granted Spanish patent ES2501367 (B1)
3. PCT filing PCT/ES2015/070435
4. Carolight - Registered Variety (Plant Breeders' Rights)
5. Cited Primary literature:
  - 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)
  - C. Nogareda et al, (2016) Plant Biotechnol J 14: 160-168; doi: [10.1111/pbi.12369](https://doi.org/10.1111/pbi.12369)