



**Yellow and red pigments  
100% natural**

# AddOro<sup>®</sup>

**100% Natural source of carotenoids  
and xanthophylls, highly stable, bioavailable  
and based on sustainable resources**





The colour of the egg yolk and chicken skin is one of the most determining factors for consumers' choice and demand. It leads to product differences, which affect the returns to poultry producers and farm incomes.



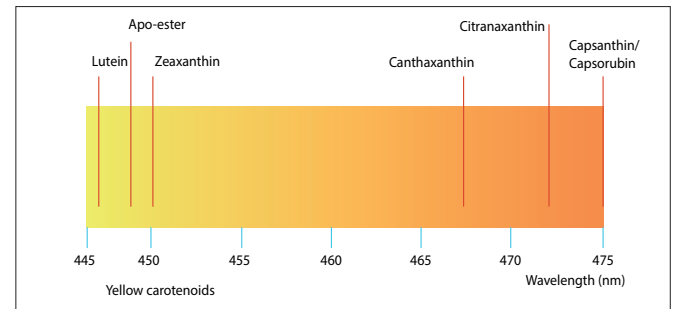
Regional preferences for specific pigmentation play a key role in consumer acceptance and quality judgement of broilers (some markets prefer white chickens while others tend to prefer yellow broilers). When it comes to egg yolk colouration, consumer preferences tend to vary greatly as some markets such as Belgium, the Netherlands, Germany, and Spain prefer orange egg yolks while consumers in France, U.K., and Finland prefer dark yellow egg yolks.

A highly coloured egg yolk is preferred for processed food, especially pasta, whereas in Ireland and Sweden a light colour of egg yolk is accepted.

Modern industrial farming has limited the availability of carotenoids within the diets to insufficient levels.

## Carotenoids: needs and importance

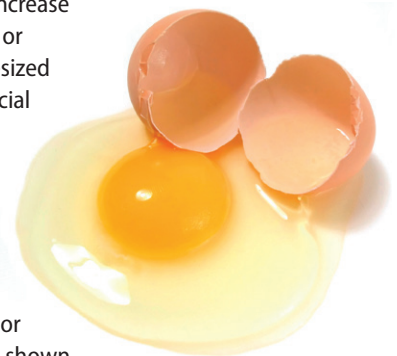
Sufficient levels of carotenoids within a diet are very important for many physiological functions such as immune response, physiological needs for production and fertility, vision and ocular health. Subsequently insufficient lutein within the diet may result in improper functioning.



Carotenoids used for pigmentation are mostly Lutein and Zeaxanthine and have a wave length of 445-465 nm (yellow to orange colour).

## Skin and yolk pigmentation

Pigments are additives that can increase the colour of a broiler's skin and / or egg yolks. They cannot be synthesized by birds, and the typical commercial poultry diet does not provide sufficient amounts of pigments to produce the intense bright colour that is often preferred. Therefore, pigments are added to the diets of broilers and layers to give the desired colour of skin or egg yolk. Numerous studies have shown that the primary compounds with a colouring role in poultry products are carotenoids, the concentrated extracts from marigold meal and capsanthin or its combinations.





Carotenoids are lipophilic yellow-orange-red pigments. In nature, the efficiency and efficacy are closely related to the following factors:

- Content of xanthophyll derived from feed ingredients such as maize, maize gluten meal and alfalfa meal.
- Vitamin E and A content within the feed.
- Mycotoxin contamination within the feed and ingredients.
- Fat stability and quality (oxidation).
- Health status and genetics.
- Applied dose level taking all the above into account.
- Feeding regime.

## Fish and crustaceans

Most people consider salmonids as a “red” fish. The flesh from wild salmon from oceans and rivers is often red, pink or orange, in varying degrees. The major carotenoid in wild salmonids is astaxanthin, which originates from the feed they live on, small crustaceans or other fish with small crustaceans in their digestive system.

Many marine and freshwater animals, including fish and crustaceans, owe their bright colouration to carotenoids as well. Just like poultry and mammals, aquatic animals cannot biosynthesize carotenoids de novo, they depend entirely on feed for their supply of carotenoids. The carotenoids in crustaceans are mainly from algae; and in fish from plankton, from other fish with small crustaceans in their digestive system or from small crustaceans they eat.



## Pets: ornamental birds

Carotenoids are added to feedstuffs of ornamental birds, and fish in order to colour them. For ornamental fish, the main carotenoids used are astaxanthin and its salts and canthaxanthin. In addition to the use of carotenoids in zoo animals,  $\beta$ -carotene, canthaxanthin and lutein-zeaxanthin are frequently used in feedstuffs for canaries and other songbirds, giving a wide range of hues to feathers from bright yellow to orange-red.

$\beta$ -carotene and canthaxanthin are particularly used in colour feeding Red Factor Colour Bred Canaries to maintain their rich red plumage. The proper ratio is to give the birds half canthaxanthin and half  $\beta$ -carotene. This way the birds will develop bright red feathers.



## Natural vs. synthetic

Pigment added into animal feed consists of synthetic and natural pigment. The use of synthetic pigment sometimes showed unexpected results, and the consumers worry it might be unhealthy. That is why **natural pigments** have replaced synthetic pigments in most of the European countries, especially products that are made for food processors because of their many advantages, such as **safety, nontoxicity, strong biological activity, and greater bioavailability.**

Natural pigment is a safe alternative source to be used as a feed additive in the animal feed industry. Natural xanthophylls are the class of carotenoids that are most widely used in additives for pigmentation of skin and yolk. **Xanthophyll has also shown to decrease oxidative damage and to produce anti-inflammatory effects in poultry.**

REPRESENTATIVE CAROTENOIDS	SOURCES OF CAROTENOIDS AND THEIR METABOLITES
Astaxanthin	Adonis annua flowers, fungi, algae, bacteria, shrimp (e.g. via transformation of $\beta$ -carotene present in their diet)
$\beta$ -apo-8'-carotenal, $\beta$ -apo-8'-carotenoic acid	Grass, alfalfa, green plants, citrus fruit
$\beta$ -carotene	Carrots, fungi, algae, bacteria
Canthaxanthin	Crustaceans, fungi (Cantharellus sp.), algae
Capsanthin, Capsorubin	Red pepper (Paprika - Capsicum annum)
Citranaxanthin	Citrus fruit
Cryptoxanthin	Fruits, pumpkin, yellow maize, seaweed, peaches, nuts
Lutein, Zeaxanthin	Yellow maize, Marigold flower, alfalfa
Lycopene	Alfalfa, tomato, watermelon, pink grapefruit, papaya, guava, rose hip, fungi



### Yellow pigment:

Marigold meal is a natural product, obtained from the petals of Marigold flowers (*Tagetes erecta*). They are rich in xanthophylls, especially lutein and zeaxanthin. It is well documented that dietary supplementation of marigold extract increases the colour intensity of carcass and egg yolk, antioxidant capacity and meat quality in broiler chickens.

Application and dose required to achieve optimal results are directly related to the compound feed and ingredients used.

### Red pigment:

The so called 'red xanthophylls' are mainly made up of capsanthin extracted from paprika (*Capsicum annum*). Experimental evidences for the potential of paprika to reduce oxidation stress, inflammation, dyspepsia, pain and fat intake are available.

After harvest, the petals or fruits are dehydrated, stabilized, homogenized. The oleoresin (rich in xanthophylls) extracted goes through a process of saponification to produce the yellow and red pigments.

### Lutein:

In humans, one of the key benefits of lutein in the diet is its accumulation in the retinal macula, which increases macular pigment optical density. This effect is exclusive to lutein and zeaxanthin.

Lutein and zeaxanthin make up the bulk of the carotenoids taken up by hens in their natural diet and account for more than 85% of total carotenoids in commercial eggs.



## AddOro®

is a yellow and red pigment range that is standardized and fully saponified to deliver a consistent and uniform colour for the egg yolk and broiler skin.

It is based on natural lutein and zeaxanthin, obtained from dehydrated, stabilized, homogenized and saponified Marigold extract (yellow pigments) and capsanthin from paprika extract (red pigments) stabilized with ethoxyquin free antioxidant and incorporated in inert carriers. All active ingredients are found in a highly bioavailable form, which makes AddOro® an effective and reliable pigment source.

Innovad's pigment experts have over 20 years of experience in providing natural pigments. A global supplier, active in the most demanding markets worldwide.



*Full control on harvesting and customer deliveries.*



## Addco SPA / Innovad<sup>®</sup> state-of-the-art production facility

As part of our continued commitment to being the market leaders for natural pigments within Europe, we have built the most advanced state-of-the-art production facility along with our Italian sister company Addco Nutrition SPA.

The focus is to ensure an optimal process control and full traceability away from any contaminants (heavy metals or PCB like Dioxins). Starting from cultivation of the flowers, harvest and processing the raw material until the oleoresins are fully controlled based on rigorous quality controls and specifications.

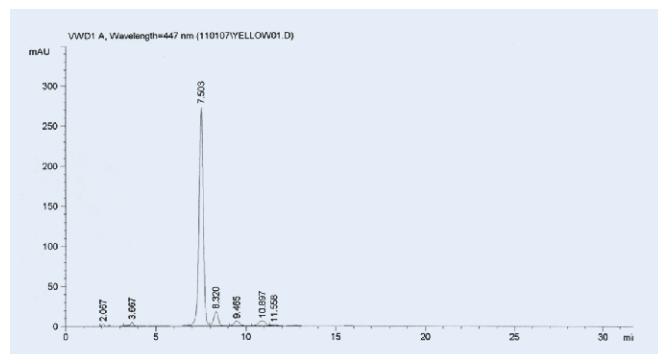
Saponification, homogenization, stabilization of the liquid and dry pigments are carried out within our newly built facility in the EU. The plant is fully automated to eliminate all variable human errors, constant output and production line are fully operating under nitrogen to prevent oxygen or product active component losses.

The process has been optimized to deliver the safest and stable lutein and capsanthin products for effective pigmentation, or supplementation for biological functions.

## Unique production facility

The current capacity is geared towards producing over 6,000 tons of liquid and 3,000 tons of dry product, forecasting one shift at this stage. The exclusive reaction knowhow ensuring :

- ETQ free process totally in line with most advanced EU regulations.
- No alcohol residue which is used in traditional saponification.
- Over 98% saponification guaranteed.
- High stability due to the use of nitrogen (zero oxygen) within the process.
- Rigorous dioxins and heavy metal control from plantation to final products.
- Constant fresh product as production is made to order not to inventory.
- Each batch of O.R is quality checked for dioxine, xanthophylls and carotenoid content at a dedicated internal laboratory.



*Fully integrated production process in our state-of-the-art production facility in Italy. From the seeds to the oleoresin and finished product. Full traceability!*



## AddOro® – benefits and features

### 1. Sourcing:

- Full control on harvesting, selection of parcels and raw material production.
- Fully integrated production process. From the seeds to the oleoresin and finished product.
- Full traceability!

### 2. Stability and freshness

- Innovad's pigments are packaged and vacuum sealed under nitrogen in an aluminum bag to prevent oxidation. A mineral carrier (not corn cob, rice hulls or even the crushed Marigold flowers and plants) provides a superior product presentation, better flowability and optimized product stability.
- Fresh products are guaranteed as production is triggered based on order. No old, stored material.

### 3. Bioavailability and efficacy

- Our saponification process provides optimum bioavailability, with a guaranteed minimum of 98% saponification.
- Quick and effective absorption due to small particle size, guaranteeing maximum bioavailability.
- Manufacturing is in accordance with current legislation on undesirable substances in animal feed (EU-Directive 2002/32/EC) including PCB and Dioxins. The absence of undesirable substances is checked on a routine basis by an accredited lab.
- Highly efficient in colouration improvement in poultry.

### 4. Minimum carotenoid guaranteed level:

- Guaranteed minimum levels of Trans-Lutein and Xanthophylls.

### 5. Flowability

- Maximum flowability on inert mineral carrier. Optimal dispersibility under extreme conditions during feed manufacturing.

### 6. Consistent quality

- The production process is fully automated with no human interaction other than handling bag of finished product, which guarantees consistent production and quality.
- No ethoxyquin antioxidant present in our production process, not even traces as we control flower, extraction, saponification and final product stabilization. This meets the updated EU regulation.
- All batches are tested negative for PCB like dioxins and other contaminants.

### 7. Application and dosage

- Recommended level of **AddOro® yellow and red** for broiler skin and egg yolk pigmentation is shown in below table.

Dosage recommendations based on gram (g) active carotenoids*								
NATURAL XANTHOPHYLLS IN DIET	colour	BROILER SKIN COLOURING			EGG COLOUR DENSITY (FAN COLOUR)			
		Low	Medium	High	10	12	13	14-15
Less than 2 g	Yellow	20-25 g	20-30 g	60-80 g	20-30 g	30-40 g	30-40 g	30-40 g
	Red	0.5 g	0.75-1.0 g	1.0-2.0 g	0.5 - 1.0 g	1.0-2.0 g	2.0-5.0 g	7.5-10 g
2-4 g	Yellow	20-25 g	30-40 g	45-60 g	15-20 g	20-25 g	25-35 g	30-40 g
	Red	1.0 g	2.0-3.0 g	3.0-5.0 g	1.0-1.5 g	3.0-3.5 g	4.5-5.0 g	5.0-6.5 g
4-6 g	Yellow	12-25 g	30-40 g	35-50 g	10-15 g	10-15 g	10-15 g	10-15 g
	Red	1.0 g	2.0-3.0 g	3.0-5.0 g	1.0-1.5 g	3.0-3.5 g	4.5-5.0 g	5.0-6.5 g
6-8 g	Yellow	10-20 g	25-37 g	37-50 g	5.0-10 g	5.0-10.0 g	5.0-10.0 g	5.0-10.0 g
	Red	1.0 g	2.0-3.0 g	3.0-5.0 g	1.0-2.0 g	3.0-3.5 g	4.5-5.0 g	5.5-6.5 g
8-10 g	Yellow				2.5-5.0 g	2.5-5.0 g	2.5-5.0 g	2.5-5.0 g
	Red				1.0-2.0 g	3.0-4.0 g	4.5-5.0 g	5.5-6.5 g

Feed intake 110 g (gram) per bird per day for layers and normal feed un restricted for broilers.  
\* Or per local regulations or the guidance of a Innovad® technical representative.

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highly stable, bioavailable and based on sustainable resources

## Packaging and shelf life

- **Packaging:** 20-25 kg aluminum bags, vacuum thermo sealed with nitrogen application.
- **Liquid:** 1.000 kg IBC and bulk.
- **Shelf Life:** 18 months when stored in a cool and dry environment out of direct sunlight in unopened original packaging.
- **Liquid product is highly stable but should be protected from sunlight.**

## Presentation and dosis

### Yellow:

*Dry concentrations Xanthophylls g/kg*

🌸 **AddOro® Y 20** - Xanthophylls (min.) 20 g/kg

🌸 **AddOro® Y 40** - Xanthophylls (min.) 40 g/kg

🌸 **AddOro® Y 50** - Xanthophylls (min.) 50 g/kg

### Yellow liquid:

*Liquid Xanthophylls g/kg*

🌸 **AddOro® Y 15L** - Xanthophylls (min.) 15 g/kg

### Red:

*Dry concentrations Xanthophylls g/kg*

🌶️ **AddOro® R 5** - Xanthophylls (min.) 5 g/kg

🌶️ **AddOro® R 10** - Xanthophylls (min.) 10 g/kg

🌶️ **AddOro® R 20** - Xanthophylls (min.) 20 g/kg



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