**EFFICACY OF MARIGOLD EXTRACT IN EGG YOLK PIGMENTATION**

**DESCRIPTION**
Egg yolk color is determined by a combination of yellow and red carotenoids in the layer’s diet. These may be mostly synthetic or derived from vegetal extracts, according to consumer preferences.

In addition to its pigmenting properties, Marigold extract also enriches eggs with lutein.

**OBJECTIVE**
The purpose of this study was to compare the efficacy of marigold extract versus synthetic pigment beta-apo-8’-carotenoic acid ethyl ester (apo-ester) in egg yolk pigmentation.

**MATERIALS AND METHODS**
This study was conducted at the IRTA Research Institute, within the Monogastric Nutrition subprogram (January to February 2015).

**ANIMALS**
Thirty-six 23-week-old Hy-Line Brown layers were used. The layers were housed in 12 cages, with 3 layers per cage.

**RESEARCH DESIGN**
- **A white feed meal (carotenoid-free)** based on wheat, barley and soybean was used.
- **9 animals were allocated to each treatment.** Each cage was set up as one replicate, with 3 replicates per treatment.
- **4 treatments** were planned based on the type and concentration of yellow pigment:
  - Apo-ester - 2.5 ppm;
  - CAPSANTAL EBS 30 NT - 3.75 ppm;
  - CAPSANTAL EBS - 5 ppm;
  - CAPSANTAL EBS 30 NT - 6.25 ppm.

As the source of red pigment, **2.5 ppm canthaxanthin** was added (CAPSANTAL CX) to all treatments.

The test lasted **46 days** from the beginning of carotenoid supplementation. The collection and assessment of eggs began on **day 21** and continued until day 46 (196 to 231 eggs per treatment).

**Egg yolk coloring** was assessed using a **Minolta CR 300 colorimeter** and by visual appreciation (Roche color fan).
RESULTS

Dosing with different levels of natural yellow carotenoids did not result in significant differences in the values of lightness (L) and redness (a*) as measured using the colorimeter (Figure 1).

Increased yellowness (b*) was observed with higher levels of marigold carotenoids; however, this was only significant for the 6.25 ppm dose.

In addition, no significant differences were found in visual egg yolk color comparison using the Roche color fan. Mean values were between 12.5 and 13 (Figure 2). These values are considered to be intermediate to high and are in accordance with the Spanish market criteria.

No differences were seen in pigmentation homogeneity between the different pigments and doses, which translated into the collection of homogenous egg batches with similar color levels.

CONCLUSIONS

The addition of marigold extract carotenoids together with an adequate amount of red carotenoids results in an adequate orange hue according to the market’s demands.

Even though no significant differences were observed, the increased level of marigold extract in the diet resulted in increased egg yolk yellowness.

For similar coloring, the pigmenting efficacy ratio of marigold extract to synthetic carotenoid apo-ester was 1.5 : 1. This means that the color obtained with 1 ppm apo-ester is comparable to that of 1.5 ppm natural carotenoid.

In addition, the use of marigold extract results in higher levels of lutein in the egg yolk.