

**6th CASEE conference**  
**"Latest Trends in Bioeconomy in Danube Region"**  
**24th – 26th May, 2015**

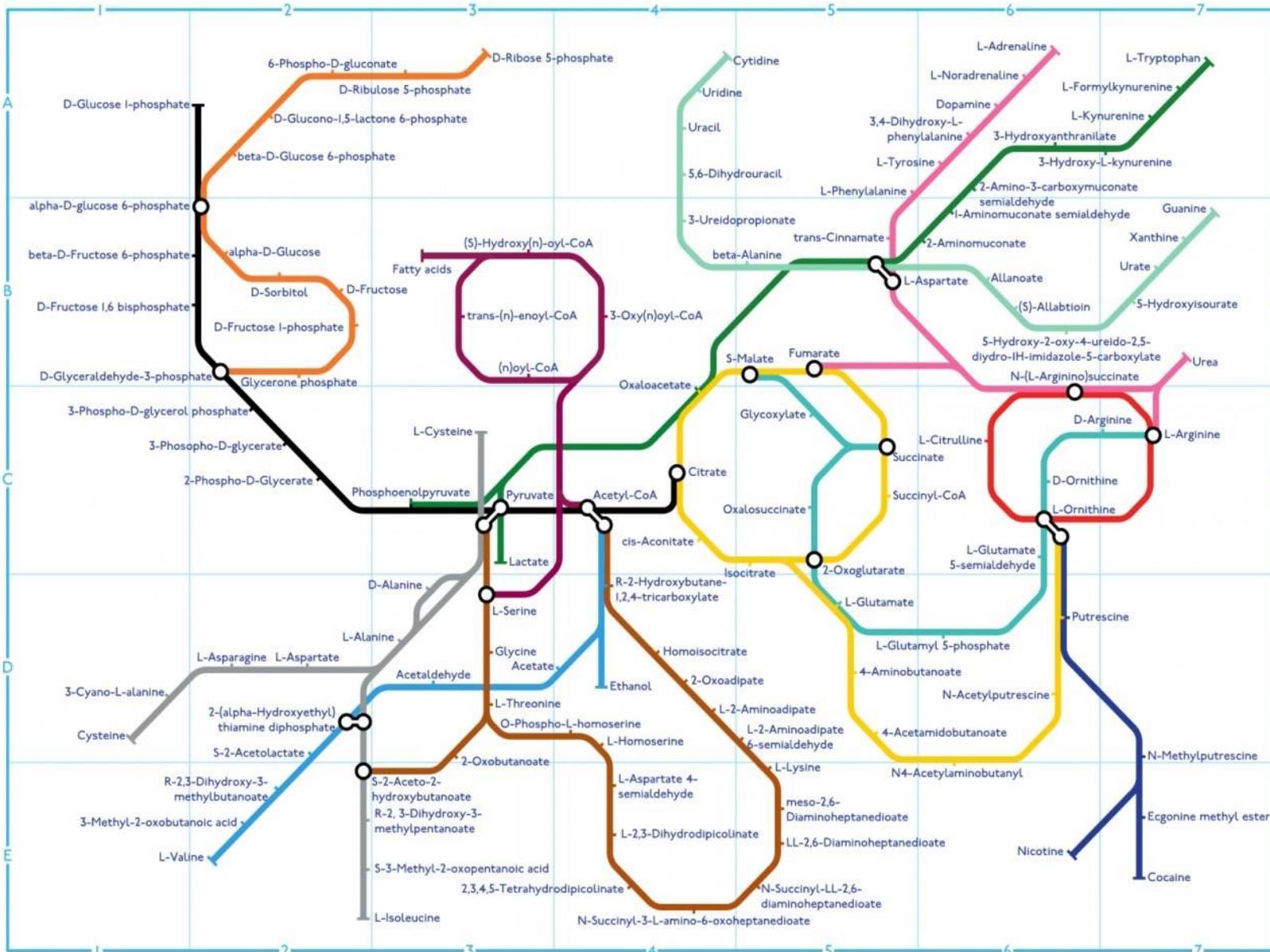
**Slovak University of Agriculture in Nitra, Slovak Republic**

**FIRST CALL**

Agrobiological sciences encompasses a wide variety of subjects, particularly those regarding the relationship between humans and the environment. This includes sustainable development, biodiversity conservation, plant breeding, soil science, bioresource engineering, weed science, as well as agricultural economics and ecosystem management. In order to sustain the growing population, we must effectively manage the planet's natural resources. Understanding of agrobiological systems are key to humanity's continued development. Also scientific programme of conference will be designed to cover all aspects of biotechnology, including environmental and green biotechnology, microbial biotechnology, microbial synthetic and systems biology, biochemical engineering, medical biotechnology, biomedicine and much more. One of the primary goals of the conference is to promote research and developmental activities in Nutrition and Food Sciences. The conference will provide an excellent opportunity to network, share ideas and form partnerships with: agrobiology, biotechnology and food associations, learned societies in agrobiology, biotechnology, foods research institutes, universities. Another goal is to promote scientific information interchange between researchers, developers, engineers, students, and practitioners working in the Danubian region and other European countries.



# Metabolism map



Metabolism is the complex network of chemical reactions that occur in the cells of your body. These reactions modify the chemicals you take in your food and convert them into chemicals required to keep your biochemistry ticking over.

All the reactions in a metabolic pathway are driven by enzymes. These are biological catalysts which drive reactions which would otherwise not happen. Enzymes also regulate metabolism and control which pathways are active at any particular time.

Some pathways are vital for providing energy, like glycolysis and the Krebs cycle. Others make vital chemicals like the bases for DNA and amino acids for proteins.

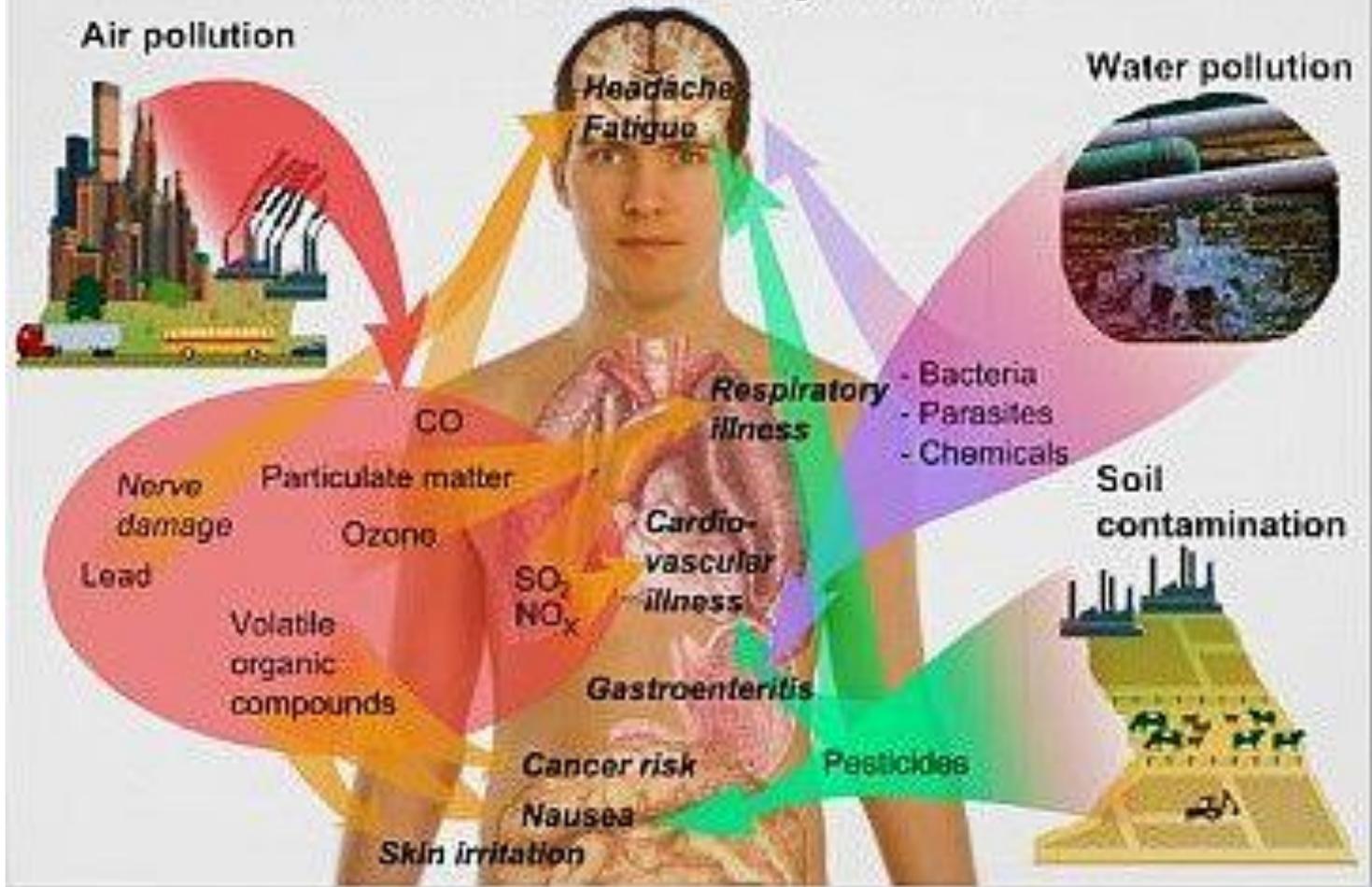
Not all chemical conversions can happen in all organisms. An organism might be missing the enzymes needed to make some chemicals, e.g. humans do not have the enzymes needed to make lysine. All the lysine our cells use has to come directly from our food.

Despite these differences all organisms have very similar central metabolic processes. Essentially every living thing from bacteria to humans has the enzymes needed for the Krebs cycle.

The metabolism of an organism defines what the organism needs and what it finds toxic. Hydrogen sulphide kills animals, but some bacteria need it to survive!

- Key to lines**
- Krebs cycle
  - Acetaldehyde line
  - Amino acid
  - Lysine loop
  - Urea circle
  - Drugs branch
  - Nucleotide line
  - Fat metabolism
  - Tyrosine metabolism
  - Tryptophan branch
  - Carbon transfer
  - Pentose
  - Glycolysis

# Health effects of pollution



# RISK FACTORS

- The **risk factors** are
  - different pollutants,
  - xenobiotics and other
  - harmful materials and influences
  - that have biological activities.
- There are different ways to prevent the contamination and/or to repair or cure their effects.

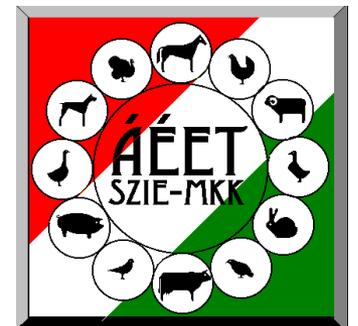


# RISK FACTORS OF FOOD CHAIN



# FUNCTIONAL EGG AGAINST RISK FACTORS

**Bárdos László**  
Szent István University,  
Gödöllő, Hungary



- **Functional food**

containing a bioactive compound is similar to a conventional food but it has some physiological benefits because it can reduce the risk of disease or dysfunctions of the body.



- **Nutraceutical**

is a special material isolated from foods and has protection effects against some specific diseases.

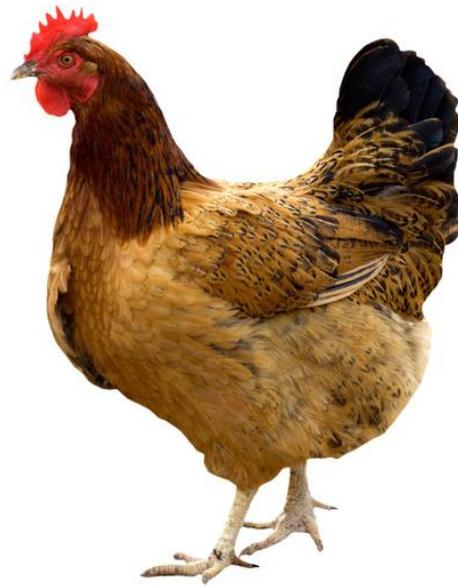




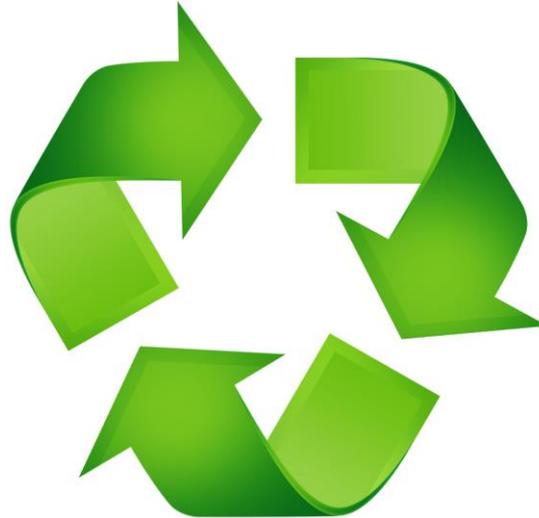
**THE HEN EGGS CAN BE USED BOTH IN  
FUNCTIONAL FOOD AND NUTRACEUTICAL**

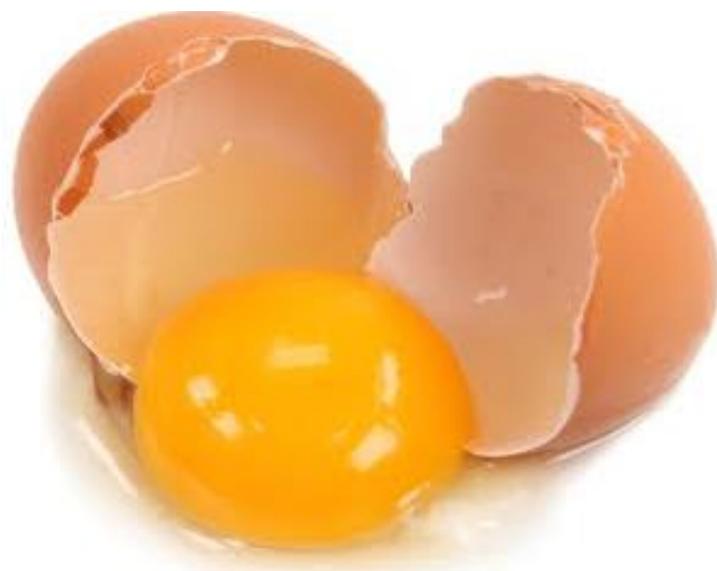


The primary aim of the hen is to supply her successor, the baby chick.....



...the egg contains all the materials which are necessary for a new life.





# Nutrition Facts

Serving Size

1 extra large (58.0 g)

## Amount Per Serving

**Calories** 83 Calories from Fat 52

**% Daily Value\***

**Total Fat** 5.8g **9%**

Saturated Fat 1.8g **9%**

Polyunsaturated Fat 0.8g

Monounsaturated Fat 2.2g

**Cholesterol** 245mg **82%**

**Sodium** 81mg **3%**

**Total Carbohydrates** 0.4g **0%**

Sugars 0.4g

**Protein** 7.3g

Vitamin A 6%

Vitamin C 0%

Calcium 3%

Iron 6%

\* Based on a [2000 calorie diet](#)





- The egg components are traditionally **highly conservative** in quantities (e.g.: total protein-, lipoids-, ash-content),
- but the ratio of subcomponents **can be changed**.

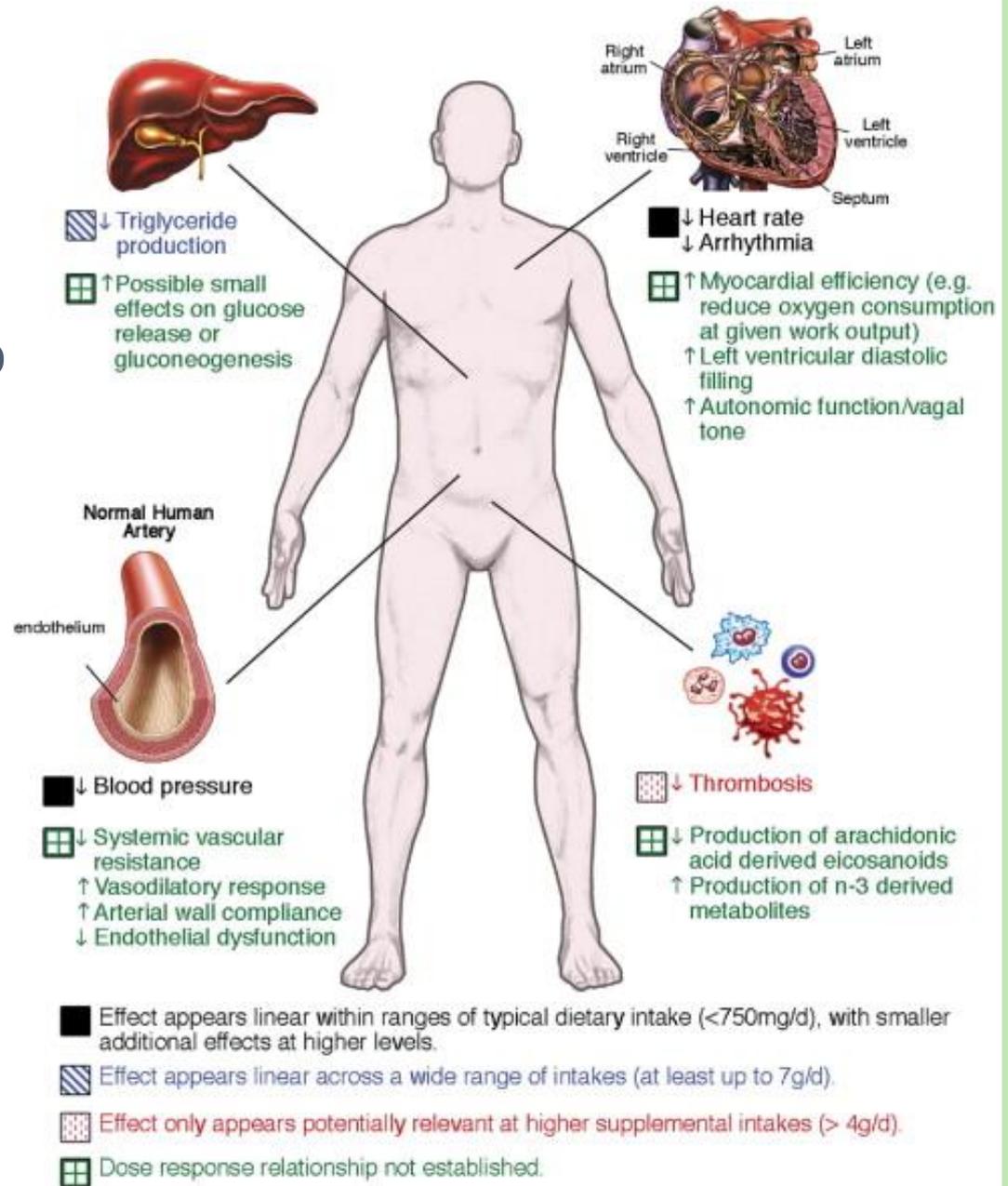


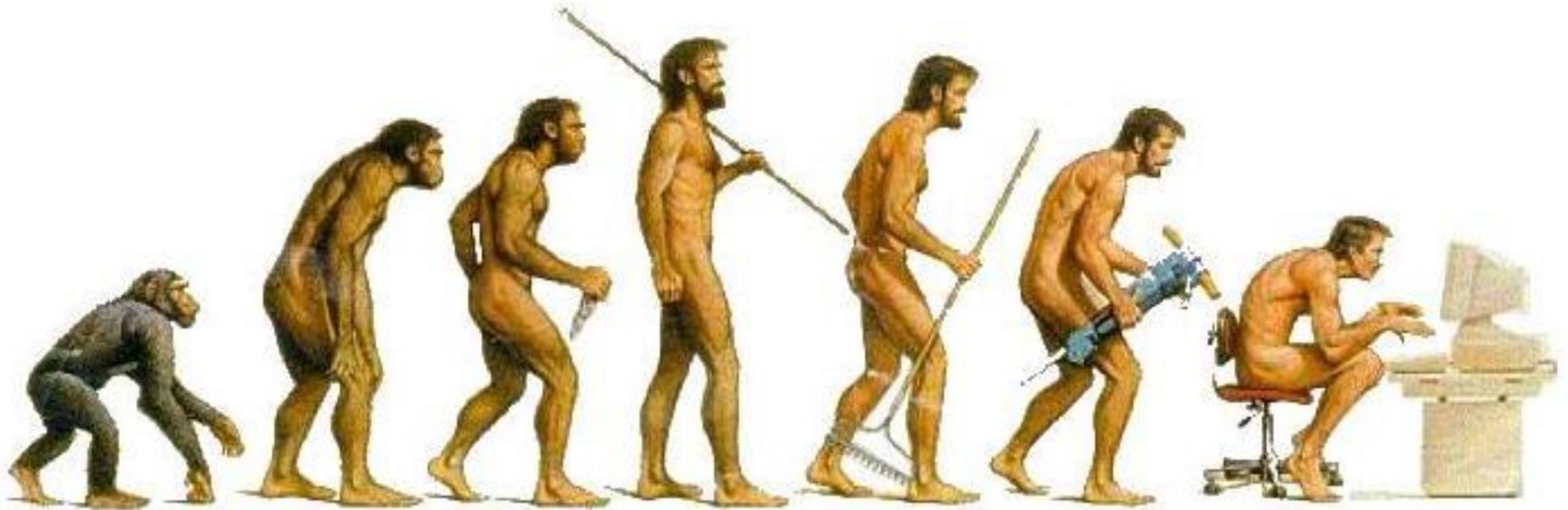
D. MOZAFFARIAN., J.H.Y. WU (2011):

# OMEGA-3 FATTY ACIDS AND CARDIOVASCULAR DISEASE : EFFECTS ON RISK FACTORS, MOLECULAR PATHWAYS, AND CLINICAL EVENTS

J. AMER. COLL. CARDIOL., 58, (20) 2047–2067.

- n-3 PUFAs affect of molecular pathways,
- alteration of physical and chemical properties of cellular membranes,
- modulation of membrane channels and proteins,
- regulation of nuclear receptors and transcription factors
- conversion of n-3 PUFA to bioactive metabolites.





Year	- 4 000 000	- 10 000	1800	1850	1950	2000 ?
<b>Fat</b>		<b>25%</b>	<b>30%</b>		<b>35%</b>	<b>40%</b>
<b>PUFA : Sat.</b>		<b>1:1</b>	<b>0.9:1</b>		<b>0.75:1</b>	<b>0.5:1</b>
<b>n6:n3</b>		<b>1:1</b>			<b>10:1</b>	<b>20:1</b>

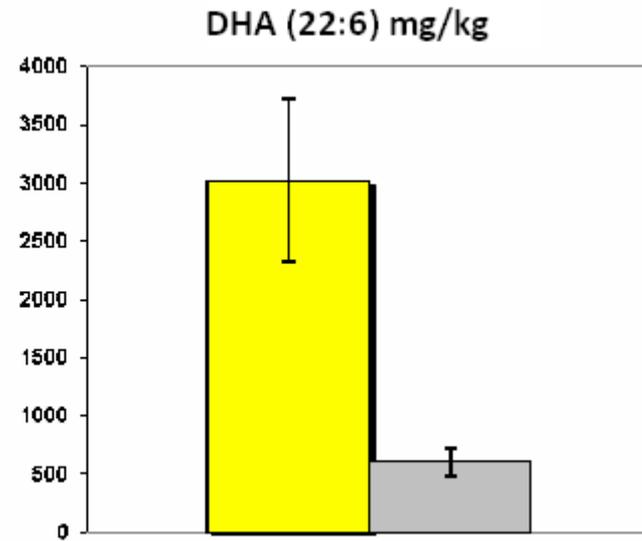
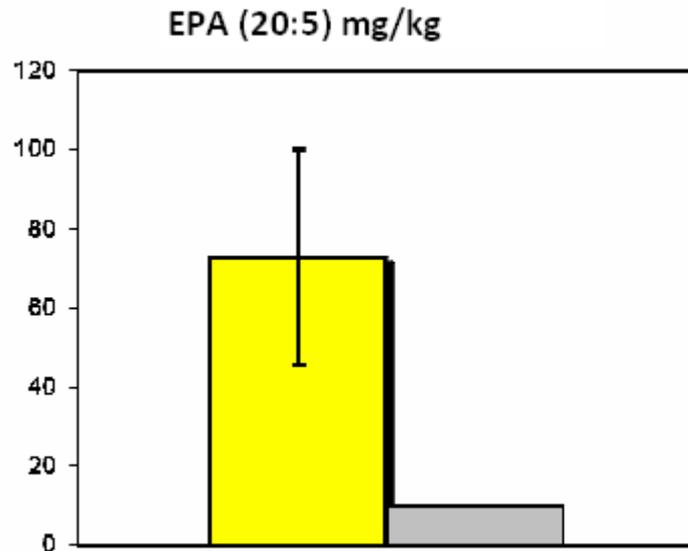
Leaf, A., Weber, P.C. (1987): *A new era for science in nutrition* Am. J.Clin. Nutr., 45(suppl.), 1048-1053





# PUFA in Egg Yolk

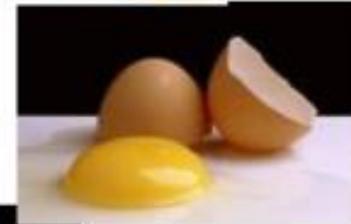
According to our results those layers which are consumed flax seed containing (8%) fodder produced a significantly **higher concentration of EPA and DHA in their eggs.**



Consumption of elevated n-3 PUFA containing egg can improve the unsaturated fatty acid content and the n-6/n-3 ratio in the human food, i.e. **this type of eggs can contribute to reduce our potential health issues.**



# Carotenoids



# Carotenoids

- Carotenoids are the natural colouring dyes of hen egg yolk.
- The best coloration is made by oxycarotenoids (xanthophylls) mainly lutein, cryptoxanthin, and zeaxanthin.
- These carotenoids are in common corn based feeds of chicken.
- After ingestion this compound is largely oxidized esterified and stored in skin, beak and deposited into the yolk.



# AMD



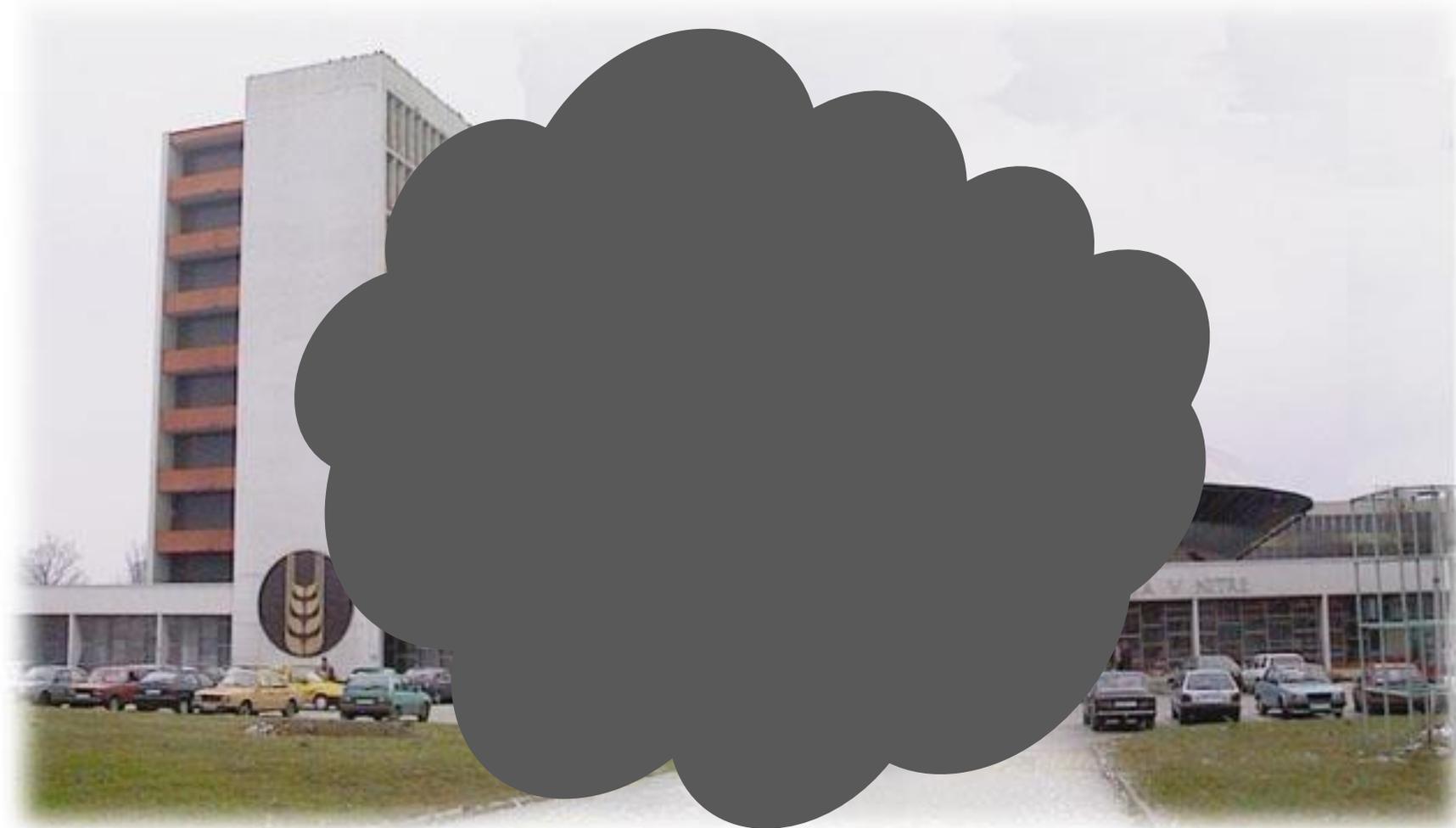
**Advanced Micro Devices (AMD) processor**



# AMD

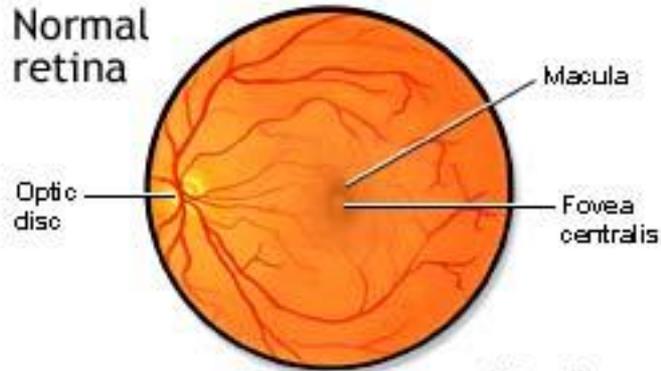
- **age-related macular degeneration (AMD),**
- is a medical condition that usually affects elderly
- results in a loss of vision in the center of the visual field
- because of damage to the retina, in the area of the macula



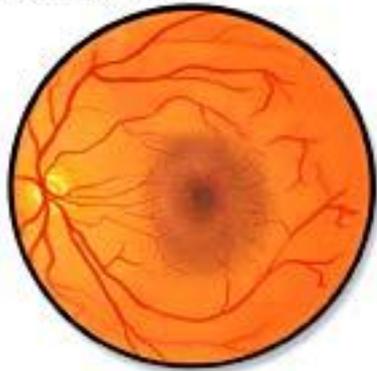




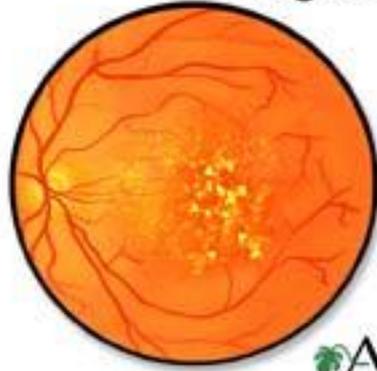
Normal retina



"Wet" macular degeneration

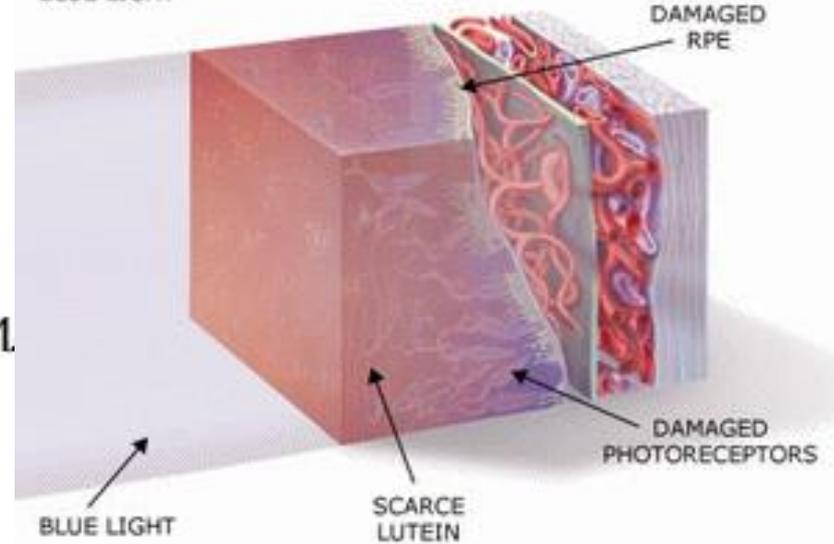
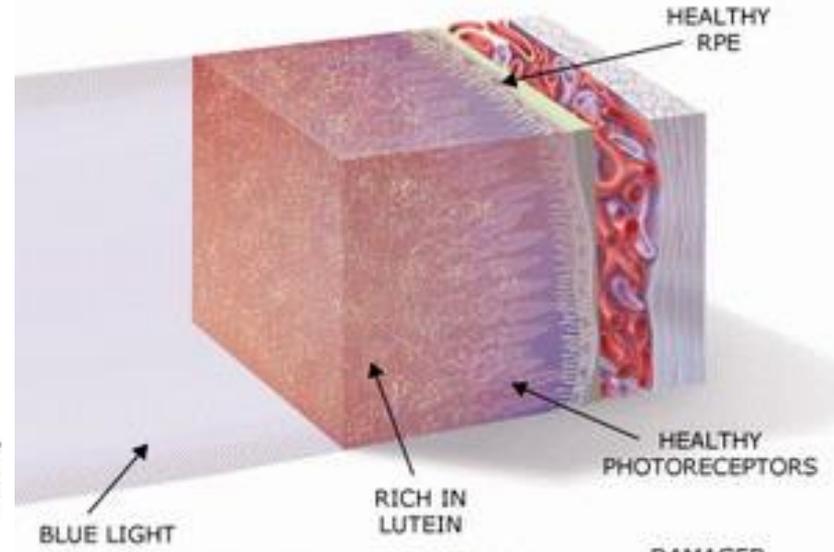


"Dry" macular degeneration

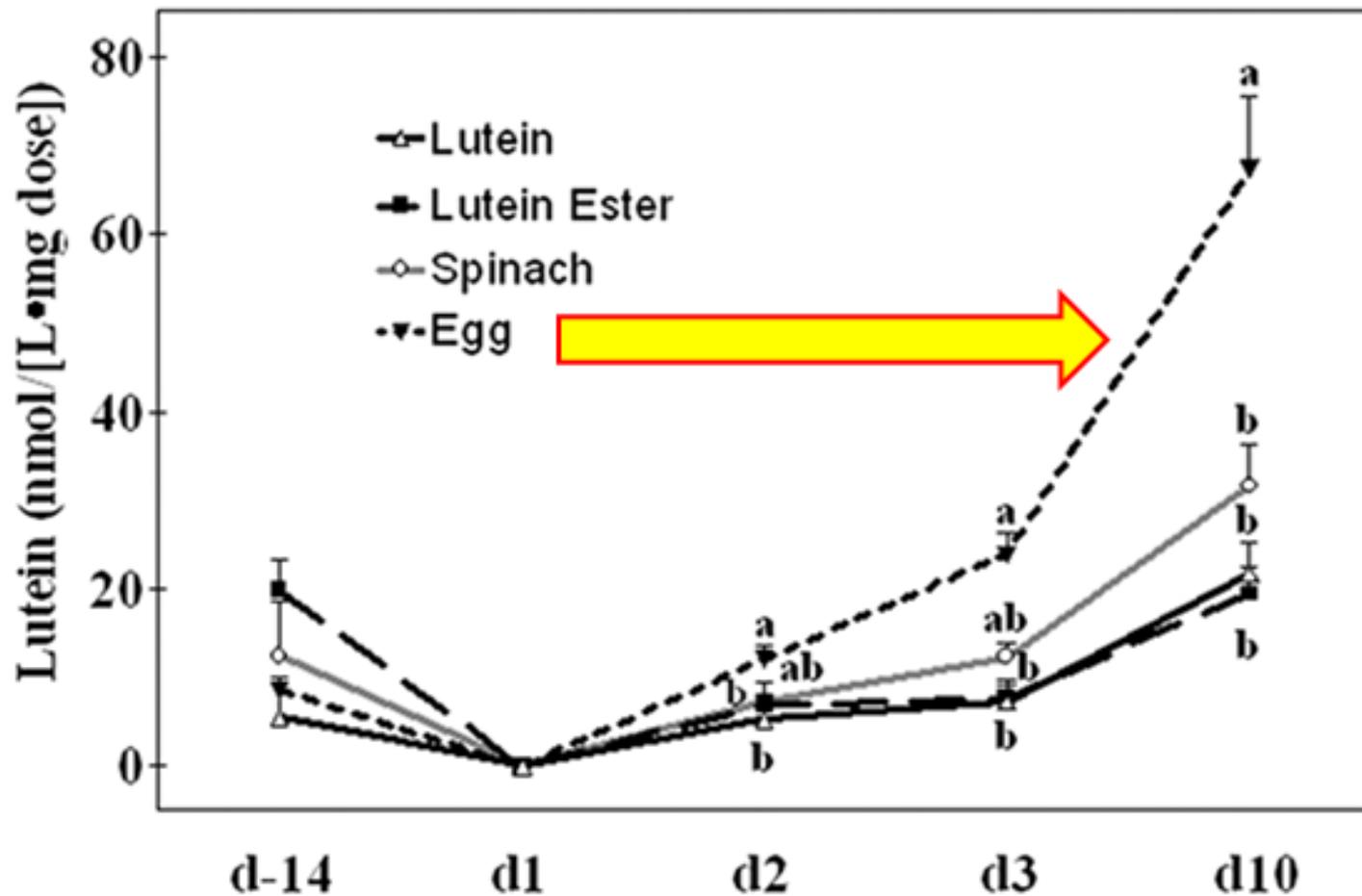


ADAM

**AMD**

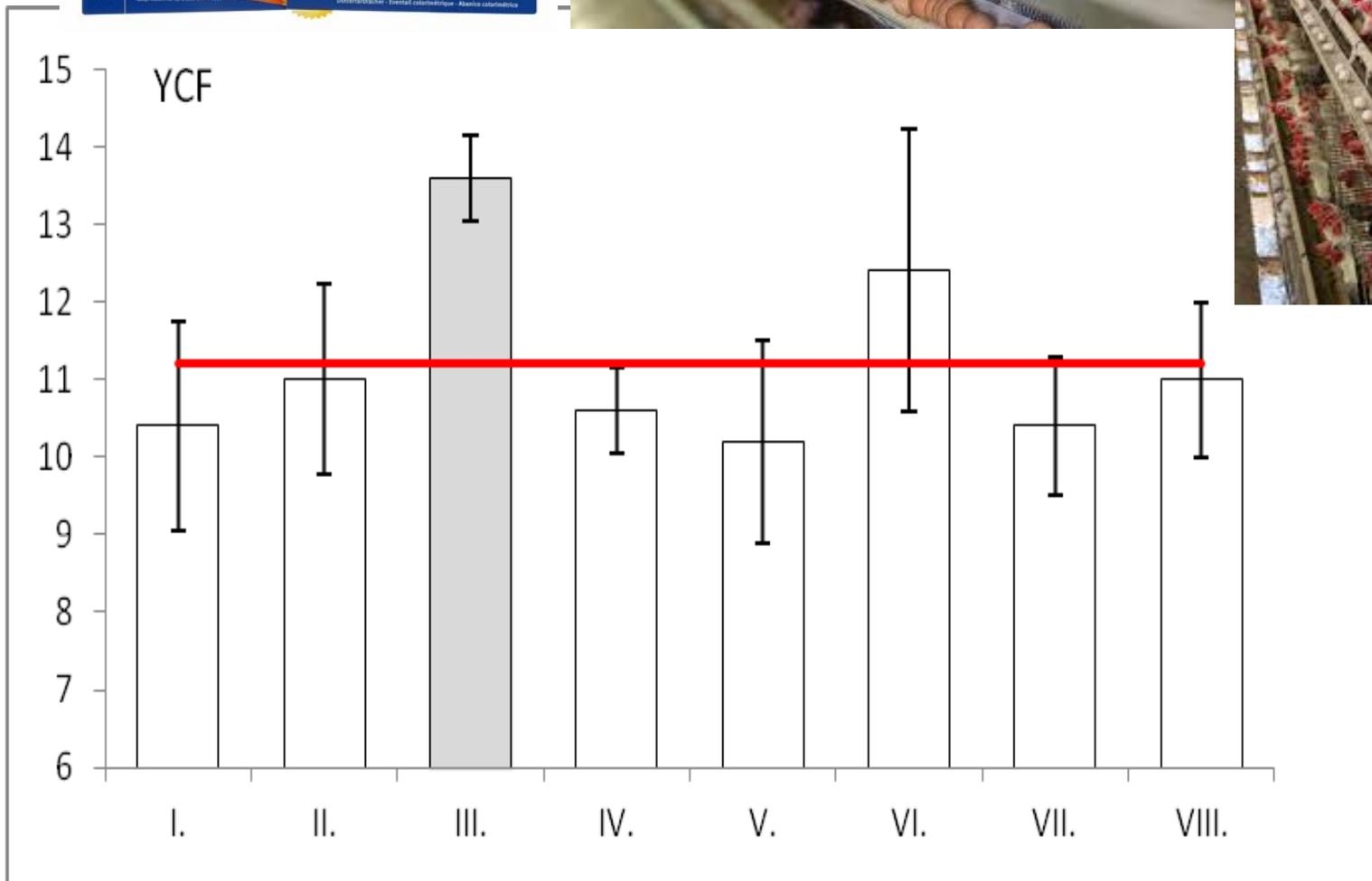


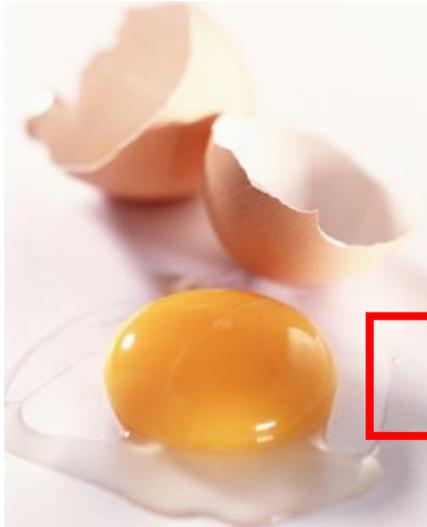
Changes in serum lutein concentration after ingestion of 6 mg/d lutein from lutein, lutein ester, spinach, and egg (5.5 mg in lutein ester treatment) in healthy adult men.



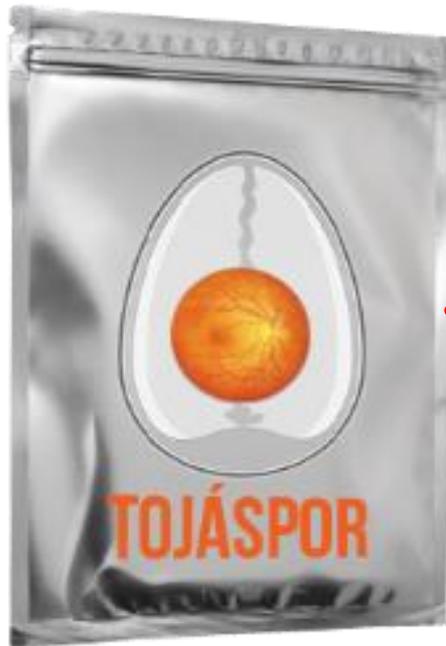
Hae-Yun Chung et al. J. Nutr. 2004;134:1887-1893







Added of **LUTEIN**



Puverization

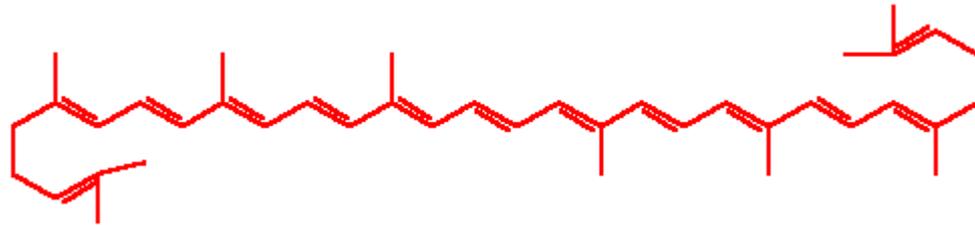




**GRAPEFRUIT  
WATERMELON,  
GUAVA,  
ROSEHIP,  
TOMATO**



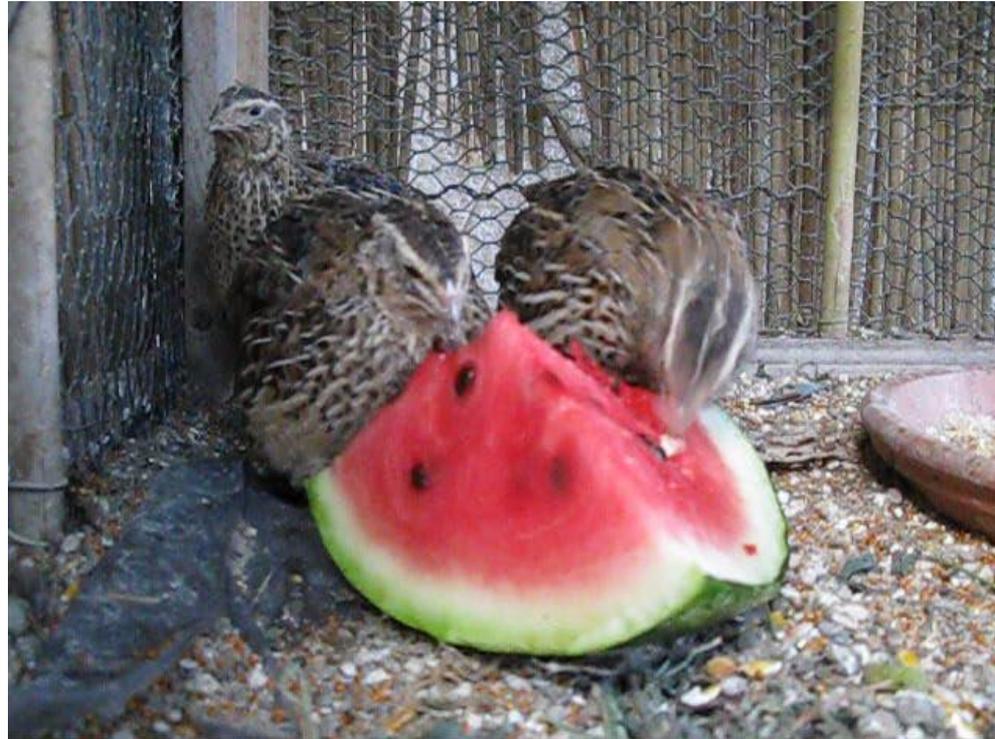
# Lycopene



- The lycopene is a non-cyclic, ring less hydrocarbon carotenoid.
- Lycopene has beneficial effects on health maintenance. Some of these effects are the following:
  - strong antioxidant,
  - reduces the malignant cell growth (especially in the prostate gland),
  - inhibit the endogen synthesis of cholesterol, etc.



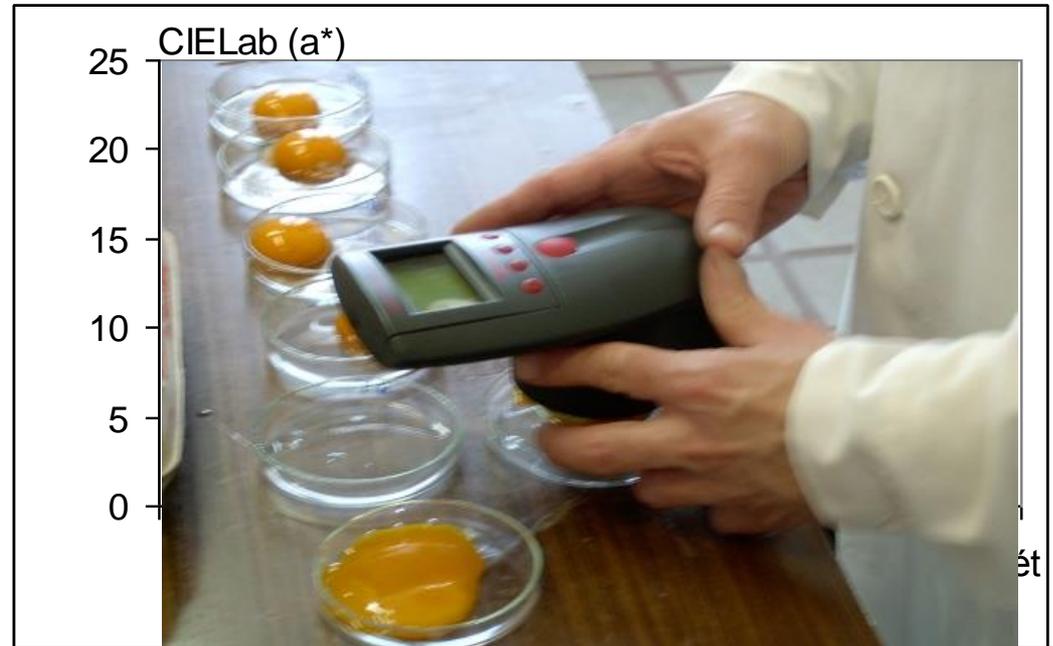
Lycopene cannot be considered standard for poultry carotenoid sources.



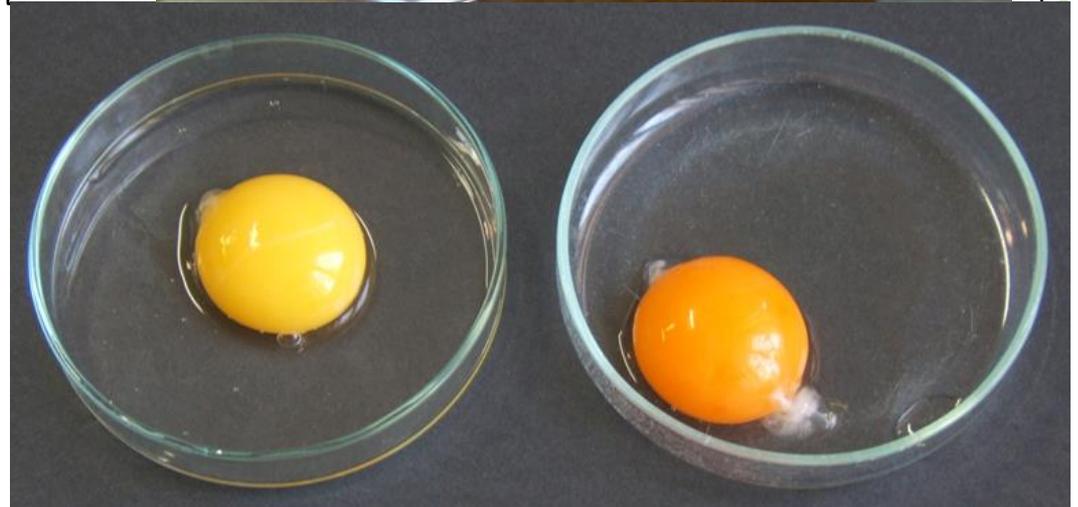
Lycopene is a good colorant it is possible to **improve the yolk color** and beside that to **produce a functional egg** by lycopene as feed additive.



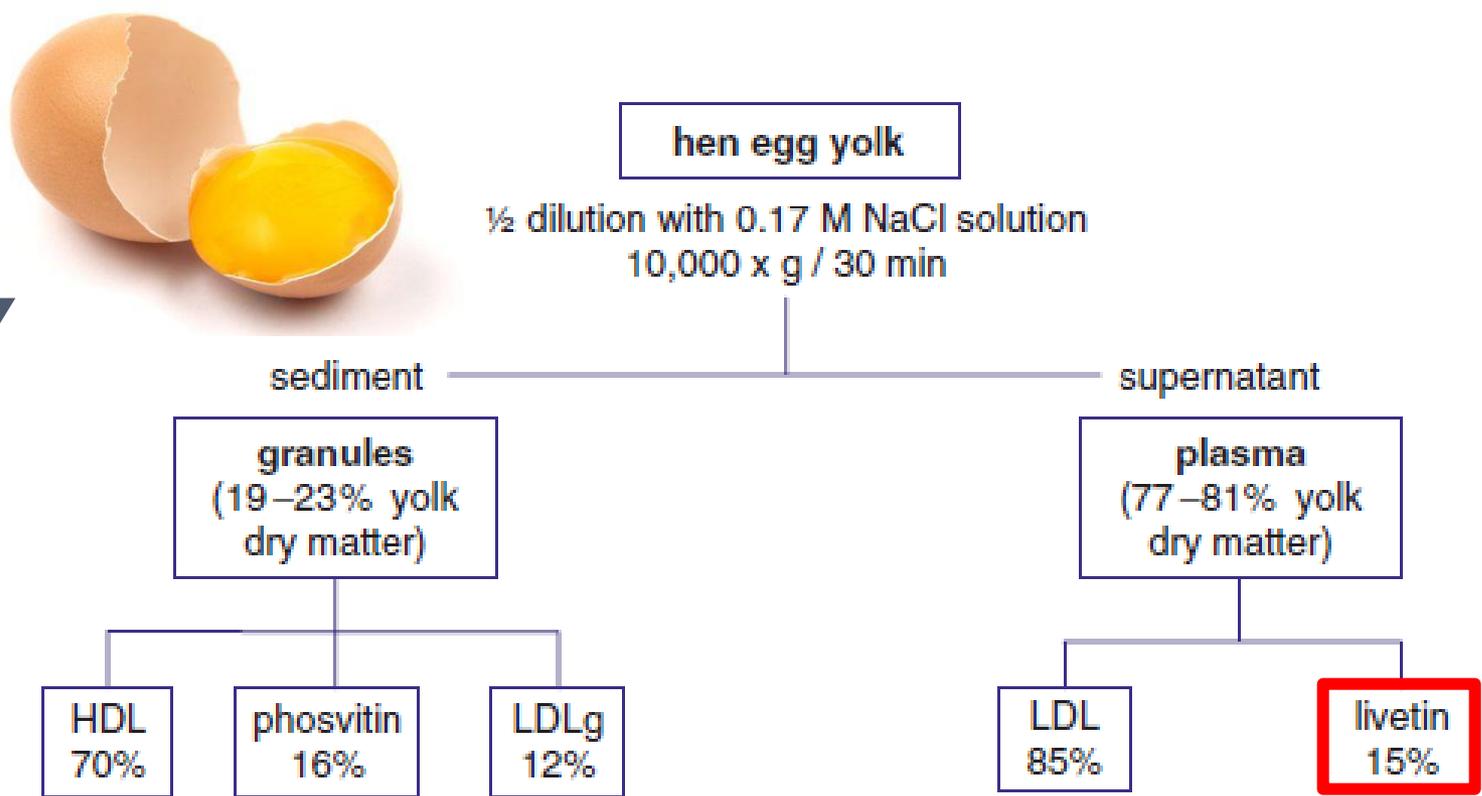
- Laying hens were supplied with two doses of lycopene (group Ly5 250, group Ly10 500  $\mu\text{g}/\text{kg}$  fodder) by Redivivo™ (DSM) for four weeks.



- The results indicate that dietary lycopene can be accumulated in the hens' egg yolk and results in high lycopene content (**functional food**) and a desired colour.



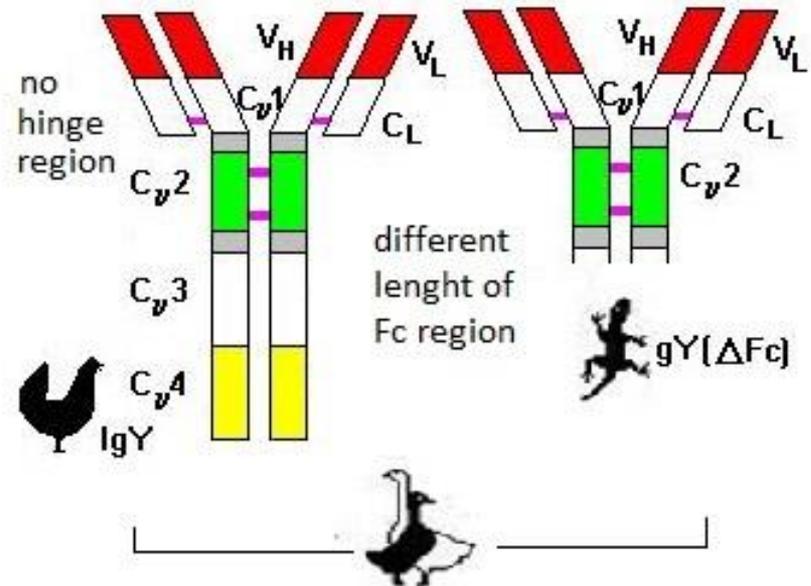
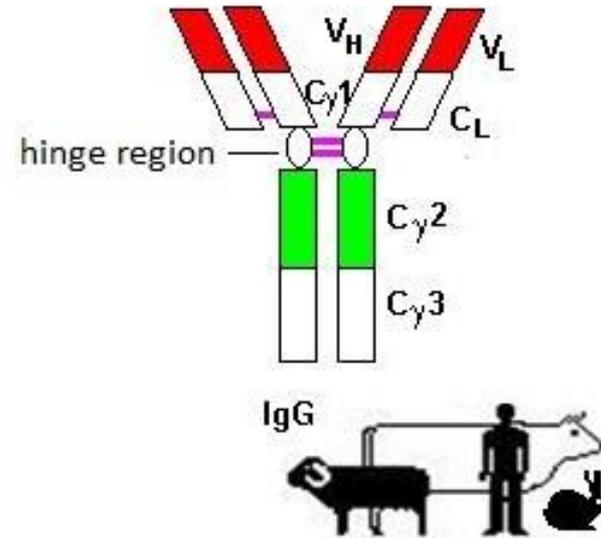
# IgY



- The protein fraction of egg yolk dry material is about 33%.
- The water-soluble part is the livetin ( $\alpha$ -,  $\beta$ -, and  $\gamma$ -).
- All livetins are corresponding to serum proteins.
- The  $\gamma$ -livetin is immunoglobulin.
- This mammalian analogue avian immunoglobulin was called **IgY** indicating the main source, the egg yolk.

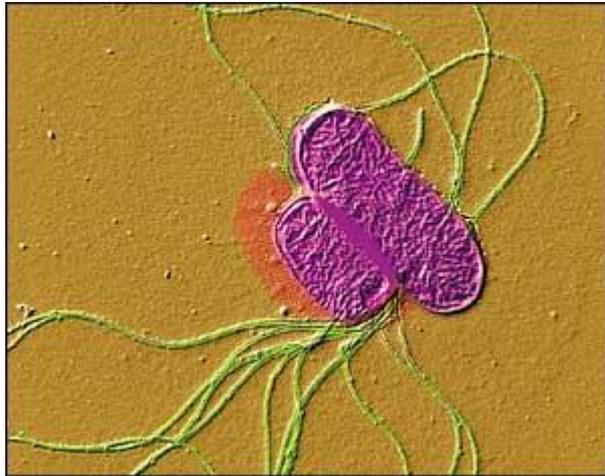


- The avian immunoglobulin has some advantages in the fields of physicochemical properties (**pH, heat, freezing and more-or-less stability against digestion!**) compared to the mammalian counterpart IgG.
- The use of IgY in different fields of biological application (e.g. as diagnostics or as **nutraceuticals**) is a relatively new and perspective applications called IgY-technology.



# SALMONELLOSIS

- Each year, nearly two million people around the world will die from a food-borne salmonella infection.  
(<http://news.bbc.co.uk>)



- Infection of mice with Salmonella typhimurium (STM) results in systemic infection and a disease similar to that seen in humans.
- The response to STM involves both T and B cell-mediated immunity.  
([J. Leukoc Biol.](#) 2000.67(4):457-63.)

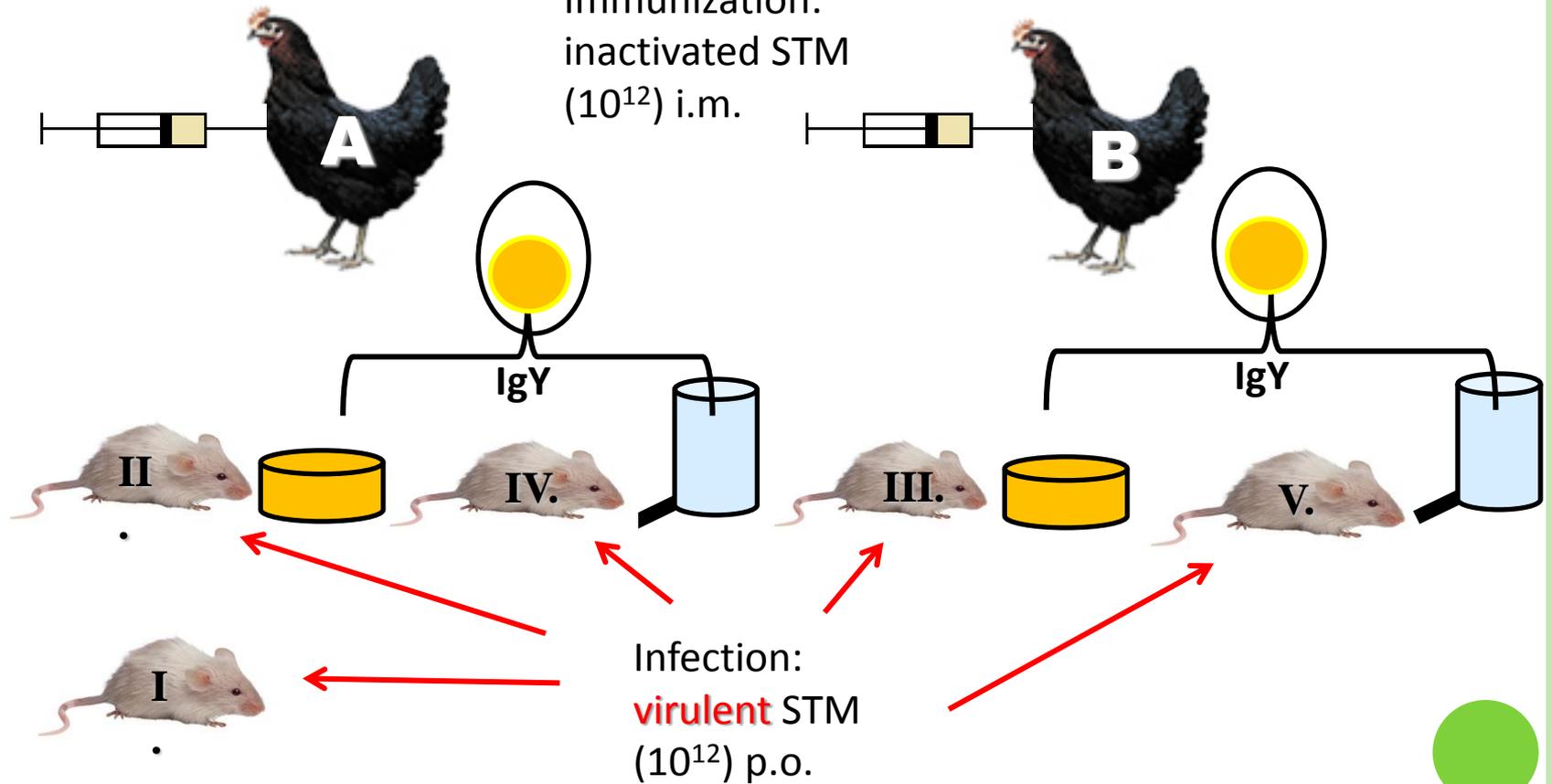


# ANTI-STM-IGY

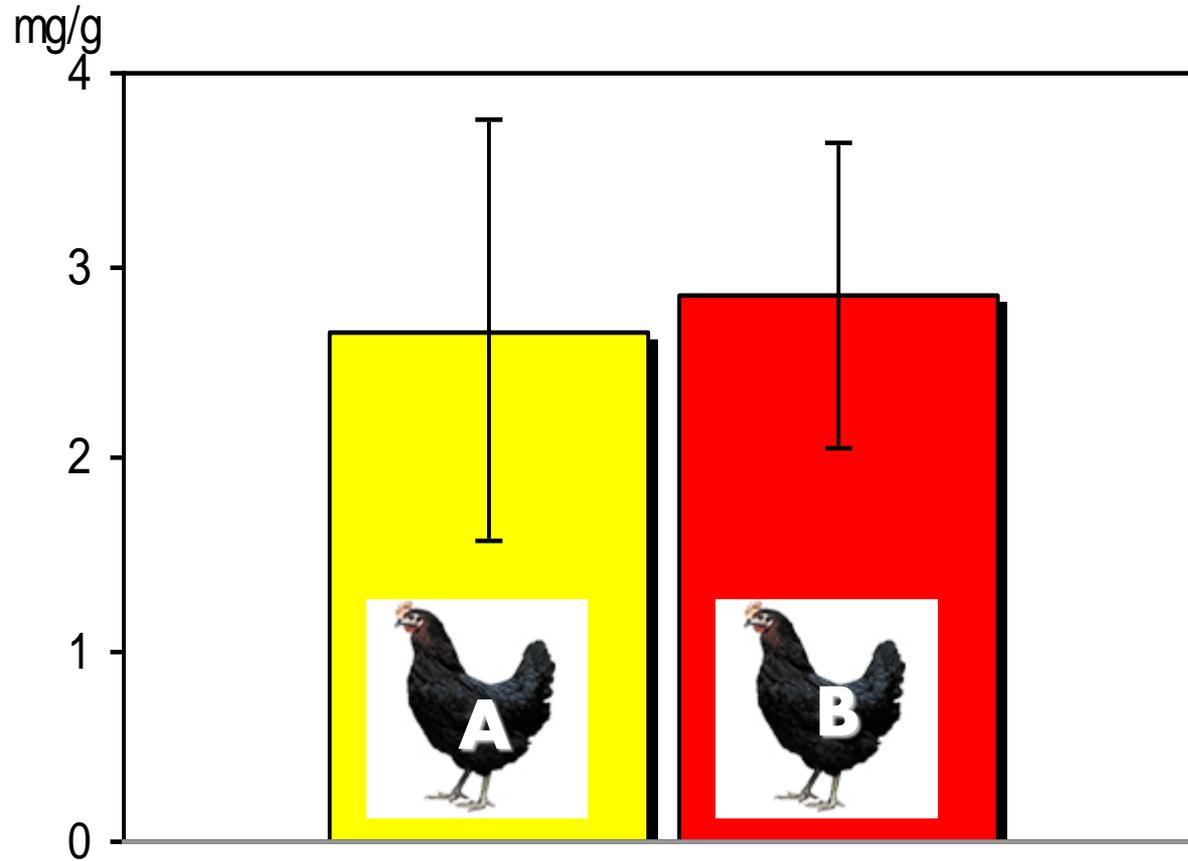
Commercial  
LayersFeed

LayersFeed + Se 0,8 mg/kg,  
 $\beta$ -carotene 35mg/kg  
E-vitamin 500 mg/kg

Immunization:  
inactivated STM  
( $10^{12}$ ) i.m.



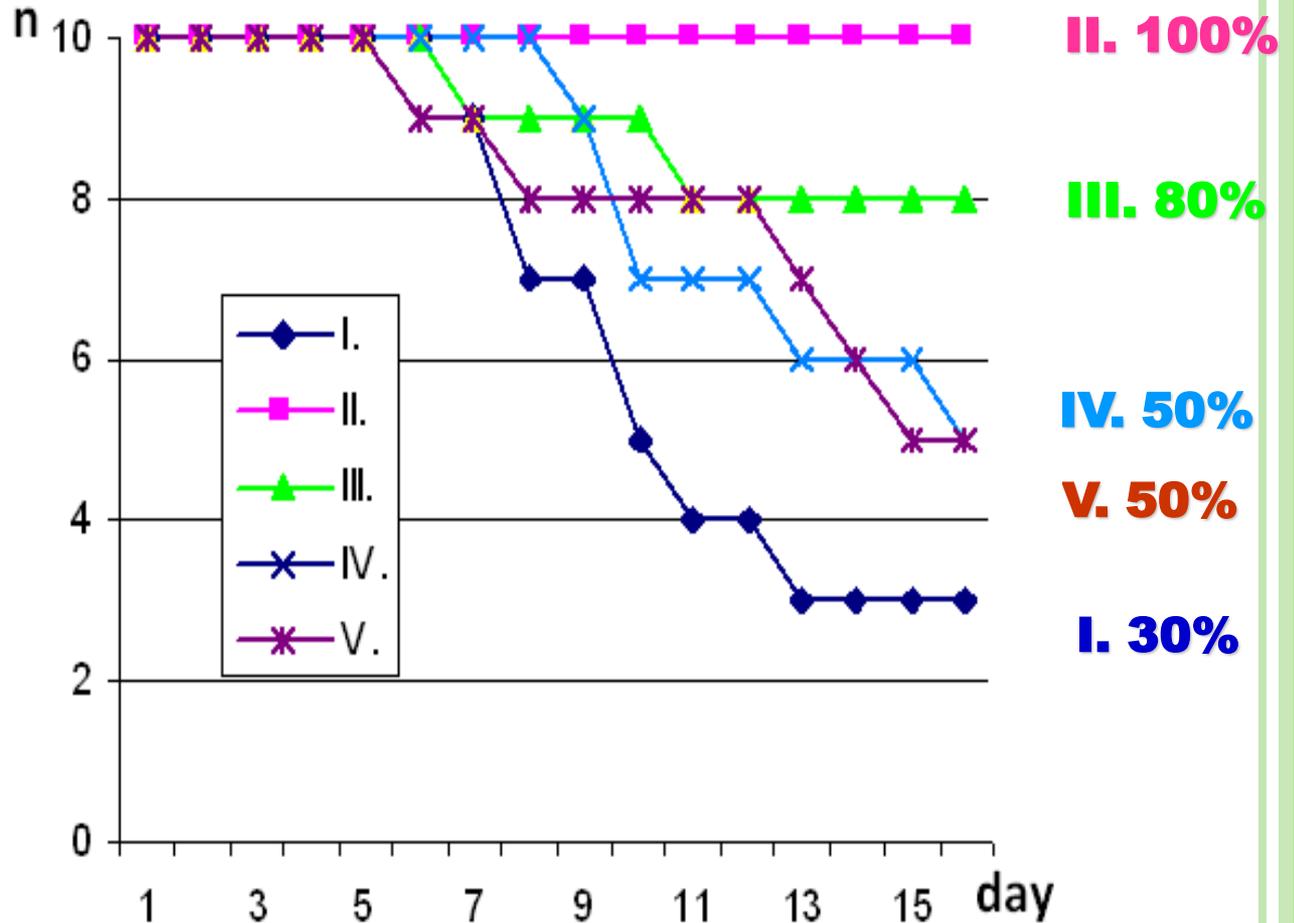
# ANTI-STM-IGY IN YOLK



# SURVIVAL



Groups	feed	water
<b>I.</b>	Normal	tapw.
<b>II.</b>	N+IgY (A)	tapw
<b>III.</b>	N+IgY (B)	tapw
<b>IV.</b>	normal	IgY (A)
<b>V.</b>	normal	IgY (B)



**Specific IgY administred p.o. helps overcome infection!**



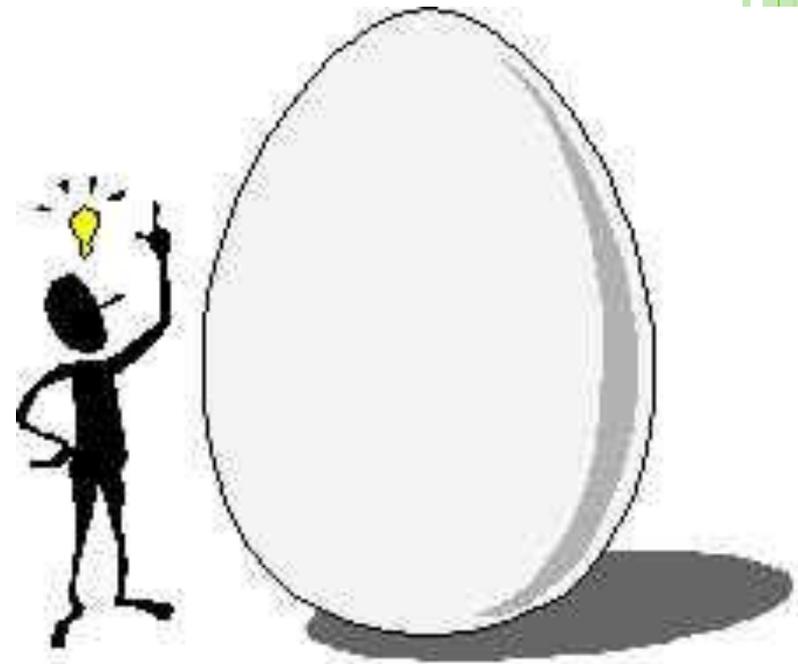
## CONCLUSION

Egg is not only a versatile food but can be a designer product;

On the base of the biological character some components can be modified;

The modified egg and/or its components can be use as functional food or nutraceutical;

These eggs can be applied successfully in the fight against the risk factors.



- The demand for the bio-products is a growing area of the agriculture.
- Functional egg production is a good possibility to step in a gap of the market especially for small and medium scale farms.

