Nut rients enriched eggs

How to develop premium eggs

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Species/ Category lead for Layers/ Carotenoids.
DSM Nutritional Products Asia Pacific

NUTRITION · HEALTH · SUSTAINABLE LIVING

3 GOOD HEALTH AND WELL-BEING

12 RESPONSIBLE CONSUMPTION AND PRODUCTION

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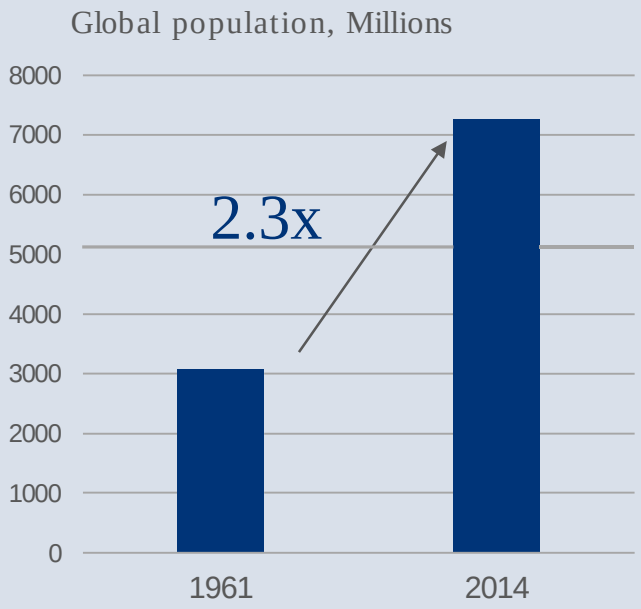
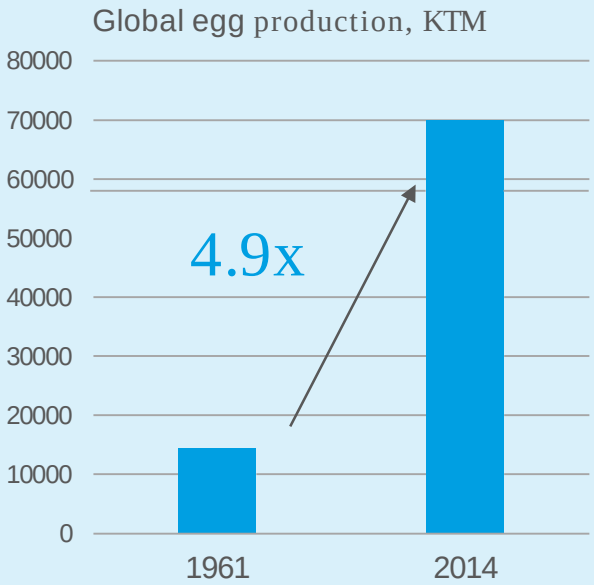
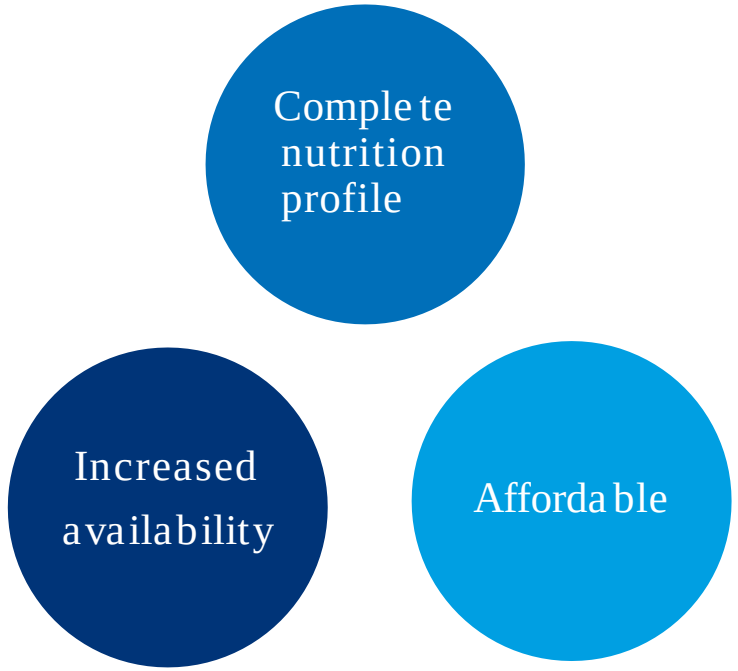
BRIGHT SCIENCE. BRIGHTER LIVING.

More people, More eggs

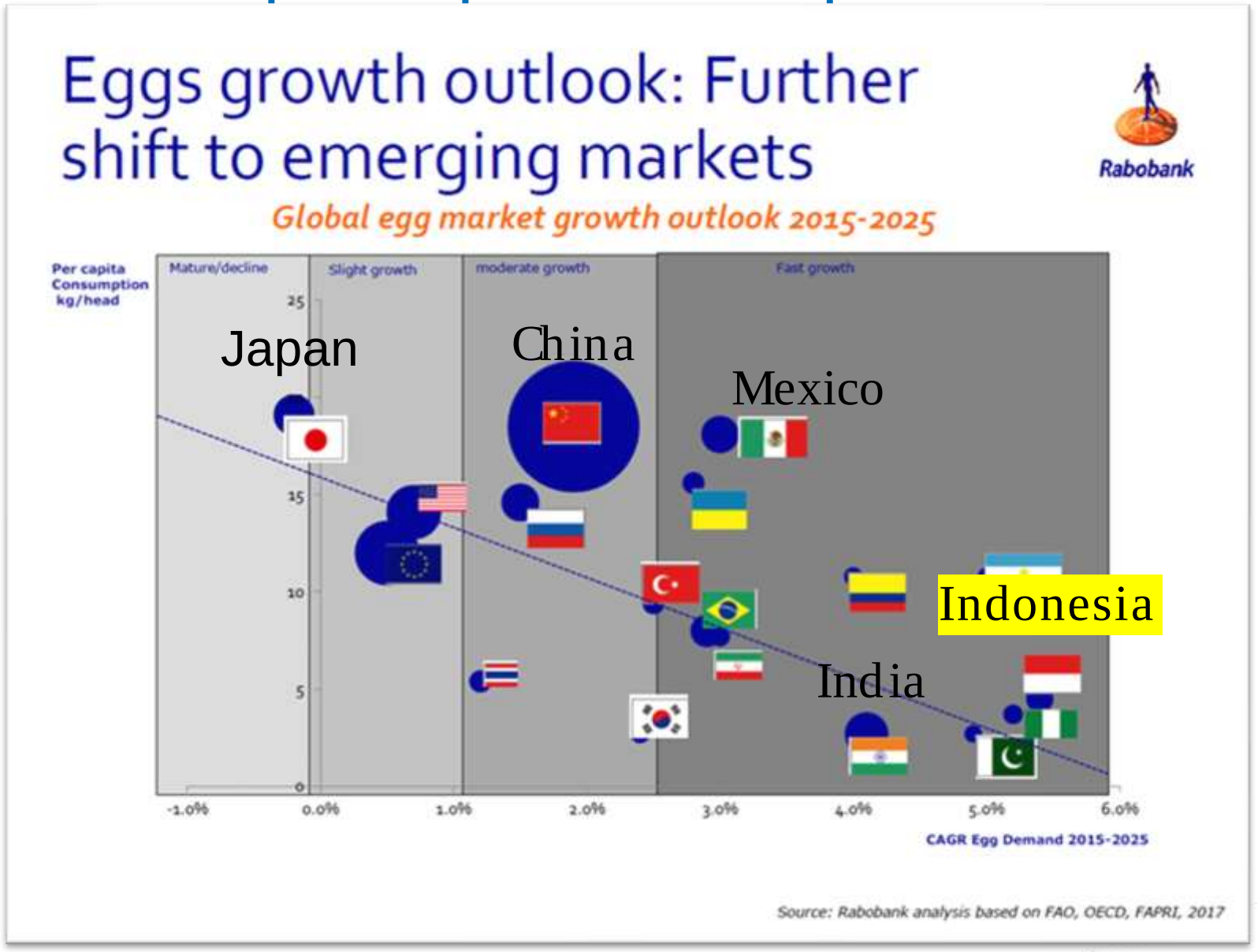




Afforda ble nutrition - Eggs have a complete healthy nutrition profile AND affordable



Egg markets continue to grow… particularly driven by countries with low per-capita consumption



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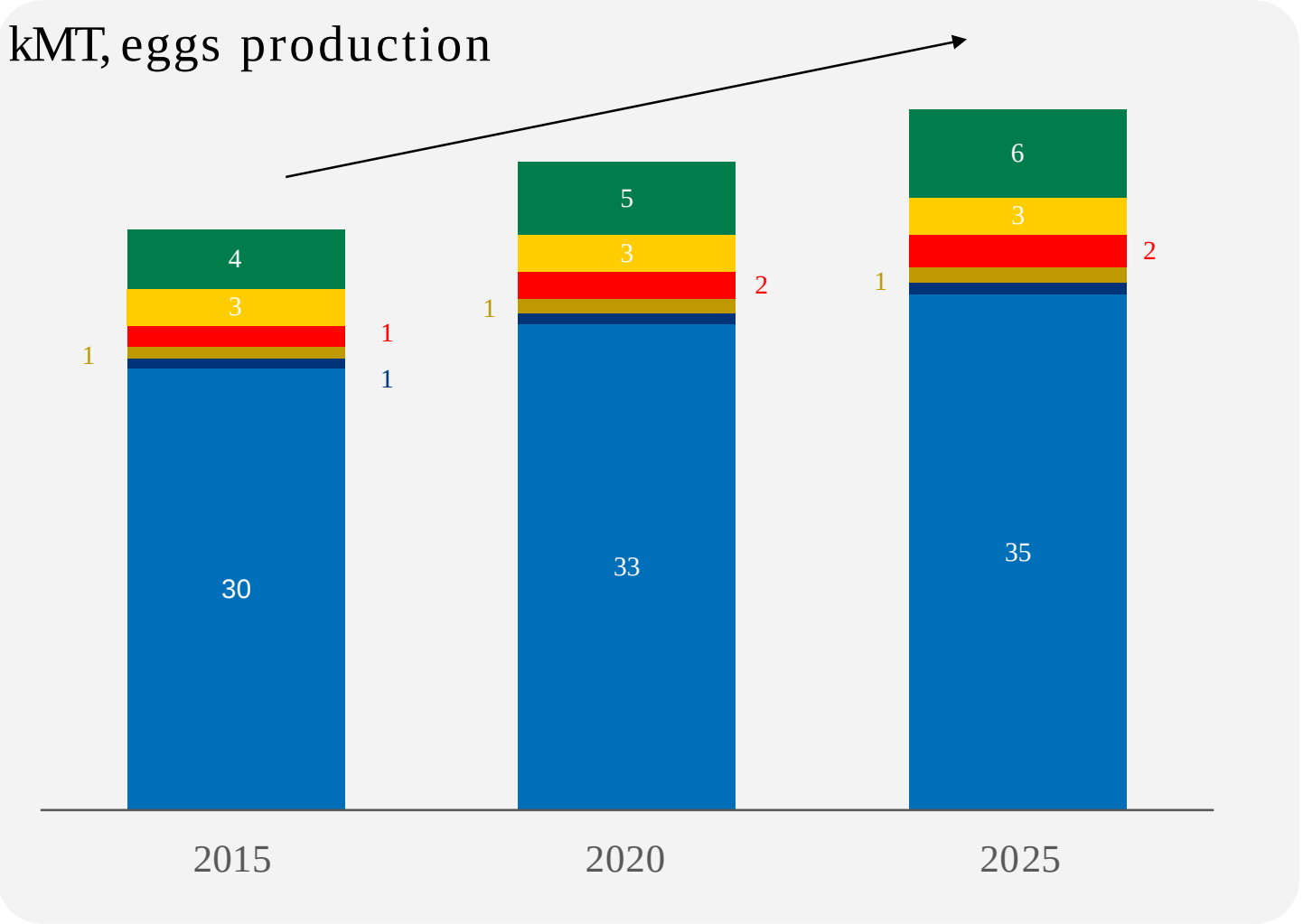
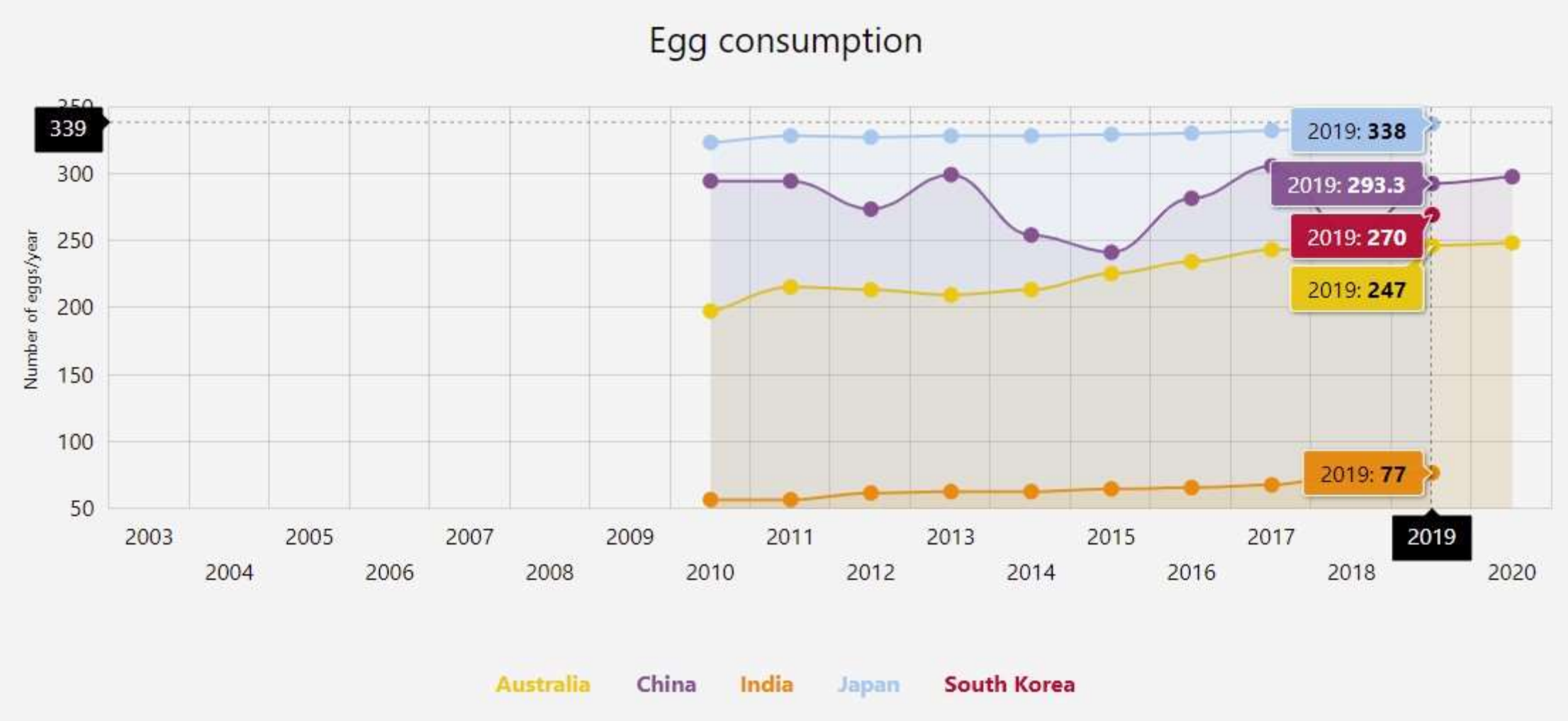
Including Asia - with the lion share of growth from China, India, and Indonesia



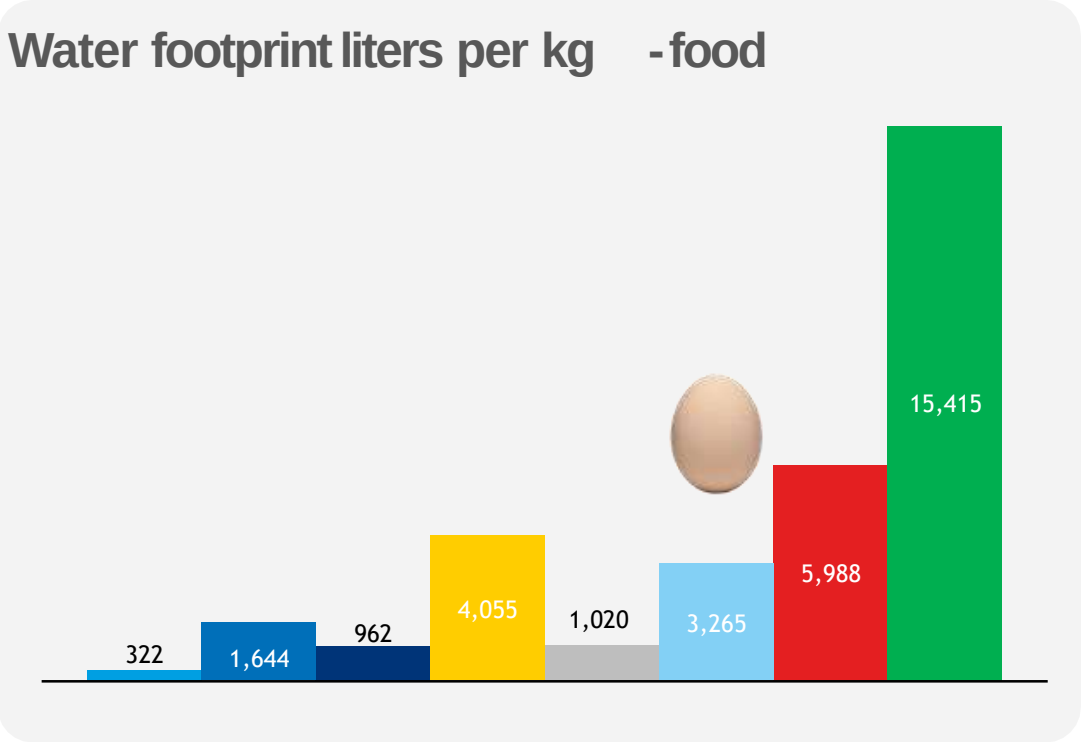
DSM business analysis based on Rabobank, FAO and WATT

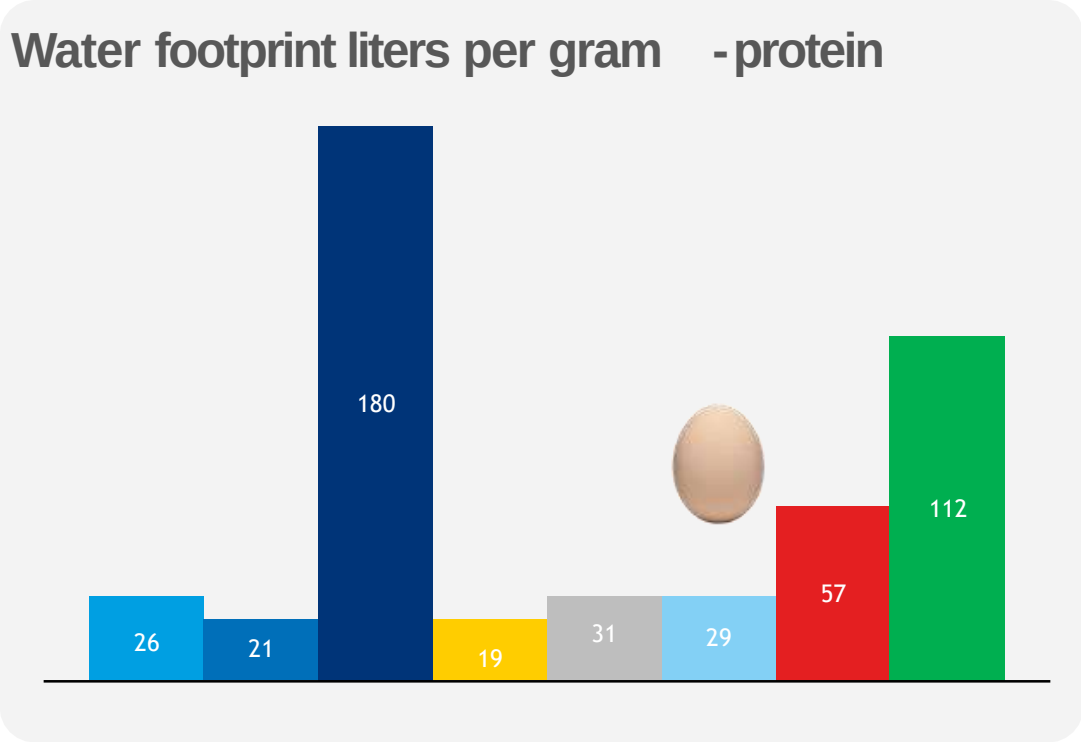
Annual egg consumption per capita



International Egg Commission 2021

Example – water footprint:
Eggs have a high water footprint per kg compared to other food, but low when compared by grams of protein.

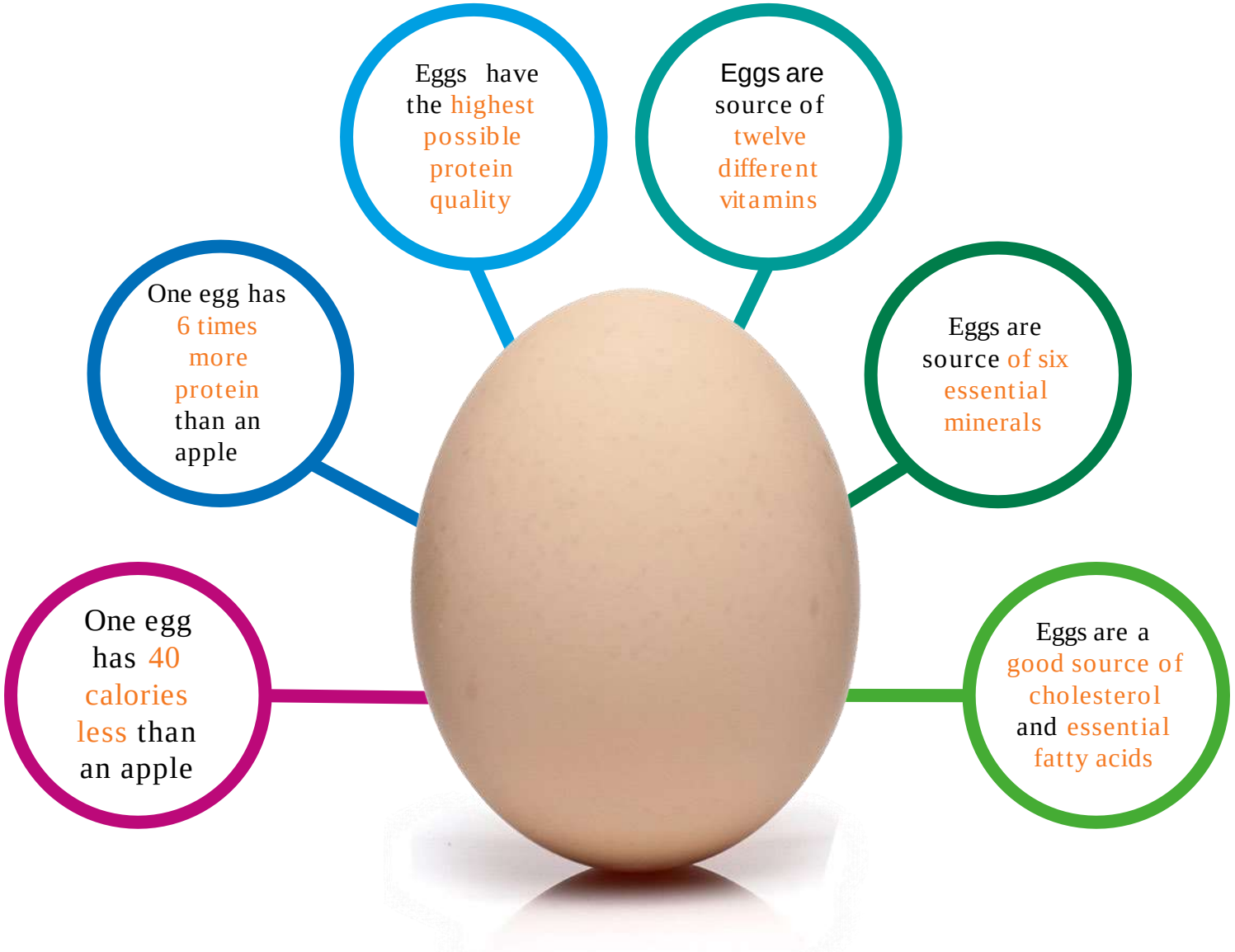




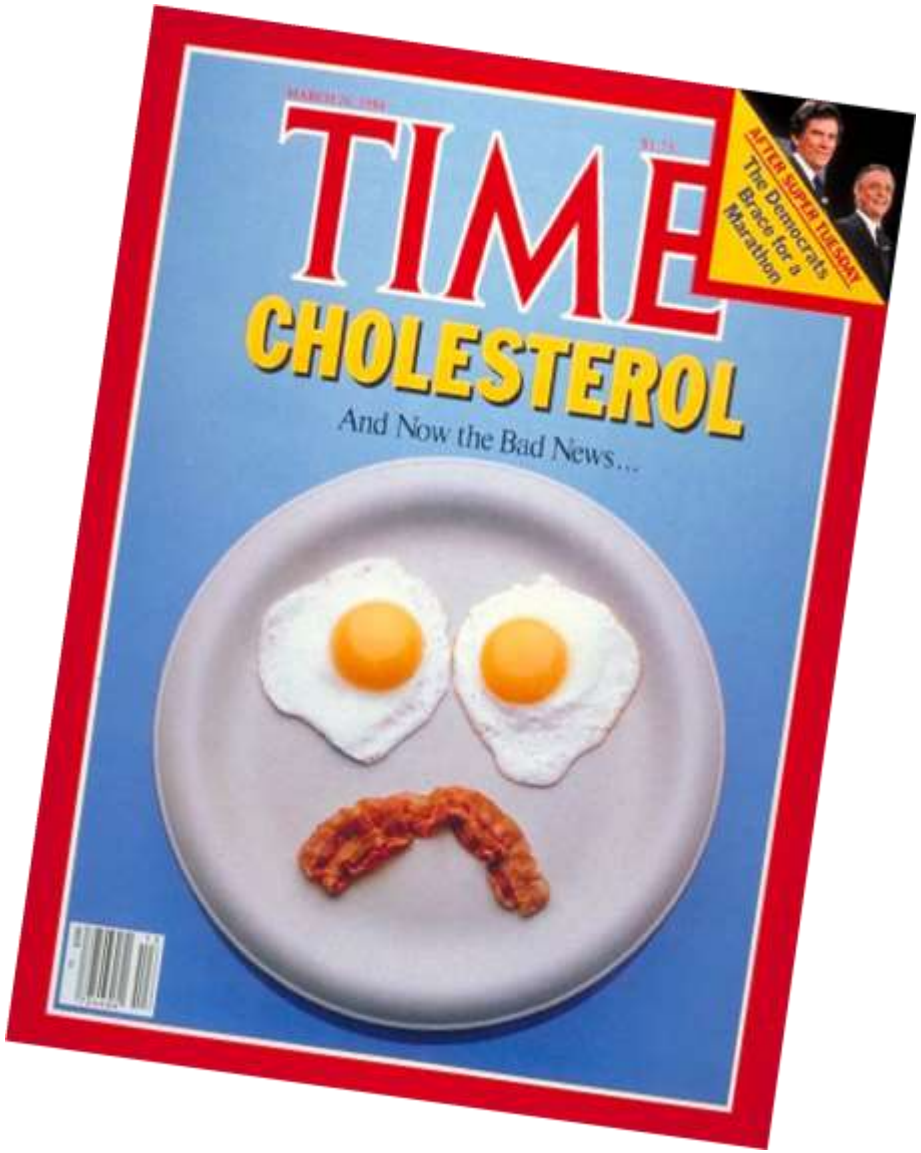
Vegetables Cereal Fruits Pulses Milk Eggs Pork Beef

Source: http://waterfootprint.org/media/downloads/Mekonnen-Hoekstra-2012-WaterFootprintFarmAnimalProducts.pdf

Egg is perfect nutritious and healthy food!



1984


TIME
CHOLESTEROL
And Now the Bad News...
AFTER SUPER TUESDAY
The Democrats Brace for a Marathon

A prospective study of egg consumption and risk of cardiovascular disease in men and women

Department of Medicine, Brigham and Women's Hospital and Harvard Medical School, Boston, Mass.

Objective

- To examine the association between egg consumption and risk of Coronary heart disease (CHD) and stroke in men and women.

Trial details

Participants: 37851 men aged 40 to 75 years and 80082 women aged 34-59 Years at study outset, free of cardiovascular disease, diabetes, hypercholesterolemia or cancer.

- Two cohort studies
- Food frequency questionaire
- 866 incidents of CHD and 258 strokes in men after 8 years
- 939 incidents of CHD and 563 stroke in women after 14 years

Results

Egg consumption per week

Relative rate of CHD*	<1	1	2-4	5-6	7+
Men	1	1.06	1.12	0.9	1.08
Women	1	0.82	0.99	0.95	0.82

Persons-years by egg consumption category

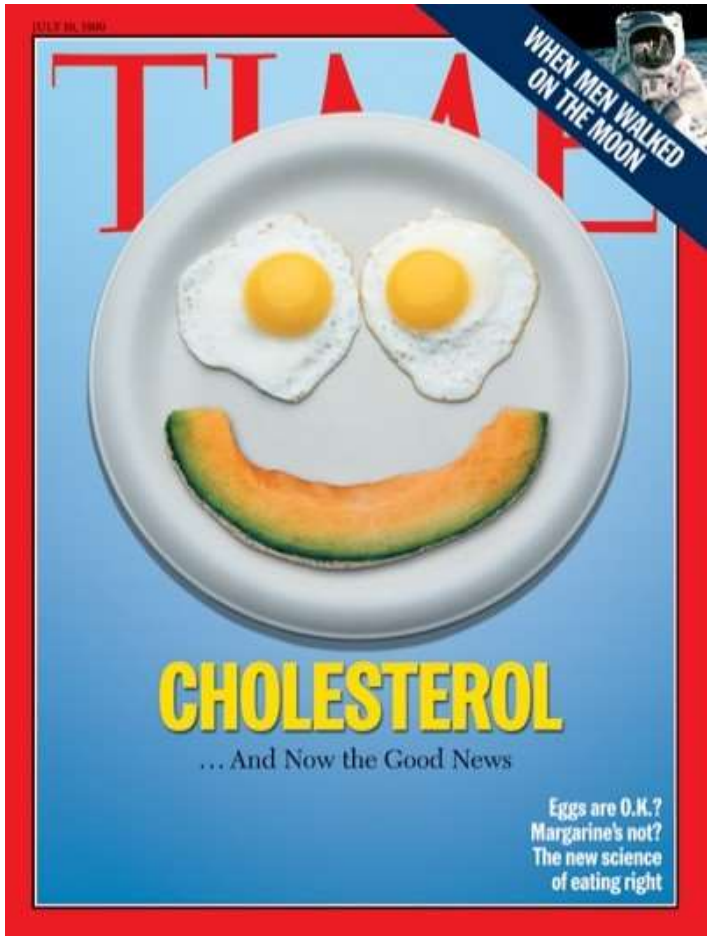
	<1	1	2-4	5-6	7+
Men	90118	69091	88077	12216	14059
Women	175144	366625	409896	52584	52971

Conclusions & Benefits

- Egg intake is not related in anyway to risk of heart failure in healthy individuals.
- Further investigation is needed for diabetic individuals, egg intake and CHD.

JAMA. 1999 Apr 21;281(15):1387-94.

1999


WHEN MEN WALKED ON THE MOON
CHOLESTEROL
... And Now the Good News
Eggs are O.K.?
Margarine's not?
The new science
of eating right

2011


INSIDE GADDAFI'S PALACE
Whoa, cowboy: How Romney can beat Perry
BY JOE KLEIN
FALL PREVIEW
Your cultural calendar, sorted
Cheney unbound
BY BARTON GELLMAN
TIME
SPECIAL NUTRITION ISSUE
What to Eat Now
UNCOVERING THE MYTHS ABOUT FOOD BY DR. OZ
PLUS: ARE VITAMINS WORTH IT?

Egg branding supermarket survey

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Supermarket evaluation

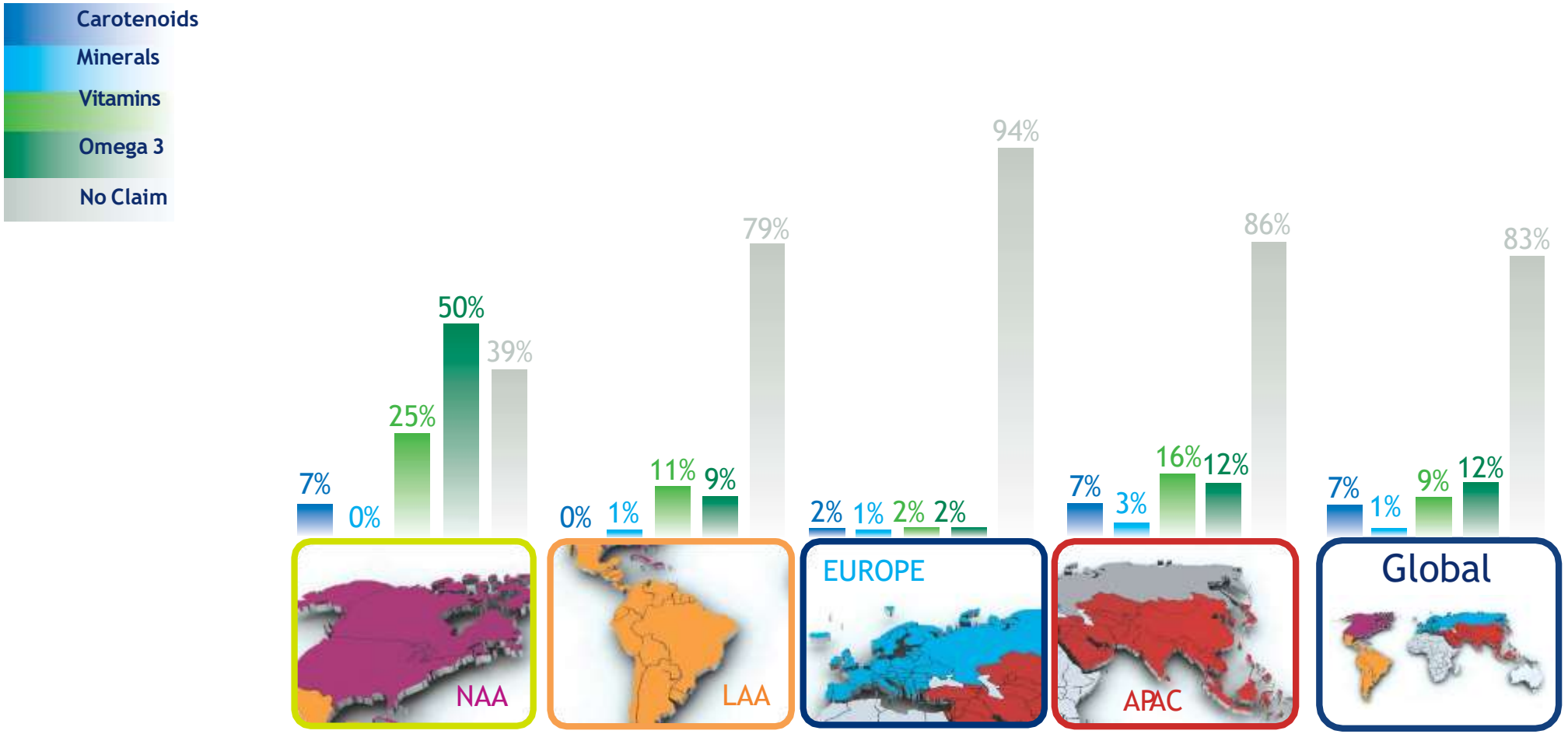
Geography	Packs	Claims	Characteristics	Excluded
Country	No. eggs	Nutritional	Shell color	Bogus claims
City	Pack. Material	Production	Size	In shell processed
Vendor	Freshness	Feed	Yolk Color	Duck or quail
	Price	Genetics		Liquid eggs
		Organic		Generic
		Special		



Value Added claims

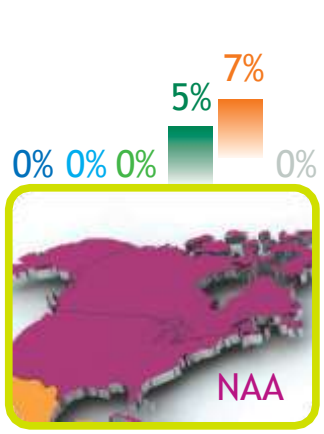
Claims	
Nutritional enrichment	Vitamin, Mineral, Carotenoids, Omega 3
Size	S or XL
Genetics	Local breeds
Feeding	Vegetable, GMO Free, multigrain, Antibiotic-free
Production	Barn, free-range and cage
Organic	Organic
Others	Extra fresh, recyclable package, local, national, happy hens, healthy, long life, hormone-free.

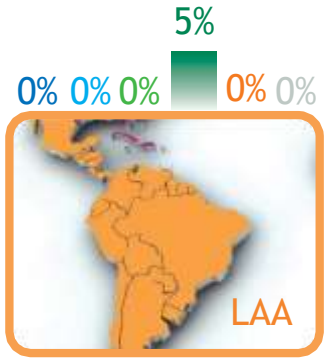
Egg brands with nutritional claims

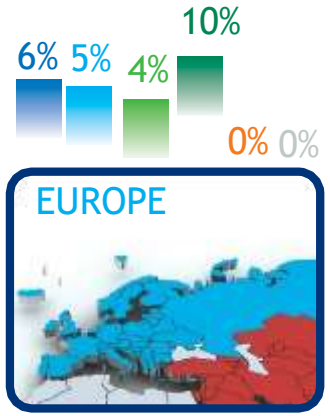


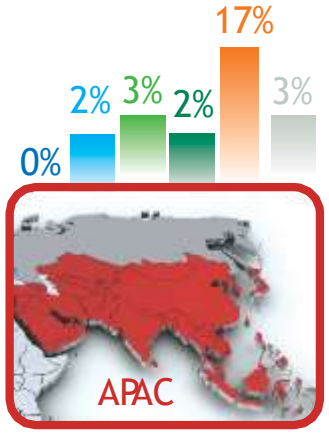
Special claims

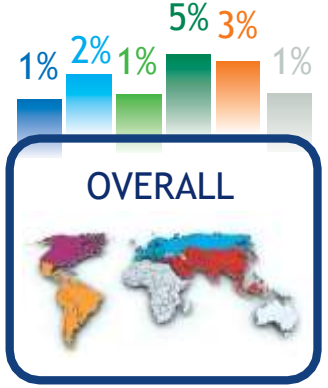
- GMO-Free
- Ecological
- Vegetarian fed
- Organic
- Antibiotic-Free
- Fertilized





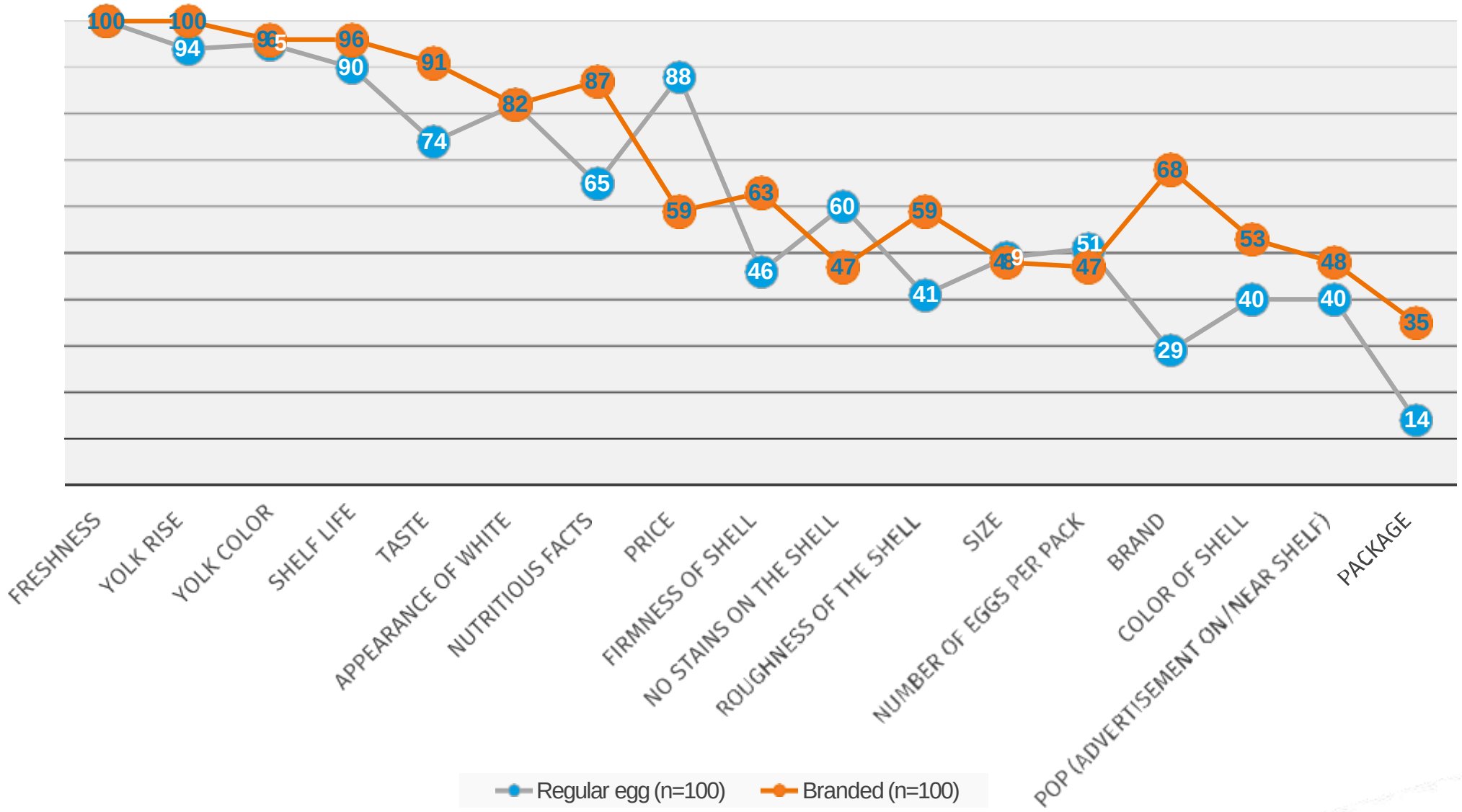






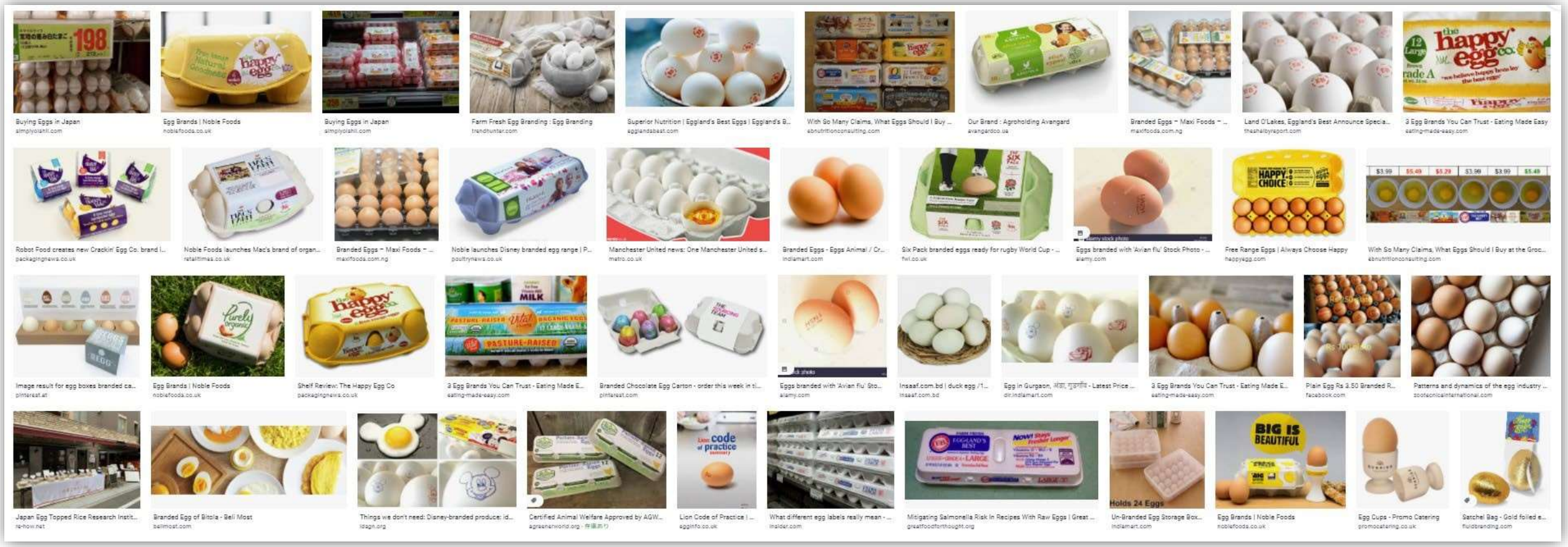
Premium eggs always offer value-added

Real consumer preference



(Research International, Tokyo)

Thousands of premium eggs in the world



Images from Google .com

In Japan, there are more than 1500 egg brands

Case study: Happy egg

Newcastle University

NOBLE FOODS

Innovate UK

DSM

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Case study: Vita Gold

Registered Functional food (Vitamin D)

Enriched A, D, E, K, B1, B12, Biotin, Folic acid, Pantothenic acid, DHA, EPA, Omega-3

Wha t we can think about..

Optimum Vitamins Nutrition concept.

- Better immunity
- Better performance
- Better egg quality

LAYERS & OTHER POULTRY (1)

Category/Phase	Duration	Vit. A[2]	Vit. D_3[2]	25OHD_3 (Hy-D)[2]	Vit. E[4]	Vit. K_3 (menadione)	Vit. B_1	Vit. B_2	Vit. B_6	Vit. B_{12}[7]	Niacin	d-Panto-thenic acid	Folic acid	Biotin	Vit. C[8][9]	Choline
		I.U.	I.U.	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg	mg
Hens and Duck Layers Starter (Pullets)	0-10 weeks	12000-13000	3000-4000	0,069	50-70[6]	3-3,5	2-2,5	6-7	4,5-5,5	0,025-0,030	50-60	15-17	1-1,5	0,15-0,20	100-150	200-400
Rearing (Pullets)	10 wks-2% lay	10000-12000	3000-4000	0,069	30-35	3-3,5	2-2,5	5-6	3-5	0,020-0,025	30-60	12-15	1-1,5	0,10-0,15	100-150	200-400
Layers	Laying phase	8000-12000	3000-4000	0,069	20-30[6]	2,5 -3	2,5-3	5-7	3,5-5	0,015-0,025	30-50	8-12	1-1,5	0,10-0,15	100-200	300-500
Layers breeders Pullets, layers and male breeders	0 weeks to end	10000-15000	3000-4500	0,069[3]	50-100[6][10]	2-5	2,5-3,5	10-12	5-6	0,020-0,040	45-60	15-20	2-3	0,25-0,40	150-200	300-500
Ducks and Geese		12000-15000	3000-5000	0,069	40-80	3-5	2-3	5-7	5-7	0,020-0,040	60-80	10-15	1-2	0,20-0,25	100-200	300-500
Partridges, quails and pheasants		12000-13500	3000-4000	0,069	50-80	2-4	2-4	5-7	4-6	0,030-0,050	50-80	15-25	1,5-2	0,20-0,25	100-200	400-600
Ostrich and emu		12000-16000	3000-4000	0,069	40-60	2-4	3-5	10-20	6-8	0,050-0,100	80-100	12-20	2-4	0,20-0,35	200-250	600-800

(1) Added per kg air-dry feed (2) Local legal limits need to be observed (3) Add 60 mg/kg CAROPHYLL® red to improve hatchability. MaxiChick™ (Hy-D® 1,25% and CAROPHYLL® red) is a DSM Nutritional Products Patent and Trademark. (4) When dietary fat is higher than 3% then add 5 mg/kg feed for each 1% dietary fat (5) For optimum immune function increase level up to 100 mg/kg in Layers Starter and up to 150 mg/kg in Breeders (6) Under heat stress conditions increase level up to 200 mg/kg (7) Use upper level as reference for animal protein free diets and when cobalt is supplemented at very low levels or removed (8) Recommended under heat stress condition and to enhance reproductive performance in breeders (9) Use ROVIMIX® STAY-C®35 for reducing loss during processing

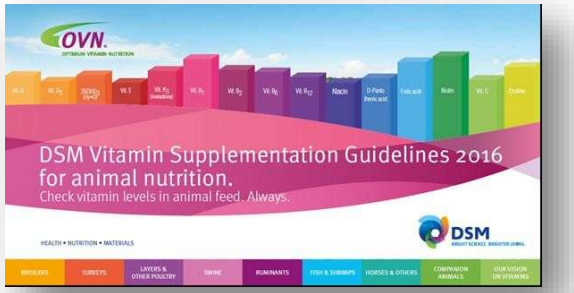
LAYERS & OTHER POULTRY

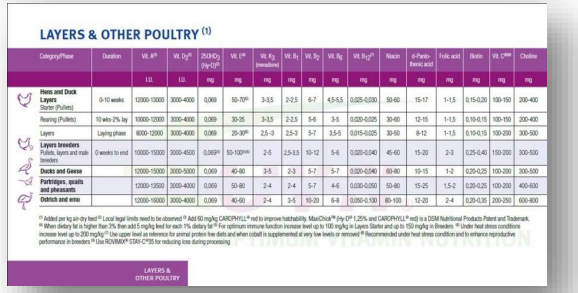
DSM Brand: OVN® eggs

Country:
- Japan

Product name:
- ECOCCO

Producer:
- Maruichi (Natura Farm), Japan
- http://www.maru1.com





Claims:
- Healthy : for better animal health & welfare
- Quality : complete hygiene and quality control
- Better feed : healthier animals fed OVN diets

DSM Brand: OVN™ egg in Spain, Portugal

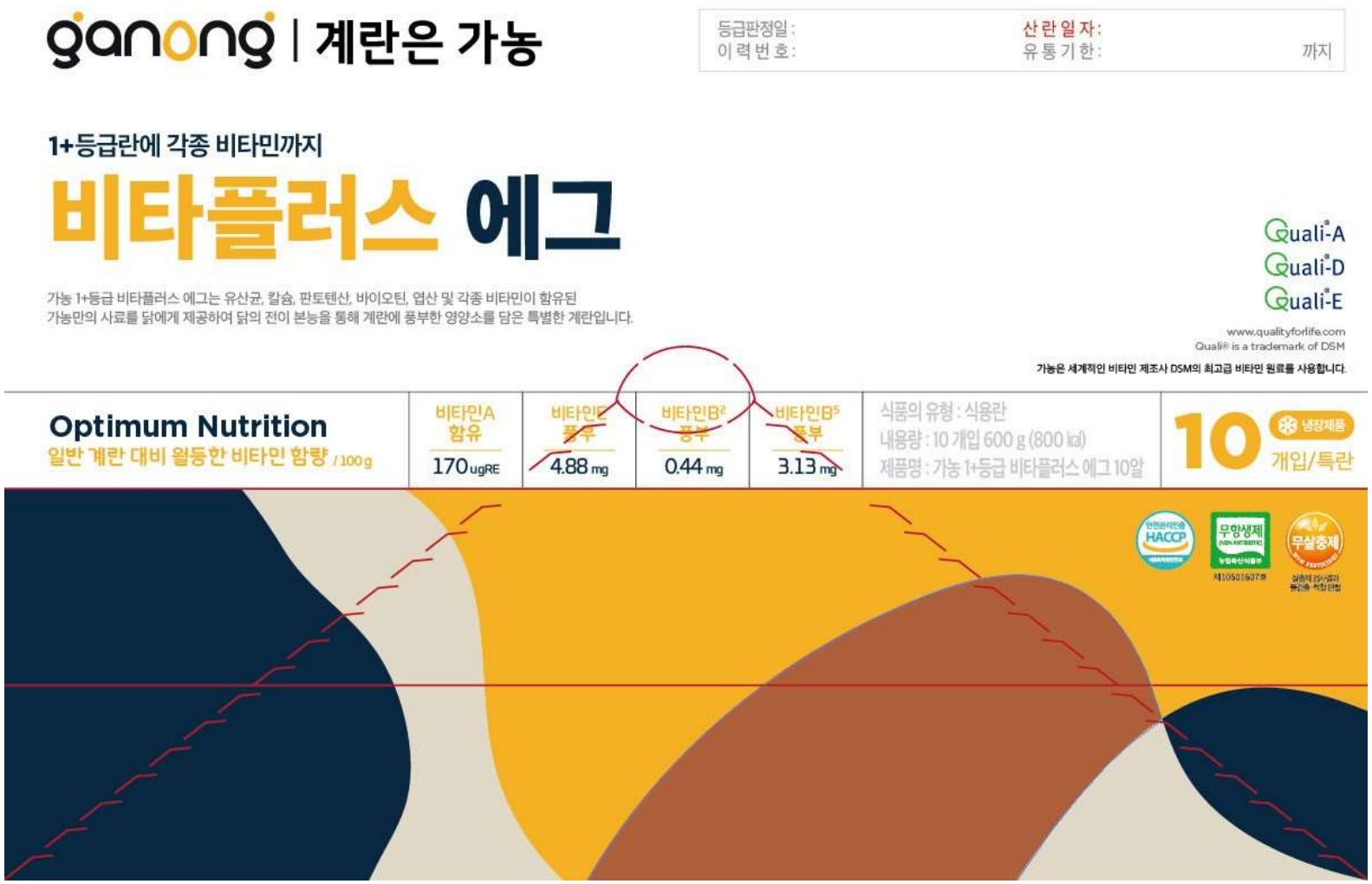

AGRI TV
MASIGLA AT LUMALAKING INDUSTRIYANG ITLUGAN
Sarimanok Layer Feeds
with OVN
Brand X
Sarimanok
POULTRY FEEDS

DHA enriched egg with Algae DHA source from S. Korea

Good message how we can secure marine resources in terms of sustainability.

DSM

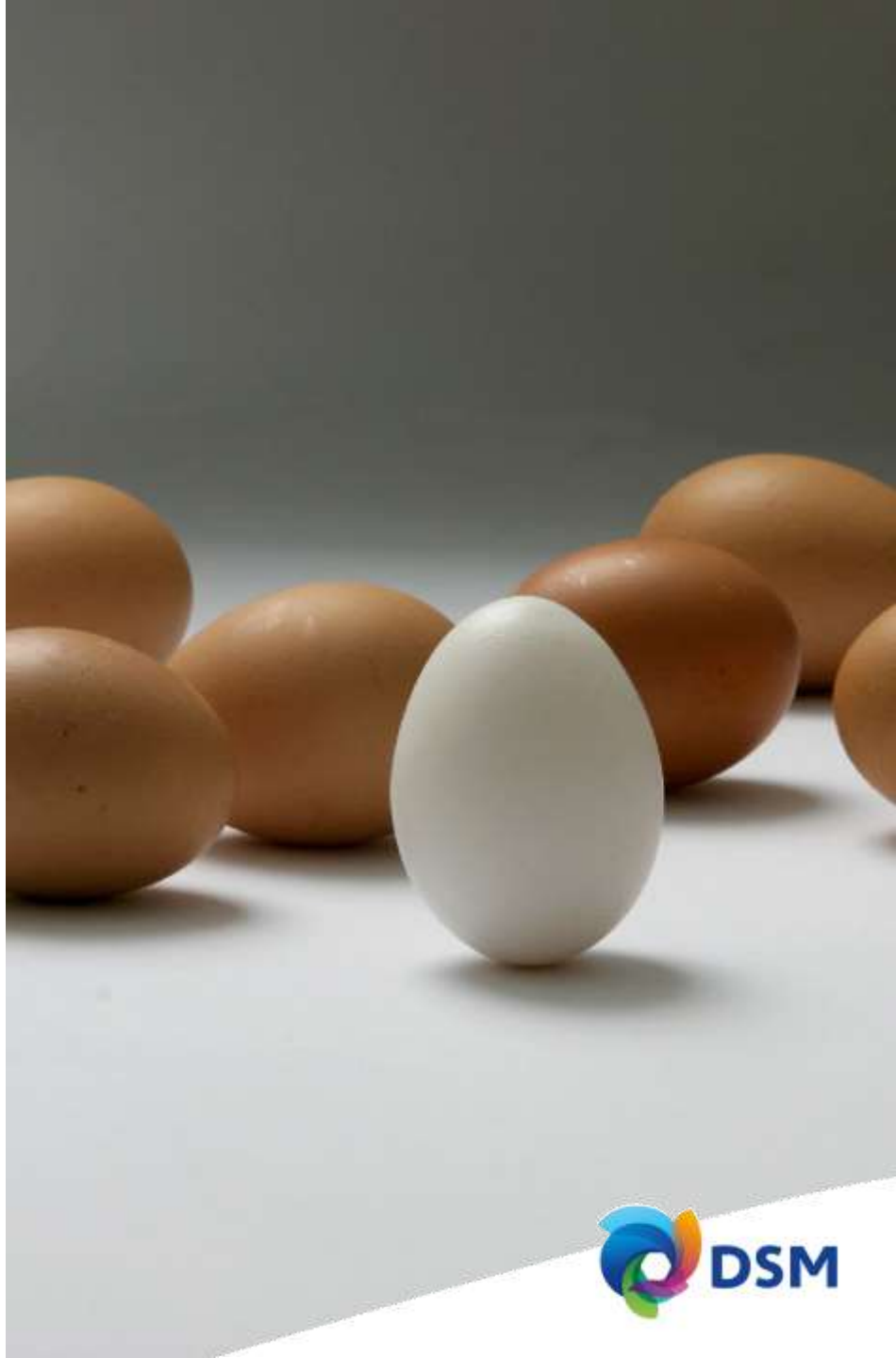
Quali-vitamin brand



How differentiate my eggs?

From global experience points of view

- Shell color; white, brown, pink, blue
- Egg yolk color; yellow, orange, red
- Raw material; raw materials which are familiar with human food ingredients. e.g. rice, herb, sesame, etc
- Nutrients enriched; vitamins, DHA/Omega3, carotenoids, etc.
- Housing; enriched cage, aviary system, free-range
- Package design



How to claim on egg packages

Low

Hurdle

High

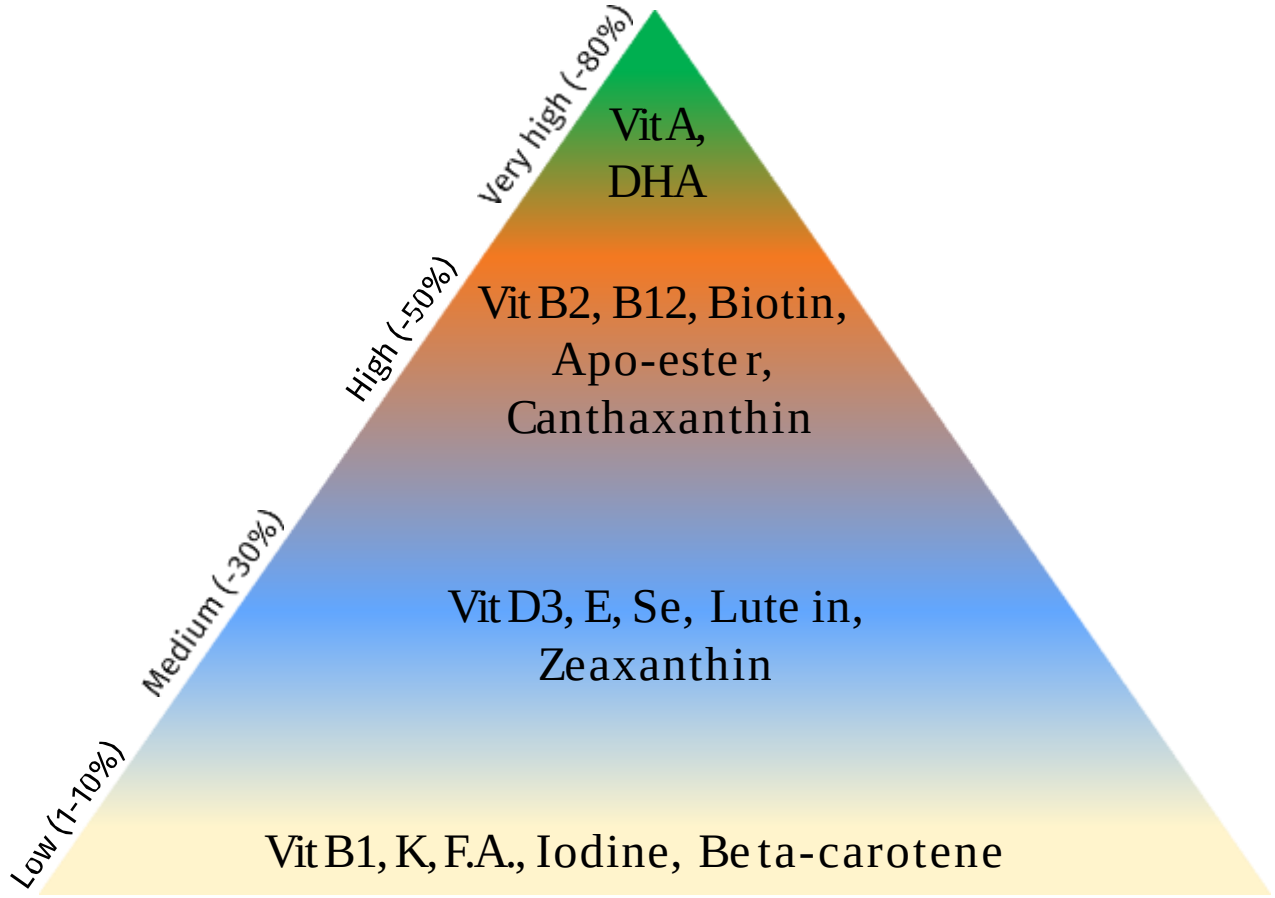
1. *We feed the hens vitamin D fortified diet*
   - Only text claim
2. *This egg is enriched with Vitamin D*
   - Only text claim
3. *We feed the hens X-times higher Vitamin D diet*
   (compared to regular diet)
   - Confirm vitamin D level in fortified and regular diets
4. *This egg contains X-times higher vitamin D*
   (compared to our regular eggs)
   -Need to analyze vitamin D content in regular and enriched eggs.
5. *This egg contains xx micro gram (IU) vitamin D*
   (per one egg, or 100g edible part of eggs(or egg yolk)
   - Need to analyze vitamin D content in enriched eggs and guarantee above level

How do we cla im nutrit ion facts in eggs?

- Value per 100g edible part
  - Use in most of markets
  - Ea sy comparison with other food source
  - La bel value is larger than per one egg
- Value per one egg
  - Use only egg
  - Ea sy to understand
  - Wide r variation actual value among different sizes of eggs

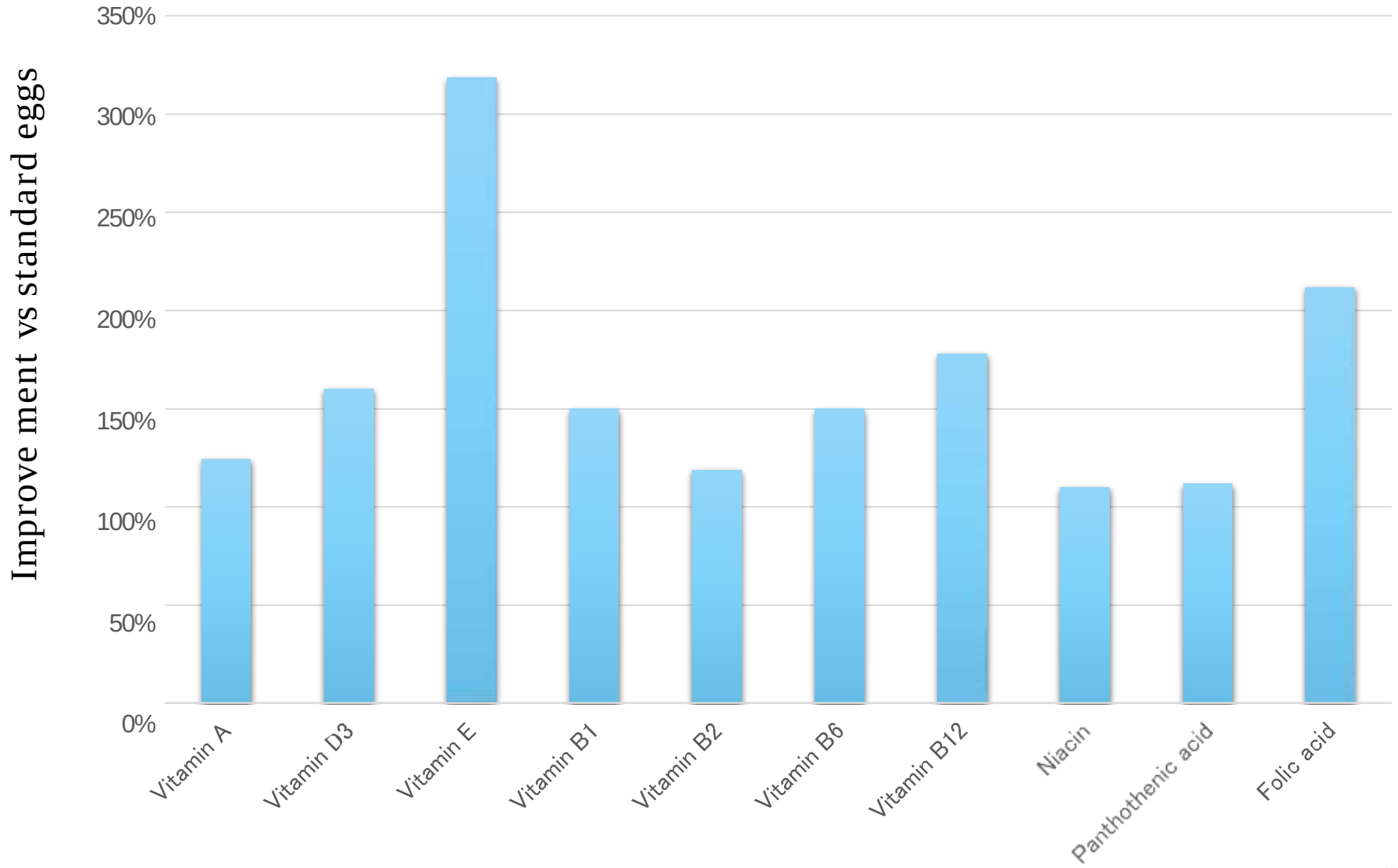
What kinds of nutrients we can increase?

Transfer efficacy form feed to egg



Source: Naber, 1993, and commercial experiences

How much we can improve vitamin levels in egg



DSM trial

How to guarantee nutrient levels in eggs

1. To understand what minimum (lowest) level of target nutrient in eggs in your layer farm.

- Nutrient is same but no same quality!

  Nutrients are weak against heat, humidity, light, oxygen.

- Only healthy hens can produce high quality eggs

  Heat stress, Gut health, Dise ases/ Infections

- Good farm management and hygie ne control are key points more than others

1. Re gular nutrients analysis is essentia l to understand in your farm situation.

- Not alwa ys same nutrition facts in egg around the year.
  Need to analysis e ve ry 2-3 months to monitor how change level of nutrients in eggs.
  When discover the trend, it will be ok to analyze 1-2 times every year.

Tips for vitamin enrichment eggs development

At the beginning…

- Check whether vitamins are well mixed (Feed analysis)
- Avoid stress as much as possible to hens (Farm & Feed management)

Egg sample collection…

- Randomly collect eggs from 3 weeks after feeding fortified diet
- Pool 10-20 eggs as one sample
- Send fresh samples as early as possible

At the lab

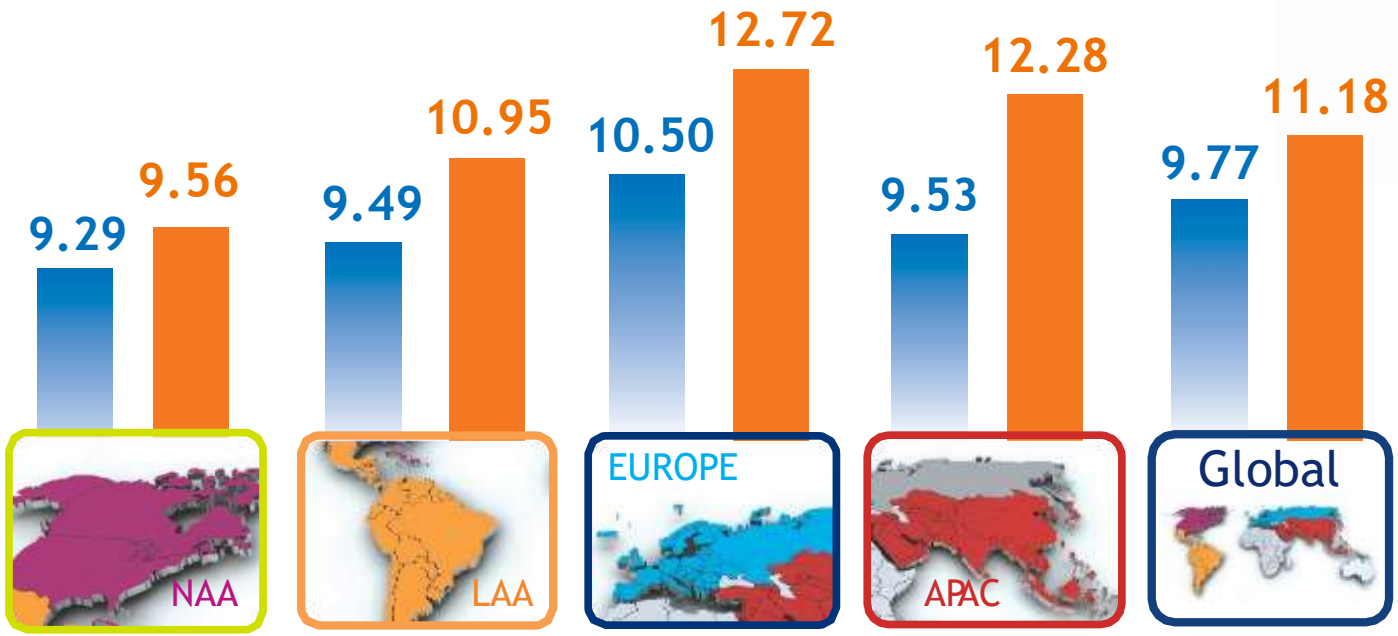
- Ask lab to separate egg yolk and egg white before analysis
- Egg yolk sample is best option to analyze most of vitamins

	Yolk (%)	Albumen (%)
Vitamin A	100	-
Vitamin D_3	100	-
25OHD_3	100	-
Vitamin E	100	-
Vitamin B_1	100	-
Vitamin B_2	57 - 46	43 - 54
Vitamin B_6	100	-
Vitamin B_{12}	98 - 97	2 - 3
Niacin	57 - 82	43 - 19
Folic acid	100	-
Biotin	100	-
Pantothenic acid	92 - 93	8 - 7

Consumers prefer bright yolk color

YolkFan # for Regular Egg

YolkFan # for Nutritionally Enriched Eggs



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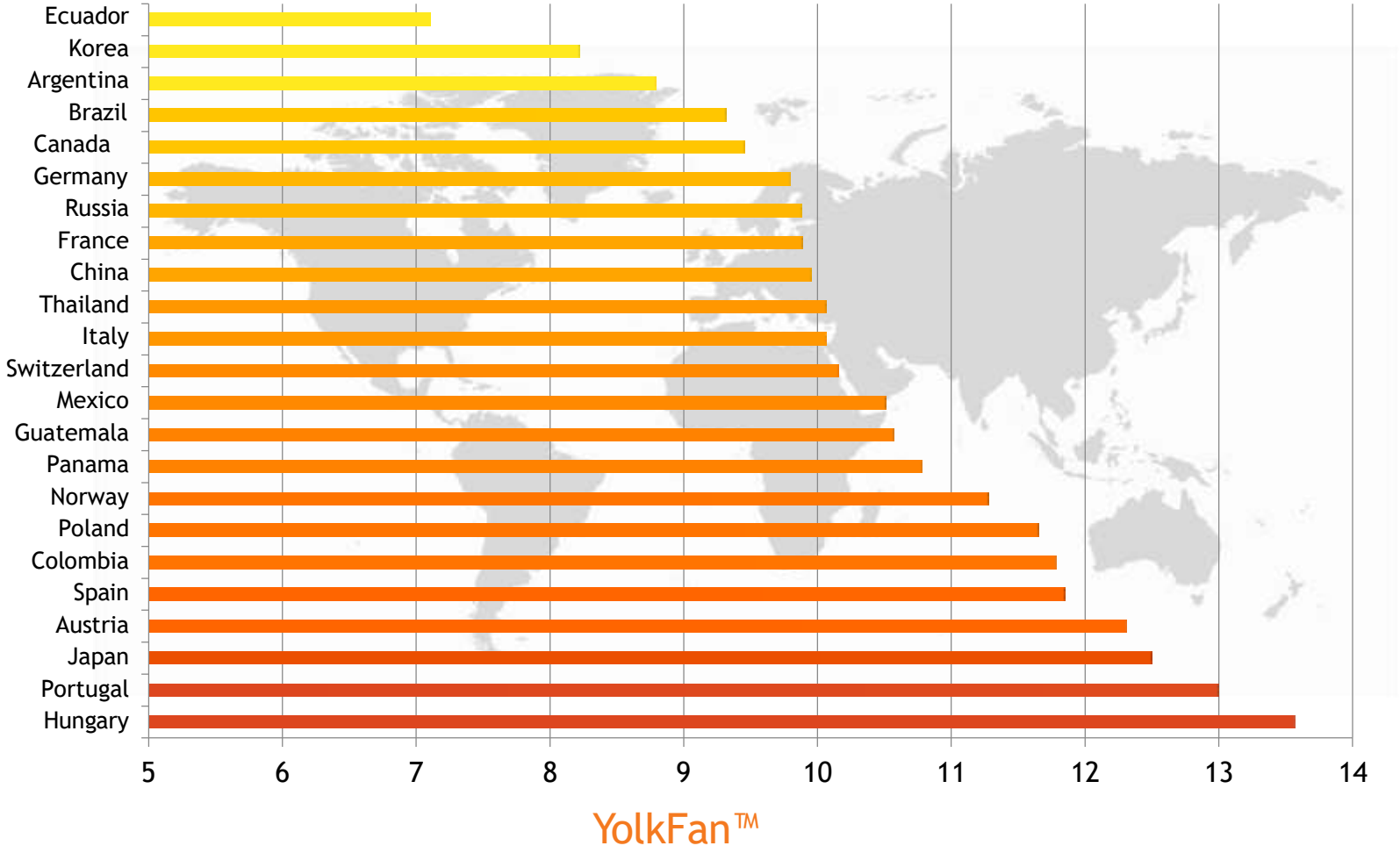
Egg yolk color in the markets

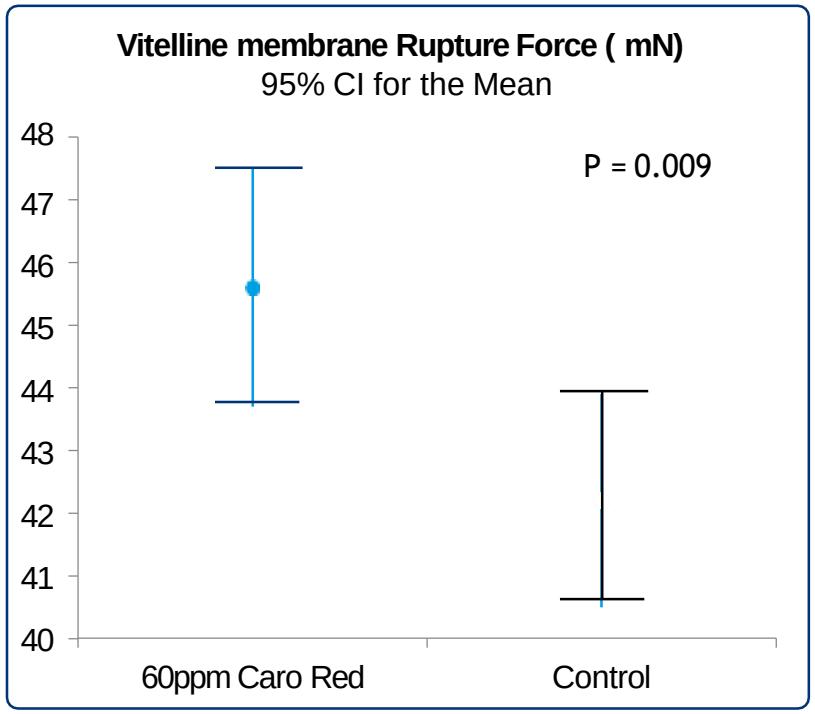


Egg yolk color is not just color

Functional bio -actives, like the carotenoid canthaxanthin, are added to table-egg layer feeds for enhancing:

1) strength of vitelline (yolk) membrane
2) freshness of eggs
3) more healthy chick (breeder)

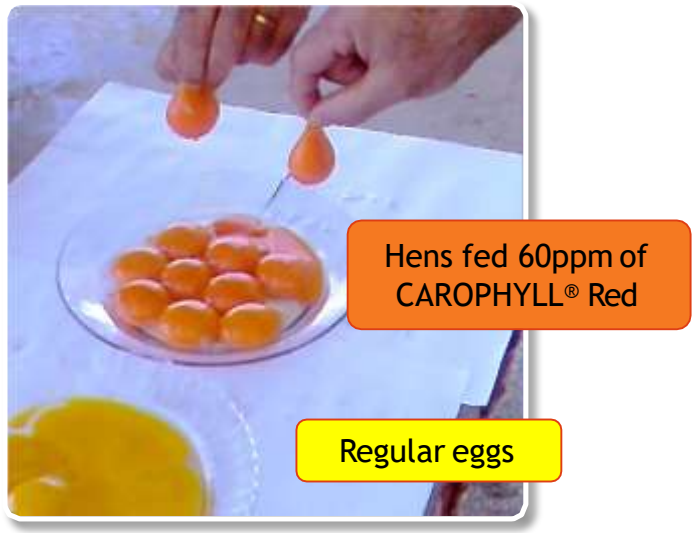
Carotenoids may support egg freshness..



40 weeks hens- 7 days stored eggs

DSM non published

- Is helpful to separate the yolk and white more easily
- Can be considered a measure for the egg freshness



Support food loss reduction

Regular layer diet

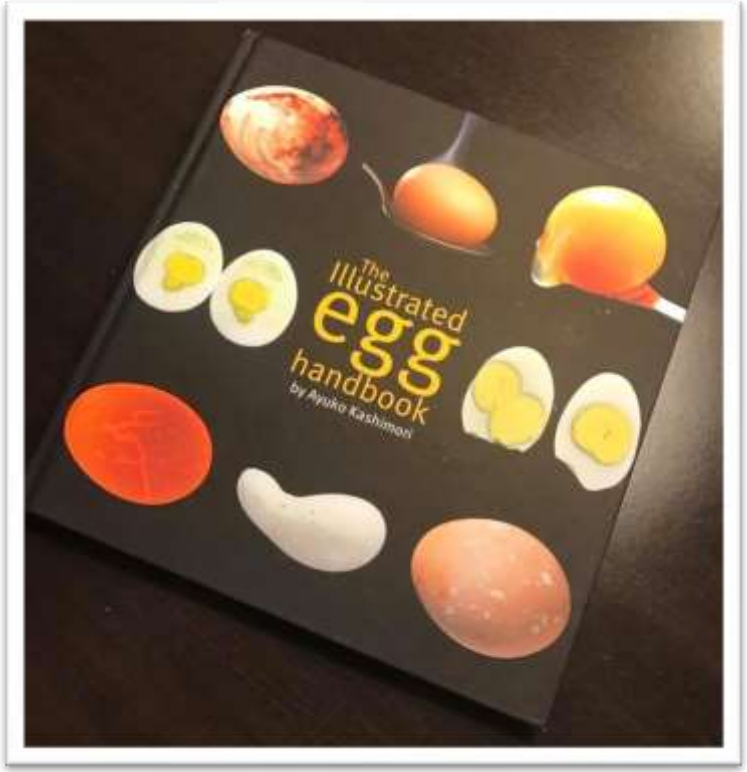
3/10

Regular layer diet + Carophyll red

7/10

Thailand, 2015

Supporting tools



The YolkFan™

The Digital YolkFan™

The i-check egg evaluates

Digital Egg Tester

Take home messages

- Eggs are one of the most reasonable and sustainable perfect healthy foods.
- Getting popular branded eggs and nutrient enriched eggs across the world.
- There are some product differentiation points not only nutrition aspects.
- To find nutrients which is popular in food industry/cosmetic industry is Key to success.
- Nutrient contents in eggs vary depends on hen health status and environment.
- Eggyolk color is one of key differentiations between premium eggs and regular eggs.
- DSMcan support to develop premium eggs and measure egg qualities objectively.

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