

Halieutica

Fish & Shrimp solutions

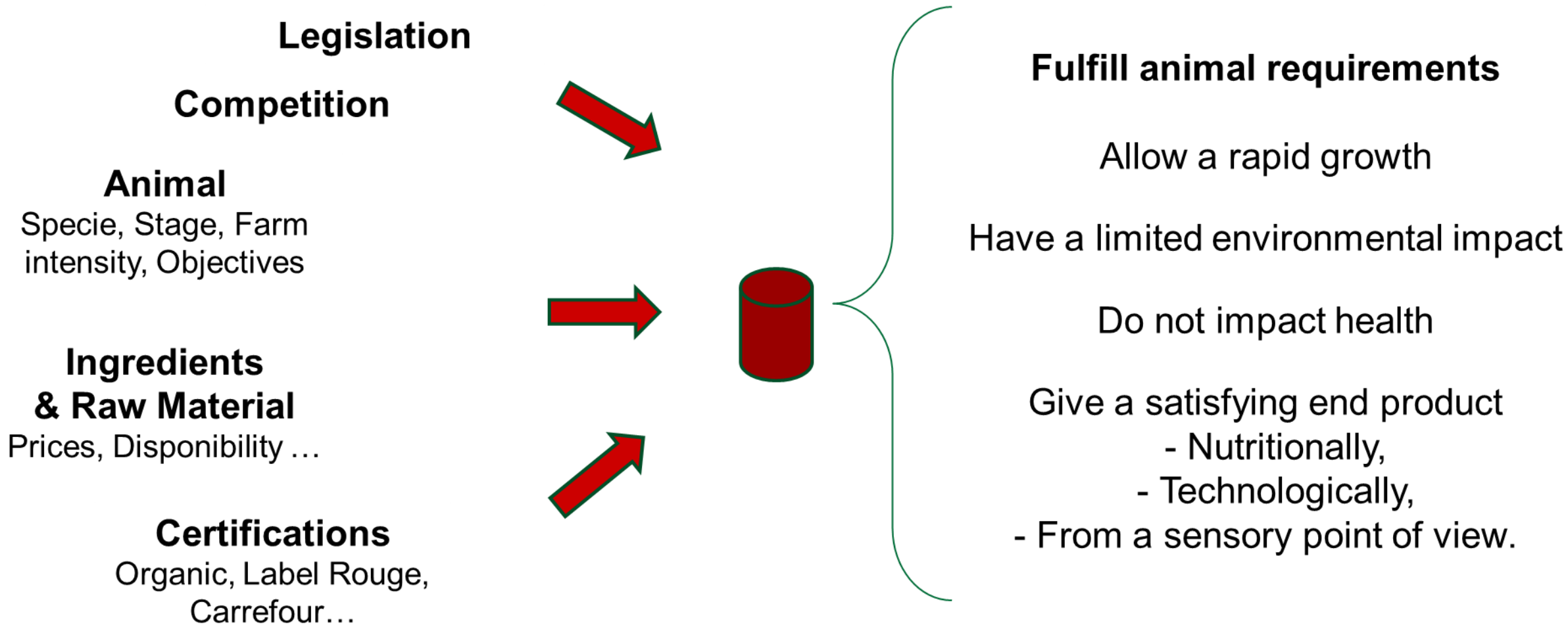


Guillaume Le Reste

00 33 648 714 051 – g.lereste@halieutica.net – skype: guillaumelereste



Aquaculture feeds



Aquafeed in the system

Presentation produced for Dr. Ebru YILMAZ. Copying and distribution prohibited

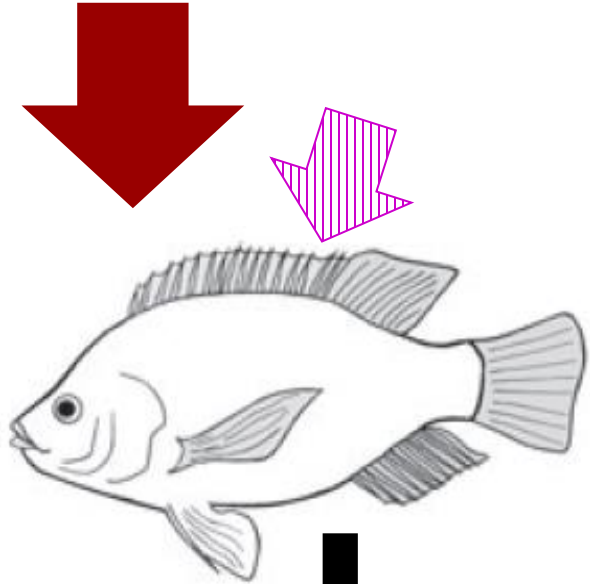
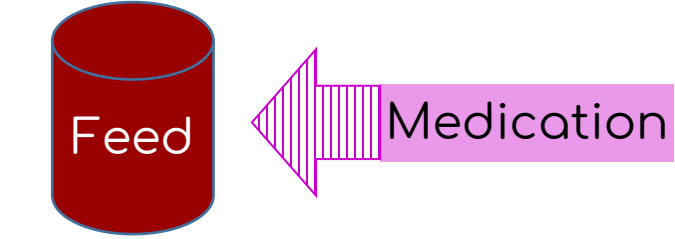
Crops & by products
Fisheries
Mining

Raw materials

Technological additives
Sensory additives
Nutritional additives
Zootechnical additives

Additives

Natural productivity (phyto & zoo plankton)



Envir. impact



Effect of extrusion temperature on different vitamins stability

Fat-Soluble Vitamins	91–95°C	141–145°C
A, beadlet	90	62
D, beadlet	96	86
E, acetate	95	81
Water-Soluble Vitamins		
Thiamine HCL	90	50
Riboflavin	98	91
B6	93	73
B12	97	86
Pantothenic acid	94	75
Folic Acid	93	64
Biotin	93	63
Niacin	92	64
Vitamin C	57	5

Source: BASF Documentation DC 0002.



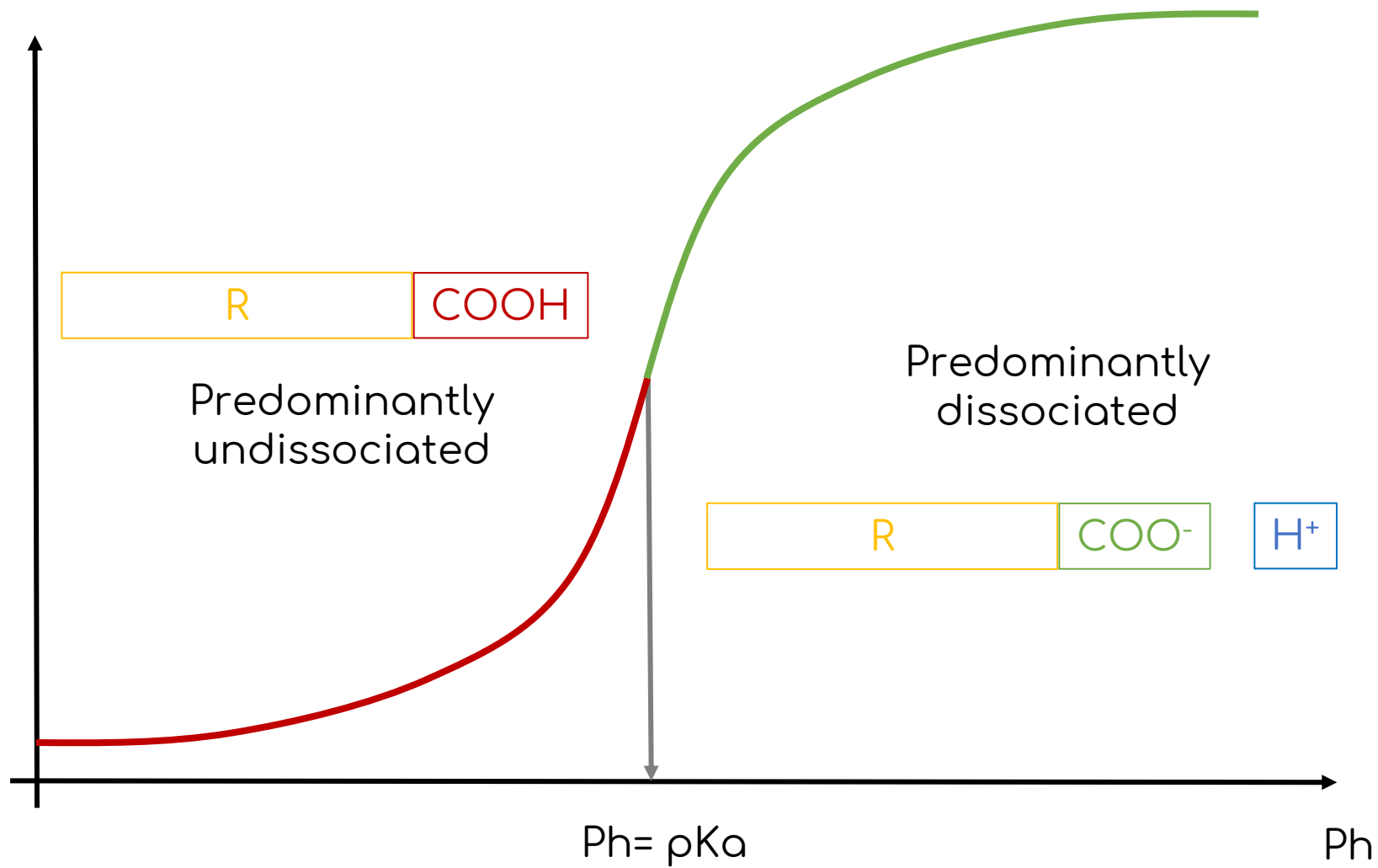
Organic acids

Originally developed for RM/Feed conservation.

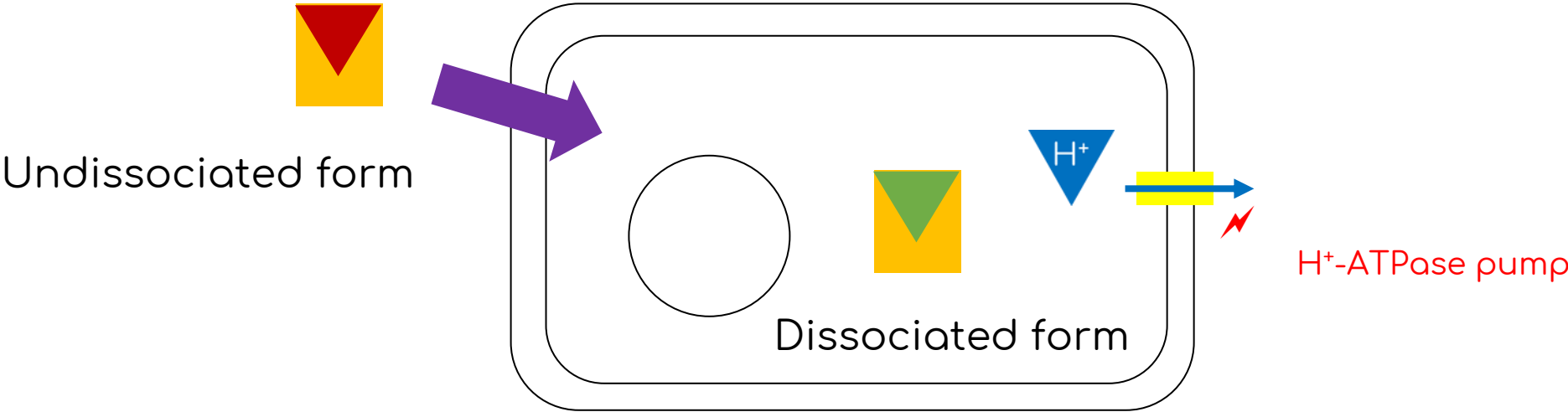
Also marketed for their antibacterial activities.



Organic acids: pK_a



Organic acids: MOA proposal

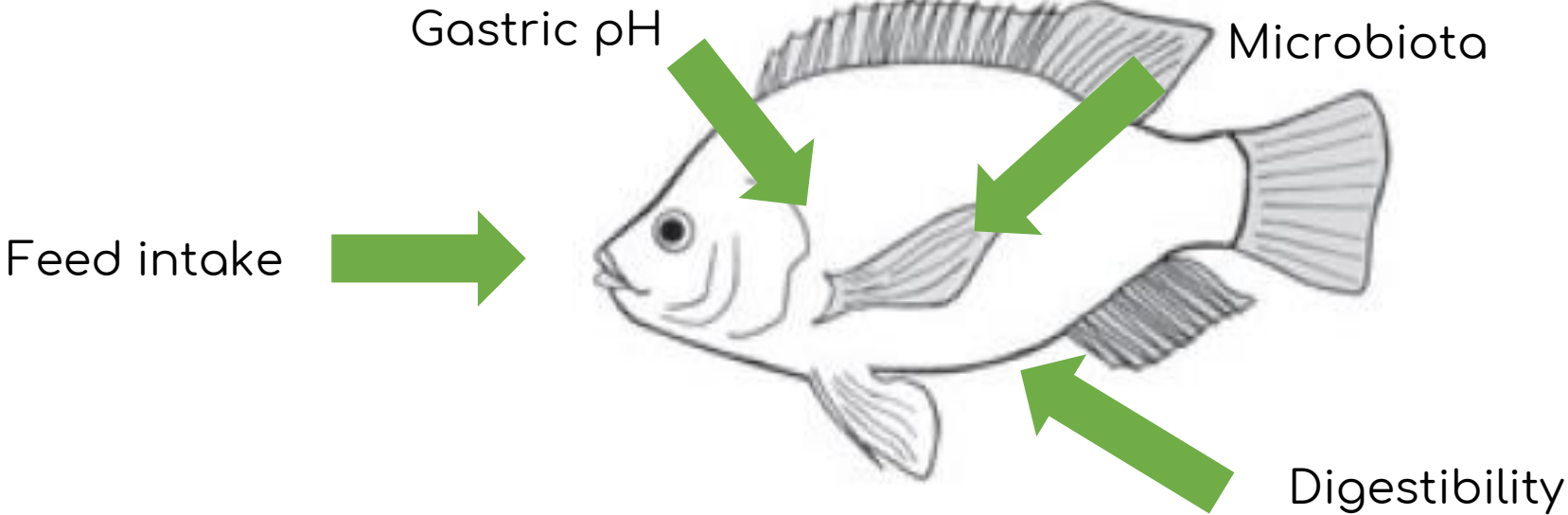


Acid	Molecular formula	MM (g/mol)	Density (g/ml)	Phys. Form	pKa	Solubility in water
Formic	HCOOH	46,03	1,22	liquid	3,75	∞
Acetic	CH ₃ COOH	60,05	1,049	liquid	4,76	∞
Propionic	CH ₃ CH ₂ COOH	74,08	0,993	liquid	4,88	∞
Butyric	CH ₃ CH ₂ CH ₂ COOH	88,12	0,958	liquid	4,82	∞
Lactic	CH ₃ CH(OH)COOH	90,08	1,206	liquid	3,83	v
Sorbic	CH ₃ CH:CHCH:CHCOOH	112,14	1,204	liquid	4,76	s
Fumaric	COOHCH:CHCOOH	116,07	1,635	liquid	3,02	s
					4,38	
Citric	COOHCH ₂ C(OH)(COOH)CH ₂ COOH	192,14	1,665	solid	3,13	v
					4,76	
					6,4	

MM: molecular mass; ∞: soluble in all proportions; v: very soluble; s: sparingly soluble.



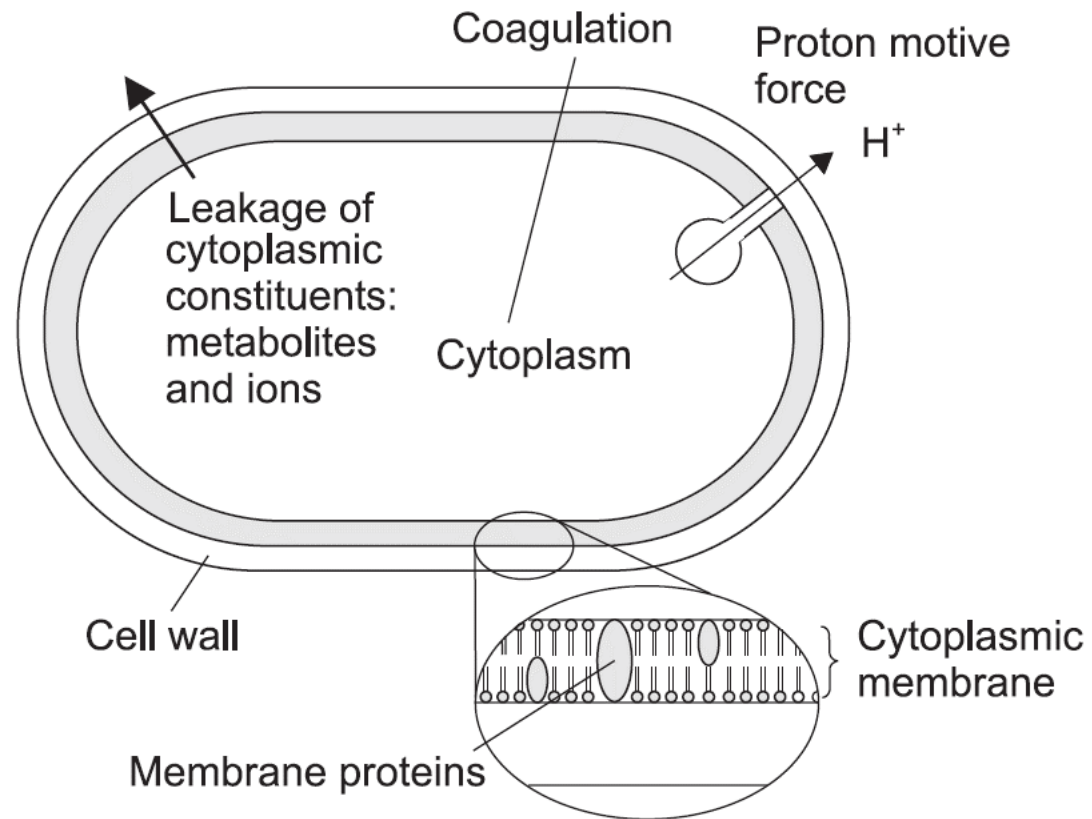
Organic acids at a glance



Da Silva et al. Aquaculture 384–387 (2013) 104–110 ([lien](#)) ; Defoirdt et al. Biotechnology Advances 27, 680–685, 2009 ([lien](#)); Morken et al. Aquaculture Nutrition 18, 21–34, 2011 ([lien](#)) ; Nunes et al. Aquaculture 260, 244–254, 2006 ([lien](#)); Lückstädt & Schulz. European Aquaculture Society, Krakow, Poland, 2008.



Essential oils



Locations and mechanisms in the bacterial cell thought to be sites of action for EO components:

- degradation of the cell wall;
- damage to cytoplasmic membrane;
- damage to membrane proteins;
- leakage of cell contents ;
- coagulation of cytoplasm;
- depletion of the proton motive force.



Essential oils

Chemical composition of natural oregano essential oil (%). P

origan 1



■ Carvacrol ■ Linalool ■ Thymol
■ γ-terpinène ■ Linalyl acetate ■ Caryophyllène oxyde

origan 2



■ α-terpinéol ■ E-caryophyllène ■ Germacrène-d-4-ol
■ γ-muuroolène ■ p-cymène ■ β-bourbonène

origan 3



Essential oils

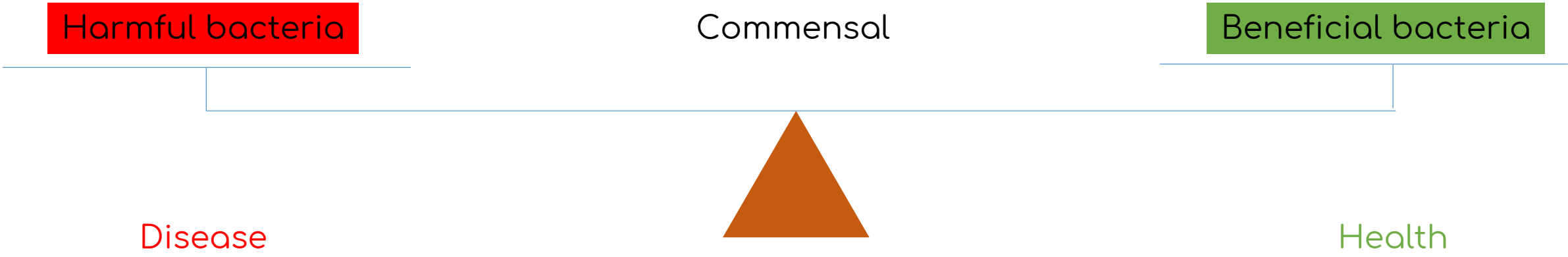
Nature identical Vs. Plant extracts

1 molecule Vs. Cocktail



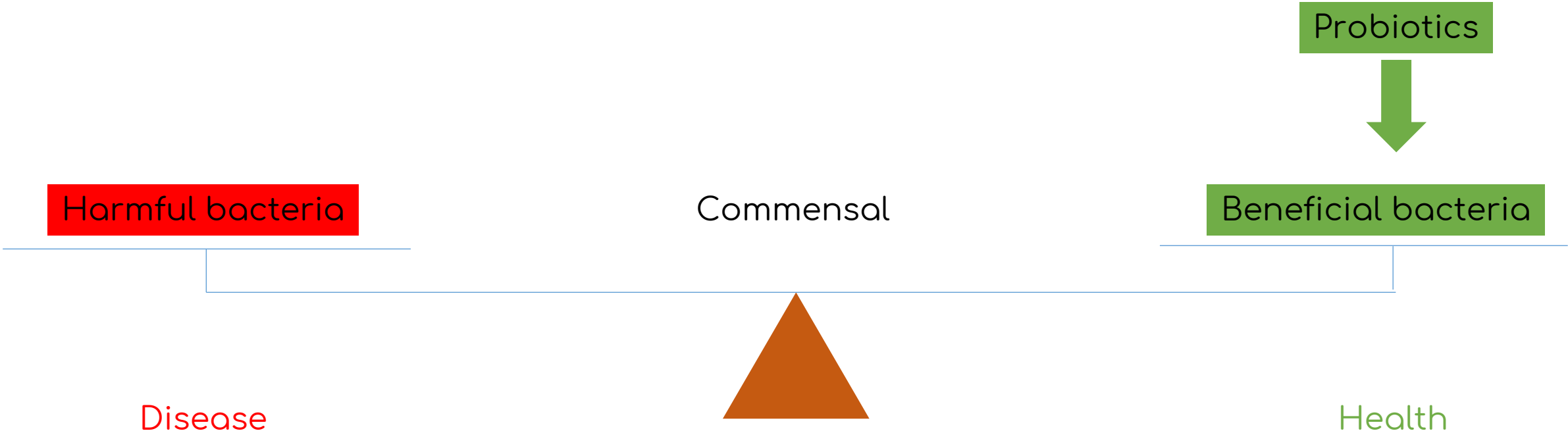
Probiotics: concept

Presentation produced for Dr. Ebru YILMAZ. Copying and distribution prohibited



Probiotics: concept

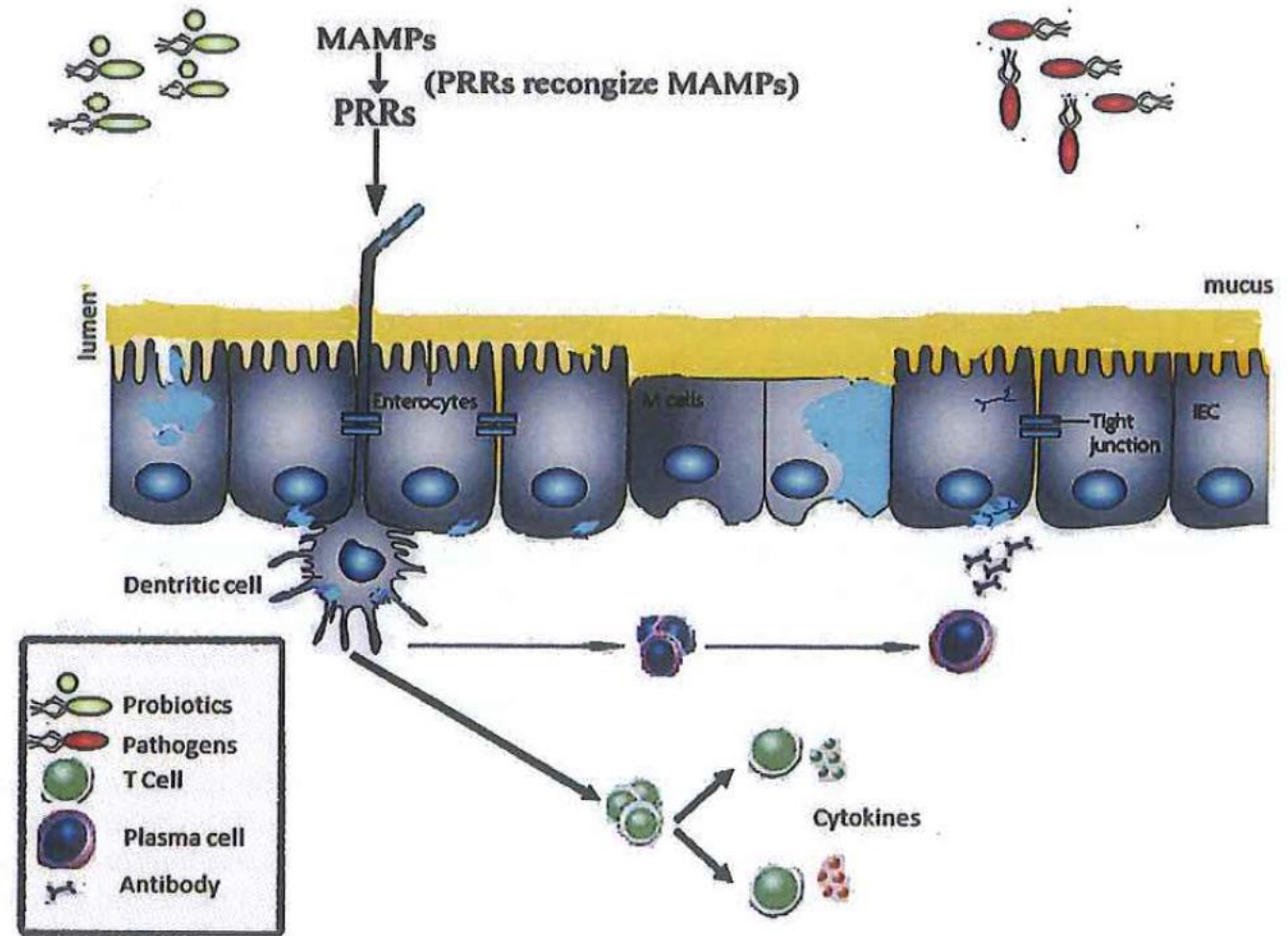
Presentation produced for Dr. Ebru YILMAZ. Copying and distribution prohibited



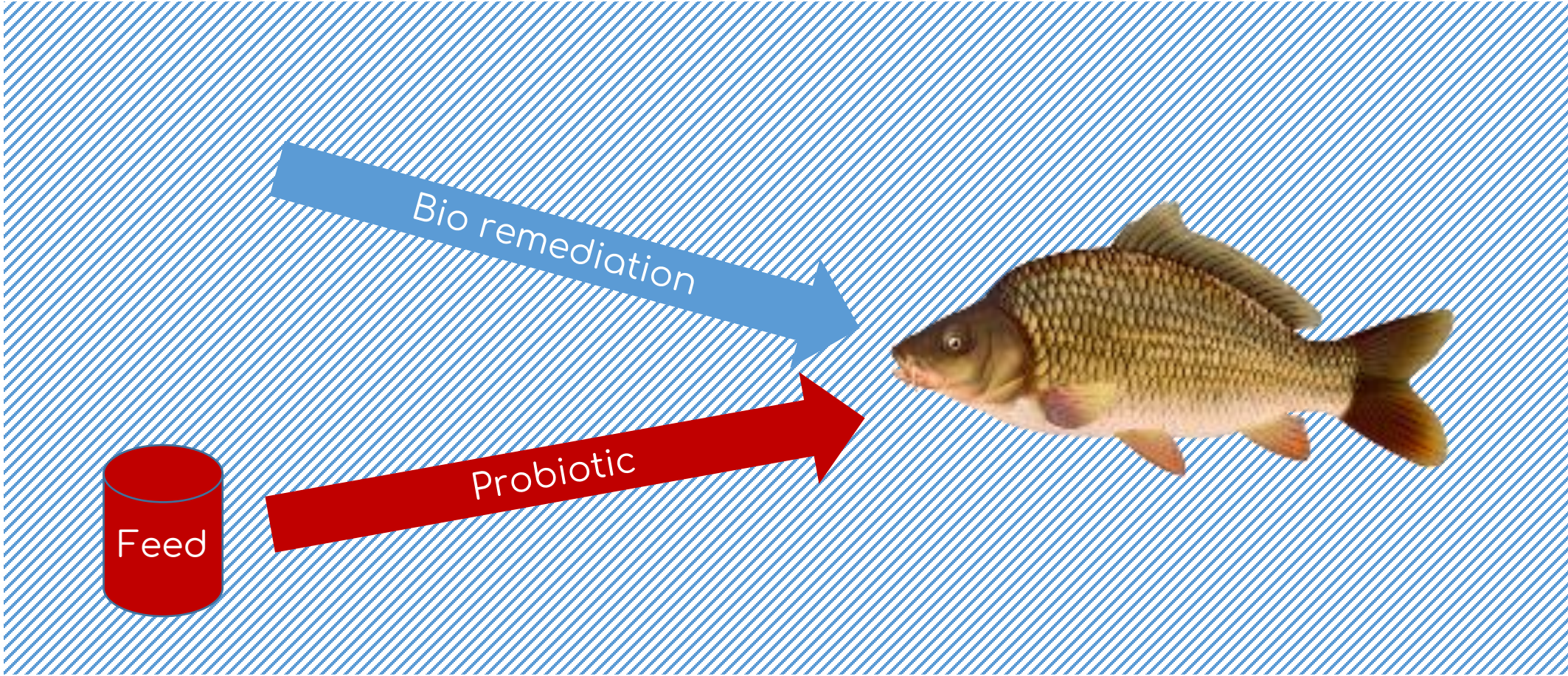
Probiotics and Immunomodulation

Probiotics showing the activity of host immunomodulation.

MAMPs: Microbe Associated Molecular Patterns
PRRs Pathogen patterns Recognition Receptors
IEC: Intestinal Epithelial Cell.



Probiotics: aquaculture particularity

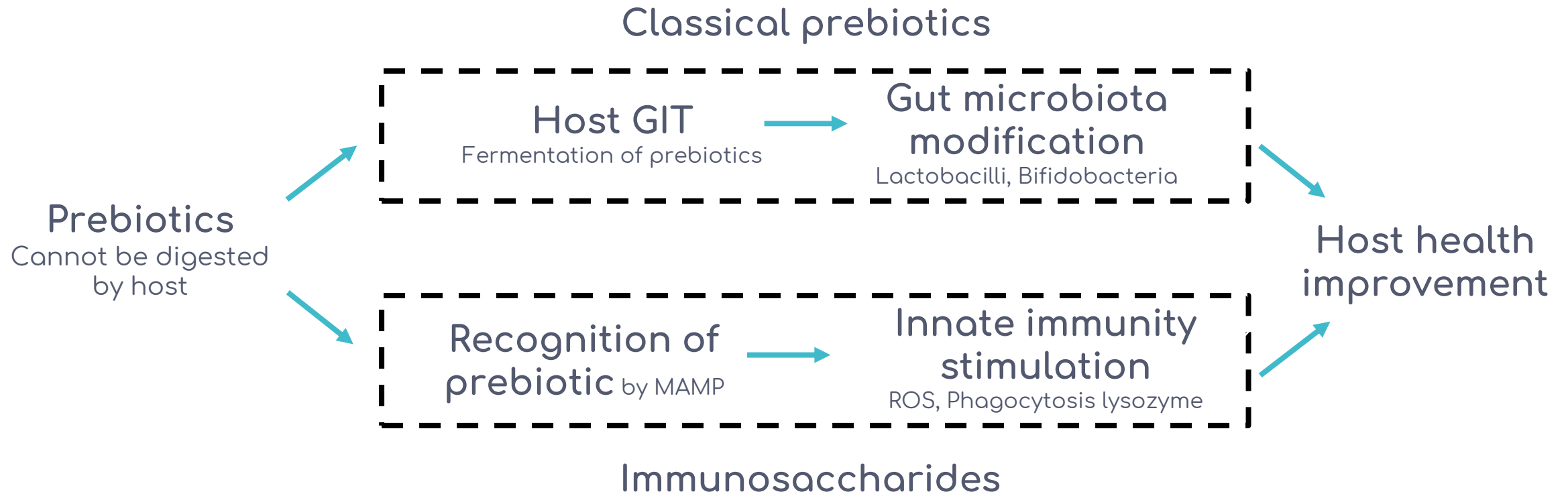


Prebiotics

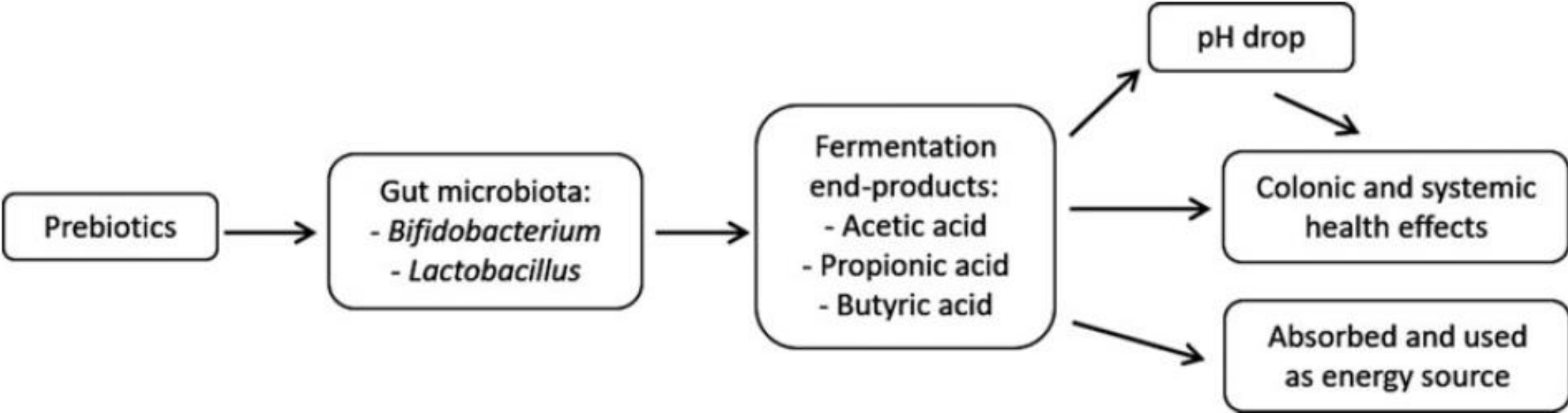
Prebiotics are “non digestsible components that are metabolized by specific health-promoting bacteria such as *Lactobacillus* and *Bifidobacterium*. These bacteria are considered beneficial to the health and growth of the host by decreasing the presence of intestinal pathogens and/or changing the production of health related bacterial metabolites.”



Prebiotics



Prebiotics

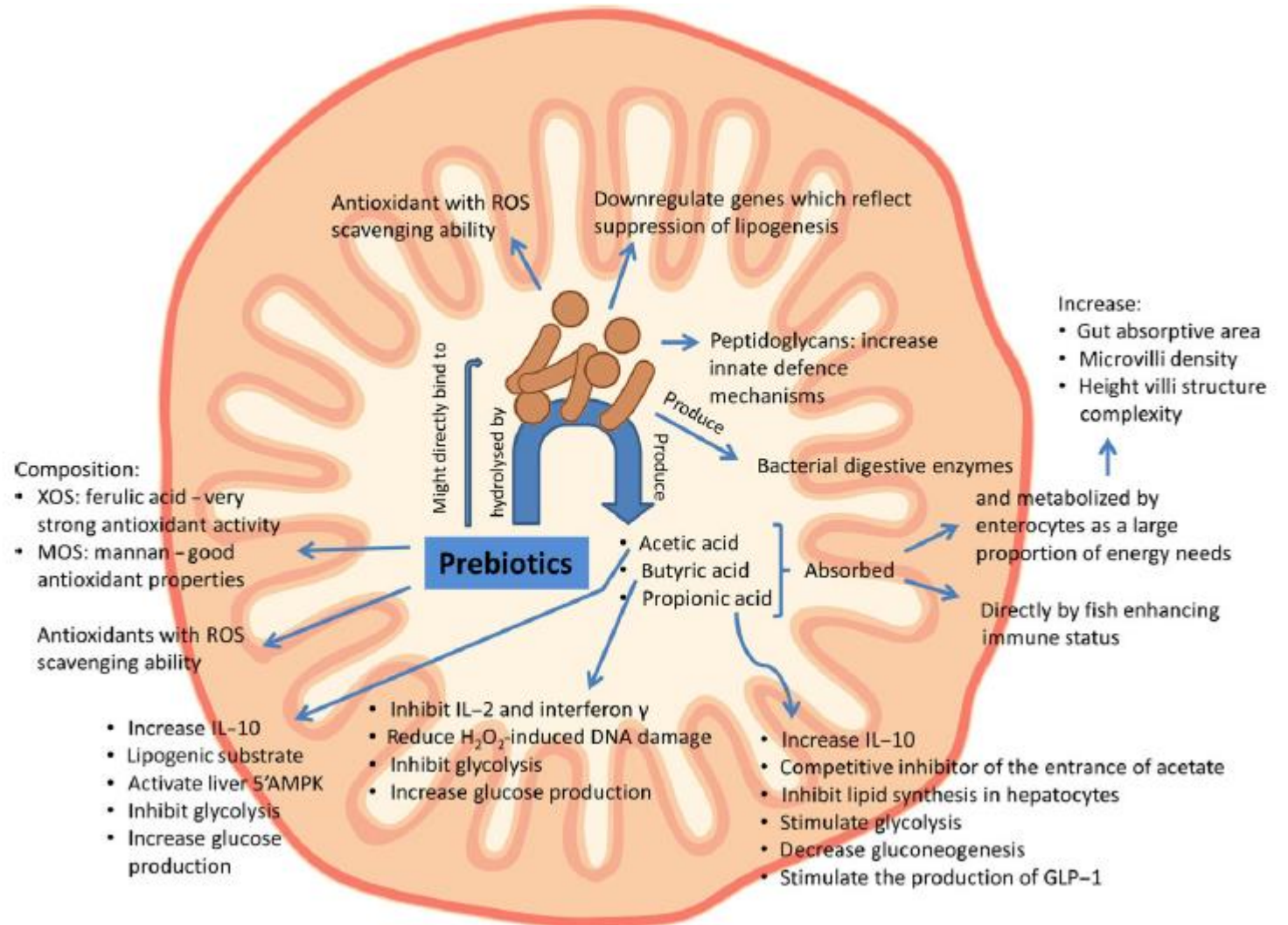


Presentation produced for Dr. Ebru YILMAZ. Copying and distribution prohibited



Prebiotics

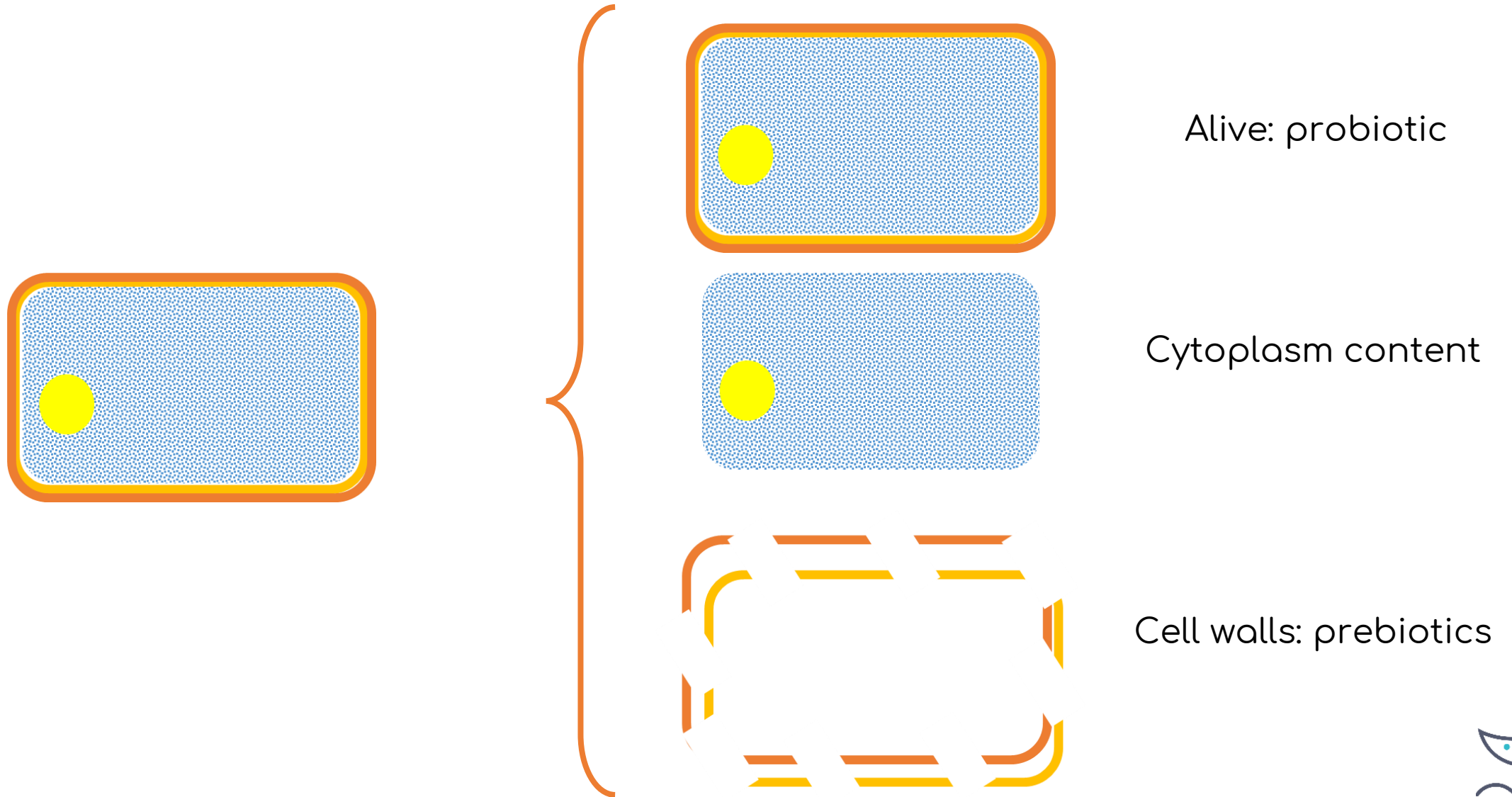
Schematic summary of general prebiotic mechanisms of action. Round and rod shapes represent bacteria.



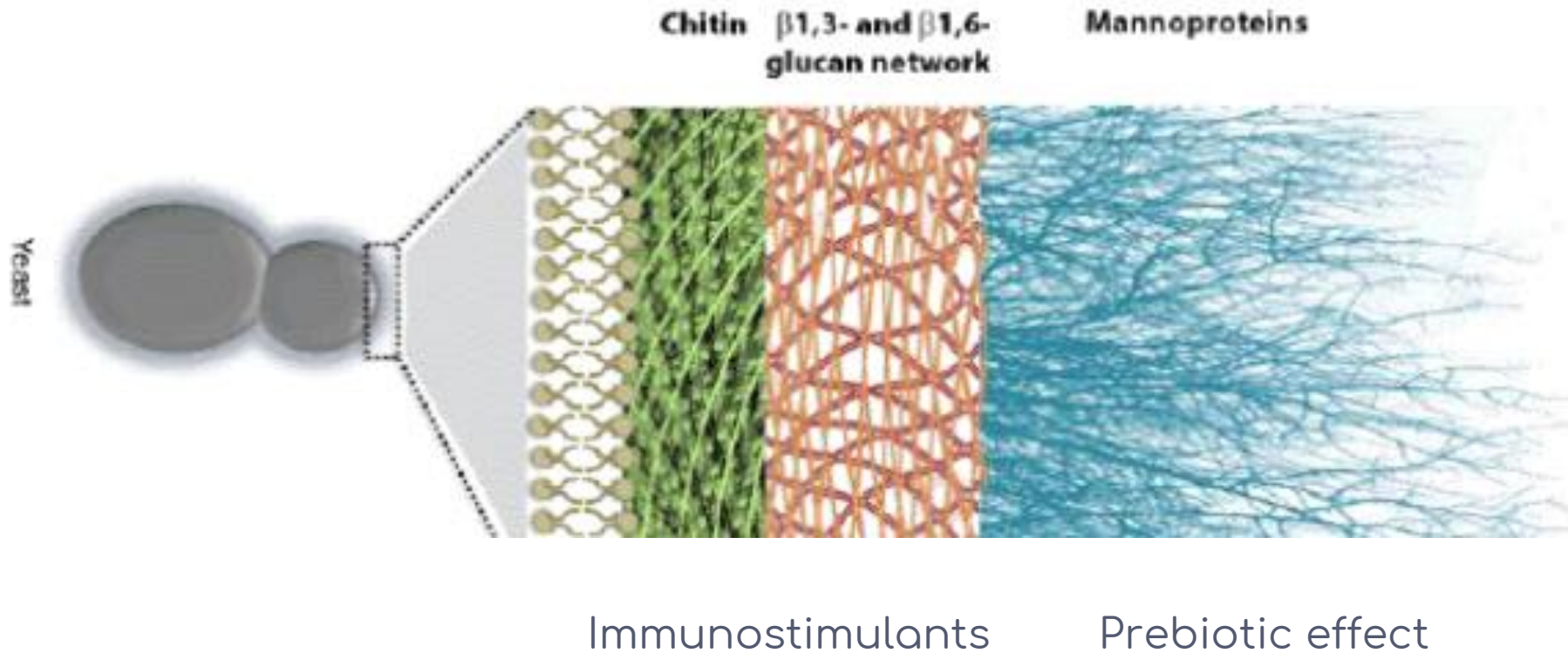
50AMPK, 50 adenosine monophosphate-activated protein kinase; GLP-1, glucagon-like peptide 1; H_2O_2 , hydrogen peroxide; IL-10, interleukin 10; IL-2, interleukin 2; ROS, reactive oxygen species



Yeast and Yeast extracts



Yeast and Yeast extracts



Thank you for your attention

Guillaume LE RESTE

+33 648 714 051

g.lereste@halieutica.net

www.halieutica.net

