EAAP 2018

Dubrovnik
August 29 2018

MEAT: Past and Future
will our children eat animal protein?

Servière Jacques
science adviser
former senior scientist INRA

Hocquette Jean-François
senior Scientist

Huang Hsin
general secretary

International Meat Secretary - IMS

- IMS brings together meat and livestock world organisations
  (90 members, 30 countries, > 75% global meat)
- IMS is a non-profit-making association and a **forum** for exchanging ideas, experiences on international issues
- has **representation in** international organisations:
  World Organisation Animal Health (**O.I.E.**), **FAO**, **OECD**, **ISO**-label, **WHO** (at IARC)
- Organise every 2 years a **WORLD MEAT CONGRESS**
  June 2018 Dallas-USA (2016 Uruguay, 2014 China)

- *is "the voice" of meat industry*
  *mostly for **beef**, pork, sheep*

IMS PROMOTES DIALOGUE on :

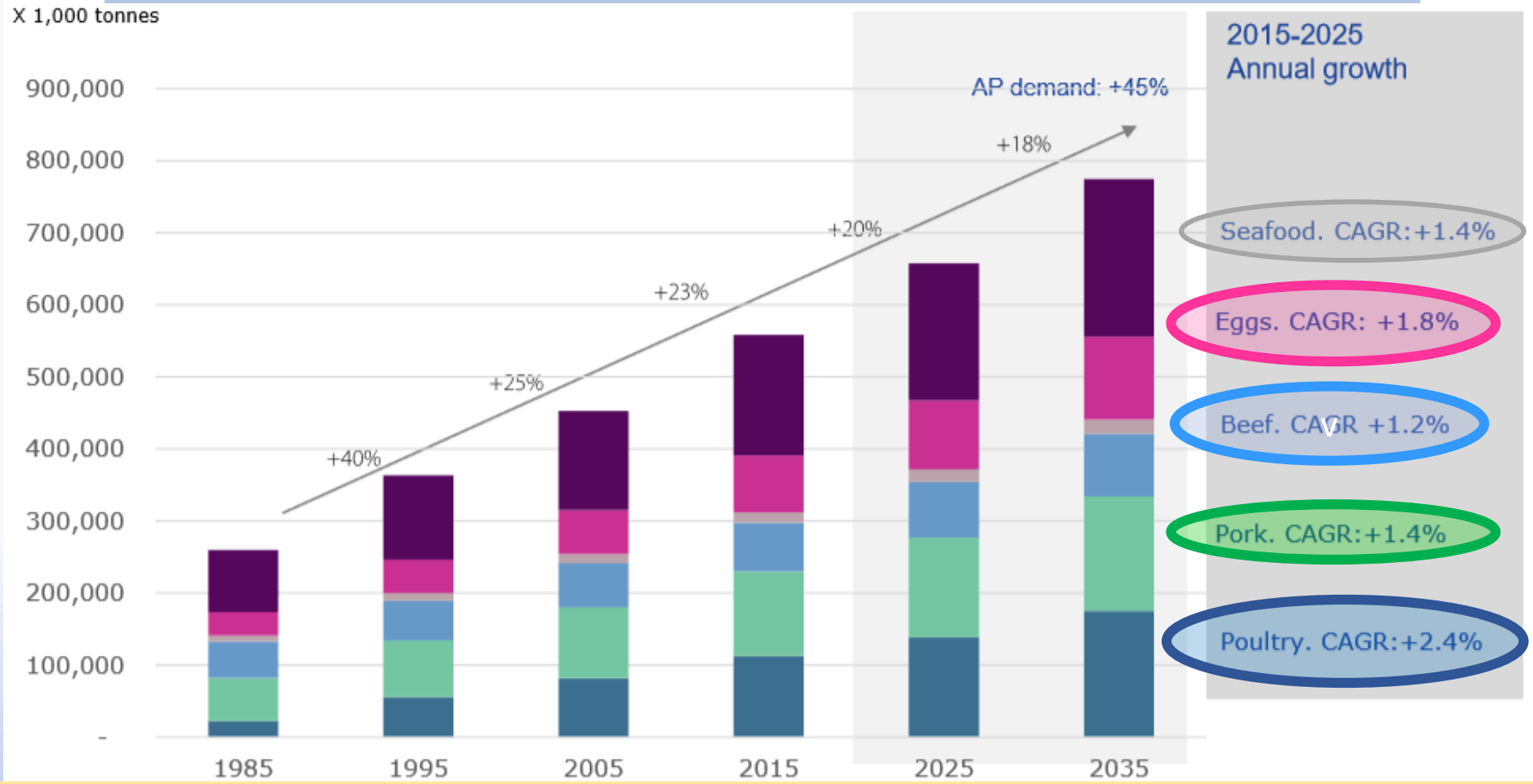
- **Environment** –joint-work with Food and Agriculture Organization (**FAO**) on **sustainability**

- **Animal Welfare** – official industry representative at (**OIE**), and **ISO/OIE** on Global Animal Welfare Standards

- **Food Safety** – official industry representative at the **Codex Alimentarius**,
  main topics at **WHO** = **AMR**,
  meat-consumption and **colorectal-cancer risk**,
  + Food Hygiene, Veterinary Drugs residues in Food

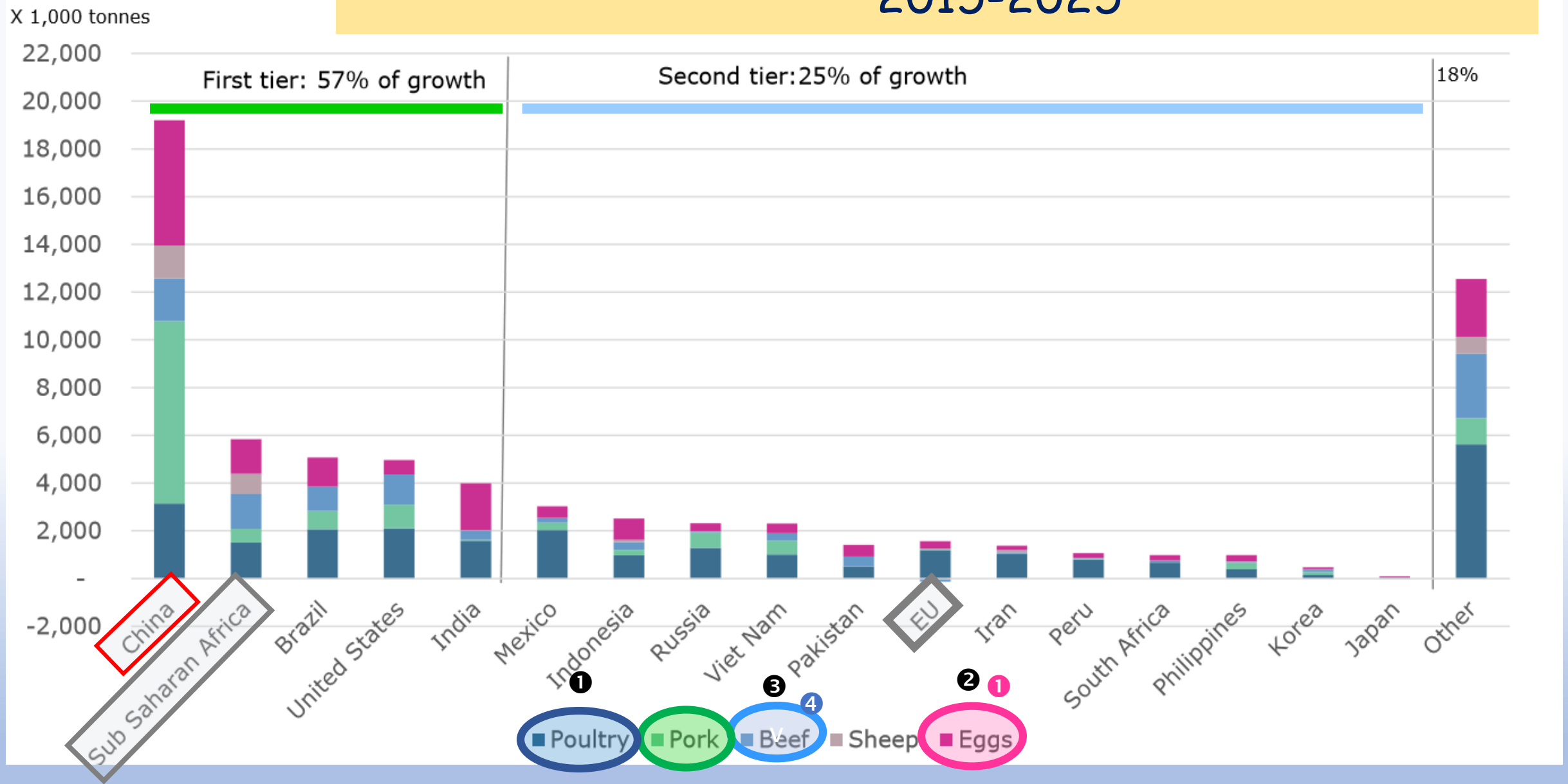
1 Global Economical situation 1

Global animal protein MARKET outlook 2015 - 2035



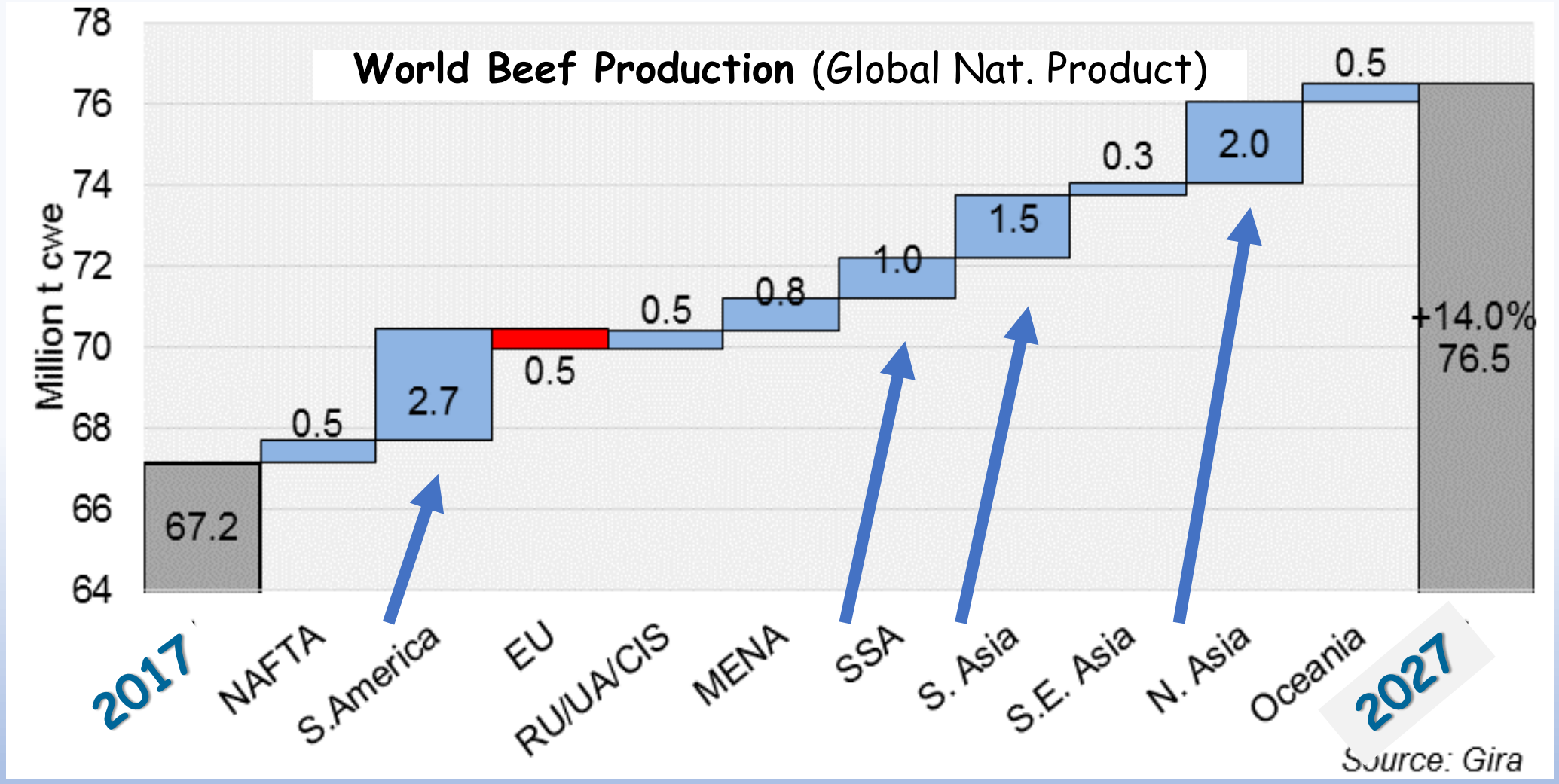
....➔ the **Global animal protein market** is expected **to grow by 45%** next to decades....

change in global DEMAND for meat and eggs 2015-2025



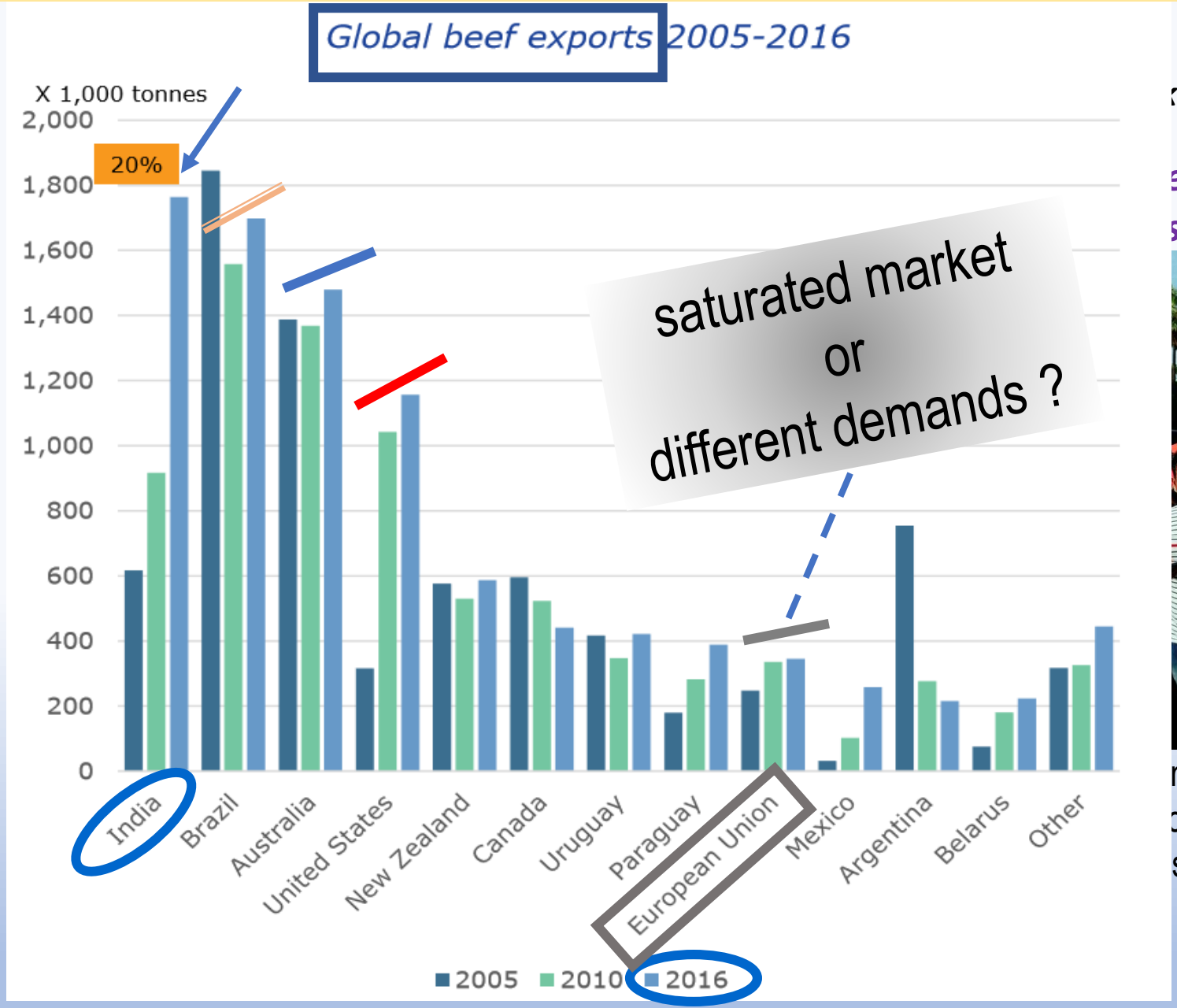
Global Beef Production Growth: Geography

Intensification *(varied)* led by: *i*) South American, *ii*) Indian & *iii*) China growth



Global Market 5

Market Differenciation needed in global beef industry



Times

asianpacific

eme Court Suspends Ban on
s for Slaughter

mbai, India, on July 2017 against
chings of Muslims who had been
sessing beef.

Global situation as viewed from EU

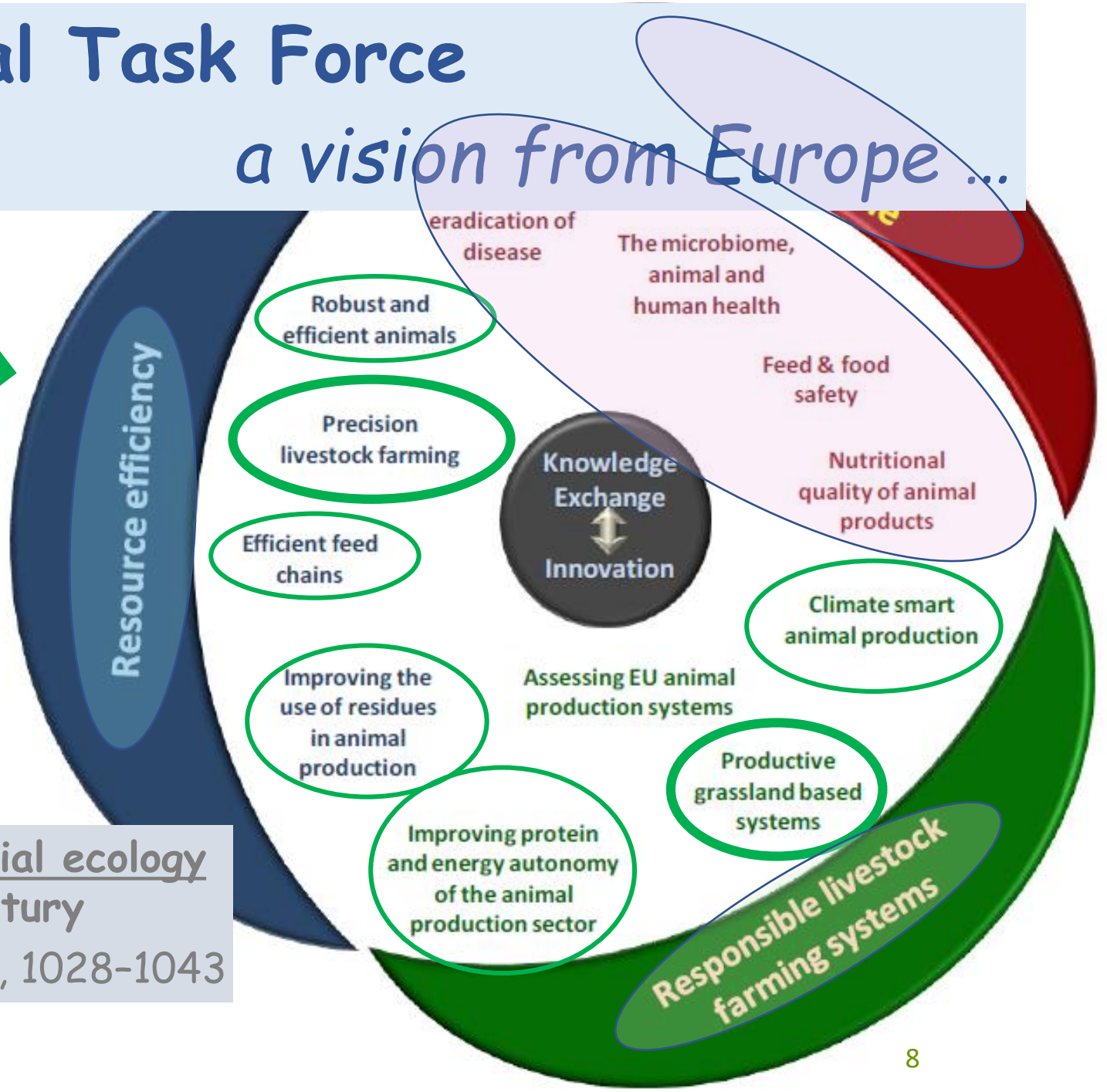
the Animal Task Force

a vision from Europe …

atf animal task force

Promoting a sustainable livestock sector in Europe

http://www.animaltaskforce.eu/



Prospects from agroecology & industrial ecology for animal production in the 21st century

Animal (2013), 7:6, 1028–1043

global situation as viewed from EU

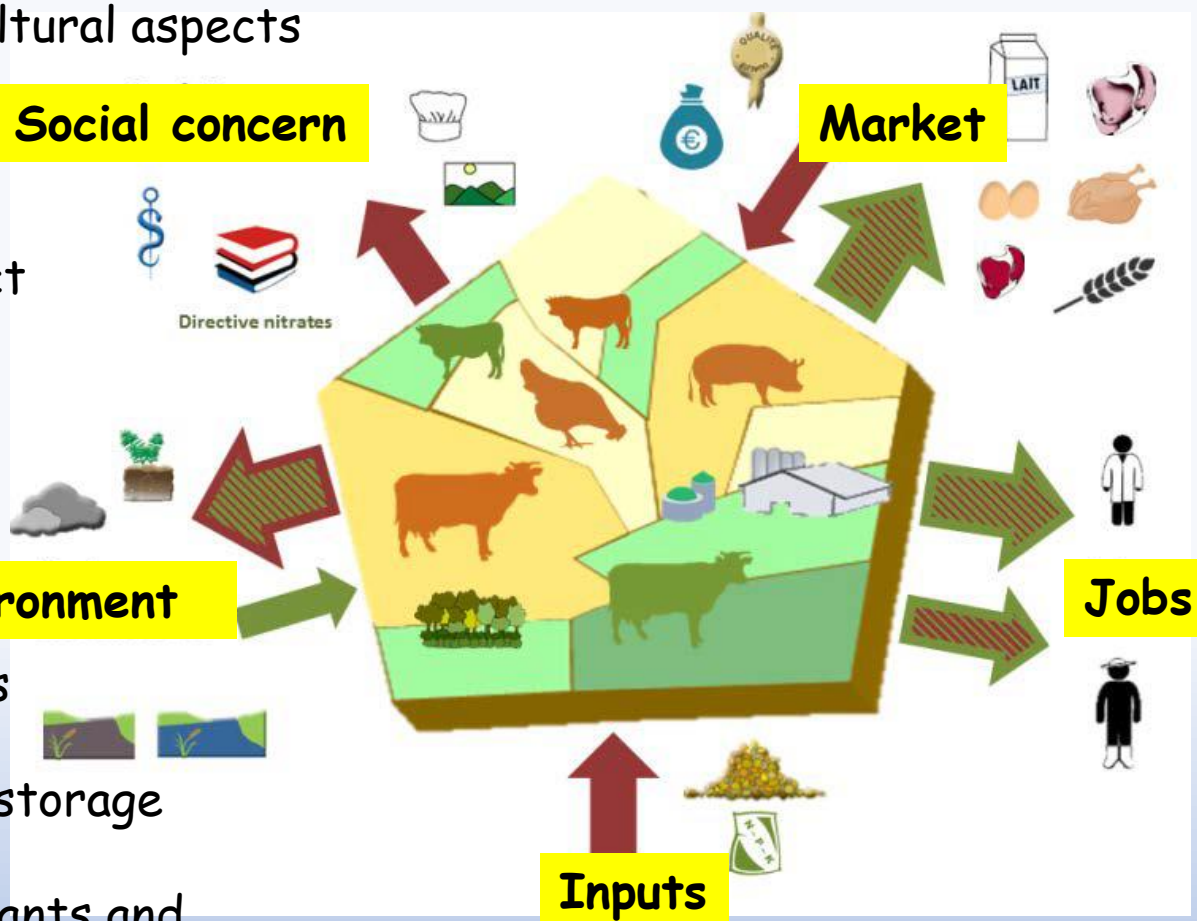
goods and services derived from livestock farming

Animal health
Heritage and cultural aspects
Animal welfare

Food consumption
Production
International trade
Associated sectors

Negative effect

Positive effect



Greenhouse gases
Air quality
Soils and carbon storage
Water quality
Biodiversity of plants and of animals

Direct employment
Indirect employment
Work
Technology and automation
Worker health and safety

Animal feed, Land use
Energy, phosphorous, water

From Dumont B. (ed.), Dupraz P. (ed.),. ROLE, IMPACTS AND SERVICES PROVIDED BY EUROPEAN L IVESTOCK PRODUCTION. Collective scientific assessment. INRA (France). .

❷ quality

over past decades:
improvements of knowledge, mostly
on muscle biochemistry and **genomics**
thanks to research

Genes, proteins, biomarkers

Marbling

Muscle fibres (number, size, type)

Blood capillaries

Adipocytes

Connective Tissue

JUICINESS

COLOUR

FLAVOUR

TENDERNESS

Fatty acid composition (nutritional value)

quality 2

still, more consumers' satisfaction is needed different beef grading schemes

Country / *Scheme*	Europe *EUROP*	S. Africa *S. Africa*	Canada *Canada*	Japan *JMGA*	S. Korea *Korea*	USA *USDA*	Australia *MSA*
Grading unit	Carcass						Cut
Pre slaughter factors							HGP implants & Bos Indicus
Slaughter-floor	Carcass weight and sex						
	Conformation Fat cover	Dentition Ribfat	Conformation				Electrical stimulation Hang
Chiller			Marbling score Meat Colour Fat colour and fat thickness			Ossification score	Fat thickness
			Texture	Meat brightness Fat luster Fat texture Fat firmness Rib thickness	Texture Firmness Lean maturity	Meat texture Ribfat Kidney fat Perirenal fat	Hump height Ultimate pH
				Eye muscle area			
Post chiller							Ageing time Cooking method

see **session 23** by Legrand Hocquette *et al*

Polkinghorne, Thompson, Meat Science, 2010, 86, 227-235.

3 CHALLENGES facing meat industry

a broad overlap between:

- efficiency — production, economical objectives — Global industry
- health — concerns for — animals & humans — Consumers..
- care — concerns for — animal 'welfare'
- environment — concerns about — climate change, land availability — humans'..... perspective
- alternatives — looking for new proteins ? — research & industry

according to breeding procedures & industry management, these components can be **mutually re-enforcing** ...

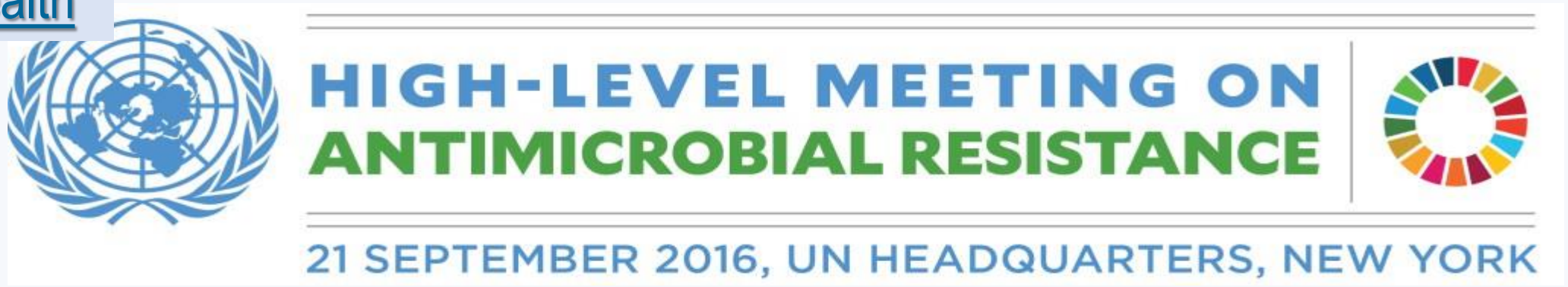
that is **sustainable**

or not sustainable !

challenges

1 health

the case of Anti-Microbial Resistance - AMR



world process launched by **UN**, involving: **WHO**, **OIE**, **FAO**

O.I.E. WORLD ANIMAL HEALTH - 2016

concept of **ONE HEALTH**

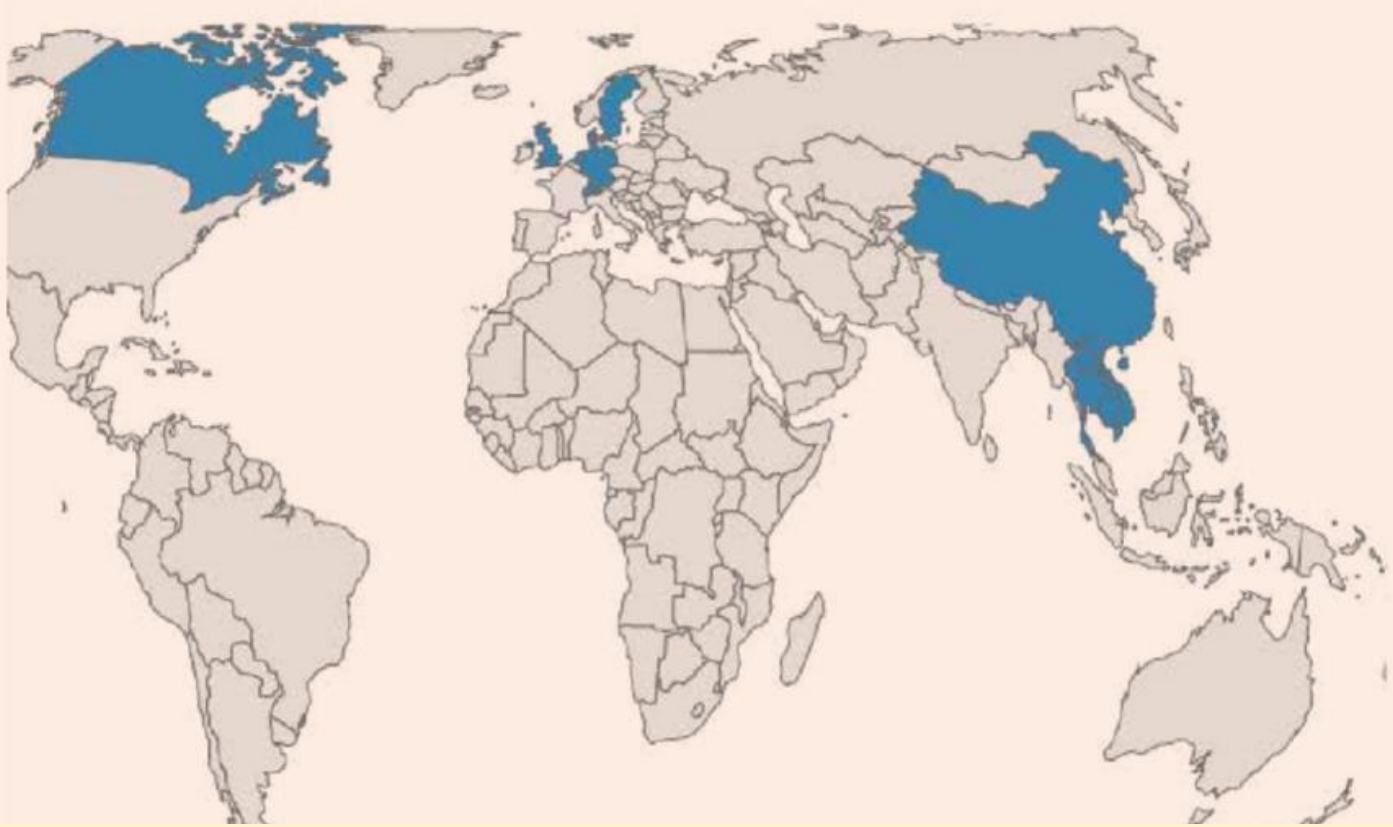
linked to ONE WELFARE

FAO report 2016

DRIVERS, DYNAMICS AND EPIDEMIOLOGY OF ANTIMICROBIAL RESISTANCE IN ANIMAL PRODUCTION

FAO report- 2014

FIGURE 3. Geographical distribution of detected colistin resistance (mcr-1 gene) in humans as of March 2016



Skov, R.L. & Monnet, D.L. 2016.
Plasmid-mediated colistin resistance (mcr-1 gene): three months later, the story unfolds.
Eurosurveillance, 2016 ; 21(9)

Excessive **drivers** for

= a animal **microbiota**.

Many of t erinary use

bel humans.

Antimicro

sub roups of animals

for *th rates* !

Exposure ns of

ant olution.

EUROPE'S FIGHT AGAINST ANTIMICROBIAL RESISTANCE

UPDATED WITH 2014 DATA

WHAT IS ANTIMICROBIAL RESISTANCE (AMR)?

Antimicrobials?
Substances used to treat a wide variety of infectious diseases in humans and animals. They:
- kill micro-organisms
- stop micro-organisms from growing and multiplying

Example: antibiotics such as Ciprofloxacin

Antimicrobial resistance?
The ability of micro-organisms to withstand antimicrobial treatments.

Example: MRSA (meticillin-resistant Staphylococcus aureus) commonly present on human skin and mucous membranes

Why is resistance growing?
- Overuse of antibiotics
- Misuse of antibiotics
- Spread through various routes

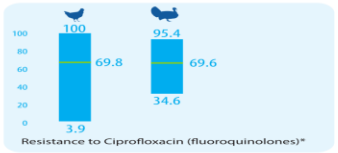
Effect of growing resistance?
- Treatment may become ineffective
- Serious risk to public health

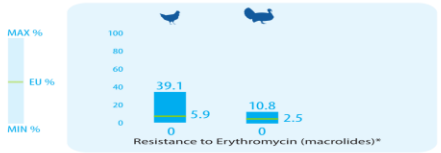
OVERVIEW OF RESISTANCE LEVELS IN EU

Based on "European Union Summary Report on antimicrobial resistance in zoonotic and indicator bacteria from humans, animals and food in 2014"

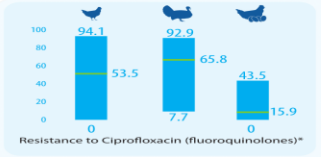
POULTRY AND FOODS

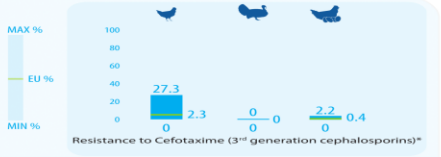
Campylobacter jejuni

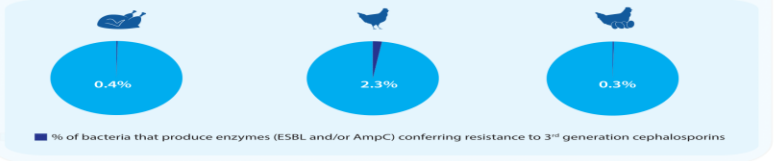




Salmonella



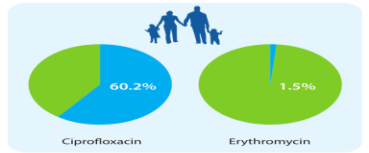




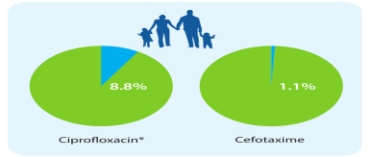
** Variability in percentage of bacteria presenting microbiological resistance reported by Member States*

HUMANS

Campylobacter jejuni



Salmonella (all non-typhoidal serovars)



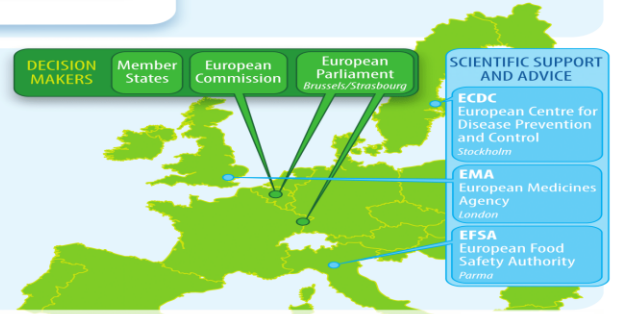
resistant

** Higher resistance levels were reported in certain Salmonella serovars that are prevalent in poultry in some Member States.*

HOW DO EFSA AND ECDC FIGHT AMR?

Scientific support & advice
EFSA and ECDC provide independent scientific support and advice to risk managers and decision makers on the possible emergence, spread and transfer of antimicrobial resistance. EFSA collects data on AMR in food-producing animals, while ECDC collects data on AMR in humans.

Integrated approach
EFSA and ECDC monitor AMR in animals and humans, using data reported by Member States. The two agencies cooperate with the European Medicines Agency to analyse the relationship between antimicrobial use and the emergence of resistance in food-producing animals and in humans.



efsa
European Food Safety Authority
www.efsa.europa.eu

EFSA is the keystone of EU risk assessment regarding food and feed safety. In close collaboration with national authorities and in open consultation with its stakeholders, EFSA provides independent scientific advice and clear communication on existing and emerging risks.

ECDC's mission is to identify, assess and communicate current and emerging threats to human health posed by infectious diseases.

ecdc
www.ecdc.europa.eu

challenges
4 health
& economy

Economical consequences of the ONE Health-AMR strategy for meat industry

➔ beyond official claimed adhesions, necessary **adaptative changes** in **breeding processes** and **trade objectives**,

Eliminating some antibiotic care
could cost cattle industry $1.8 billion

according to concerns about antibiotic treatment in animal production, the prospect to eliminate meatphylaxis (= ***mass treatment***) has to be faced and studied.
Based on data from 10 large Midwest feedlots, administering an antimicrobial upon entering occurs in 59% US feedlots.
Producers would loose $104/head
by not treating the hight-risk cattle (250 Kg).

➔ without metaphylaxis for hight-risk cattle, a global 1% reduction estimate in industry revenue would occur.

challenges

1 Animal Welfare / Care

Welfare: the 5 'freedoms'
5 PROVISIONS

1993 (UFAW)

2017 (D. Mellor)

1- *Freedom from* **hunger** and **thirst**

2- *Freedom from* **discomfort**

3- *Freedom from* **pain**, injury or **disease**

4- *Freedom to* **express normal behavior**

5- *Freedom from* **fear** and **distress**

basic needs

6- " *a* **life worth living** "

emotional need ?

ethical concerns

Regulations, Codes

Operators ...
breeders, industry

Cultures ...
citizens, consumers

Perceptions ...

different views on welfare concepts :

different-markets

different-approaches

different-cultures

Animal welfare // Human welfare

basic level in legislation:

research aimed at establishing basic welfare level

evaluation tools needed → **EU directories, World Label ?**

Animal welfare // sustainability

// Mostly market driven:

research at animal-marketability

→ Standards, Codes, Labels ?

Animal welfare // "terroir" // tradition & quality

Mostly market driven :

improving welfare in "traditional" products → **Local labels ?**

how Producers & Industry can RESPOND TO

➲ the increasing demand for

Animal **CARE**	-	Animal **WELFARE**
Anthropo-centered	/	*Zoo-centered*

National level directives laws rules penalties

International-level: nothing

but

Standards **Codes** **Labels?**

towards an **Animal Welfare** world standard ?

International standards related to **animal welfare**

transport slaughter emergency-euthanasia beefcattle broilers

are produced by O.I.E. (OIE Code-Chapter 7)

IMS + several large private companies worked with OIE to create an international **ISO Welfare Technical Specification**

Animal welfare management (TS 34700) **2016**

General requirements and guidance for organizations in the food supply chain

Will this tool be used in future ?

towards **alternative sources** for proteins ?

will our children eat animal protein ?

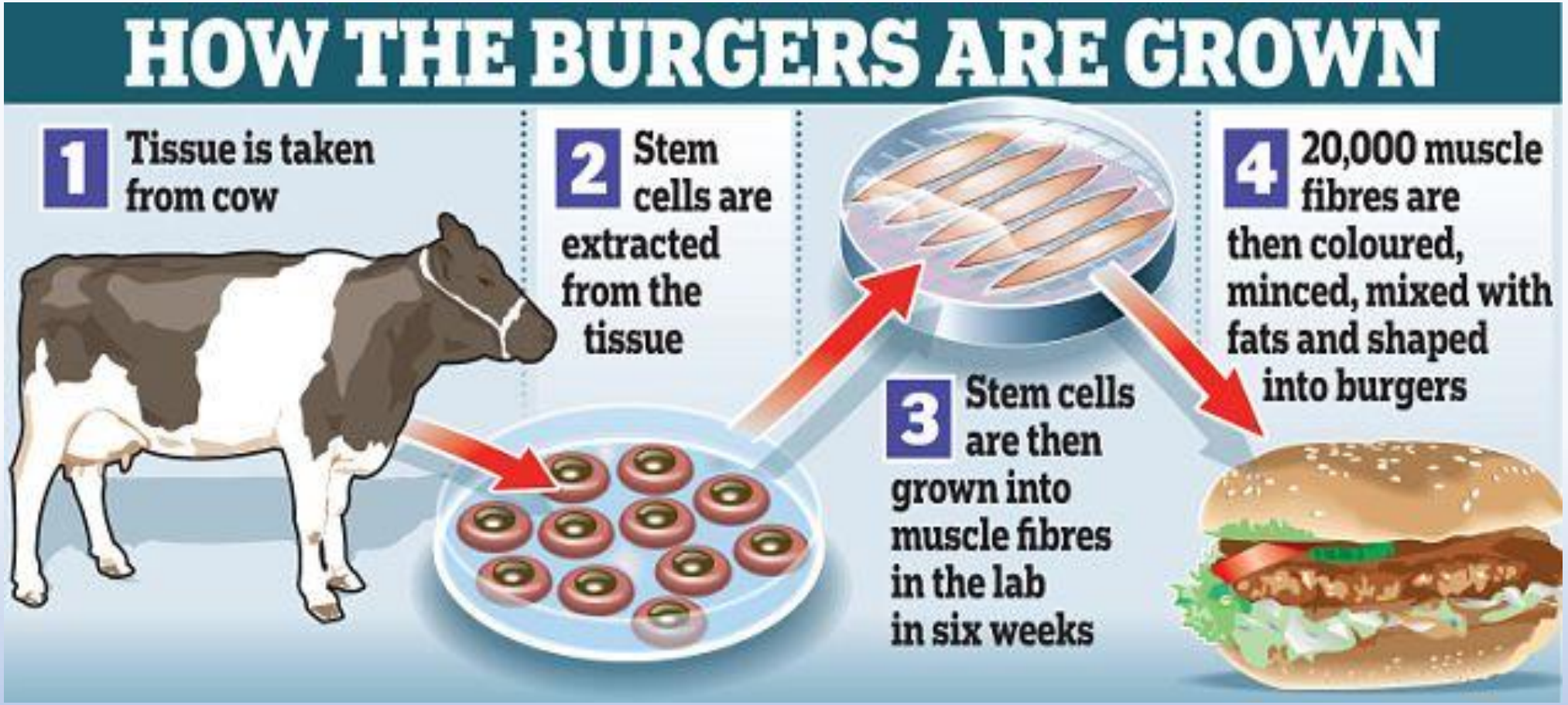
today, livestock and meat sectors are facing new challenges:

- Concerns about their **environmental impact** and part in global climate change;

- balancing the need for **increased production of animal products** (to satisfy the increasing human population)
- the need for a **lower footprint**,
- the society concerns about **animal welfare**
- new "**quality product" requests** from the consumer

challenges
6 Meat Alternatives

the meat of future: could it be cultured meat ?



http://www.dailymail.co.uk/sciencetech/article-2384715/At-tastes-meat--Worlds-test-tube-artificial-beef-Googleburger-gets-GOOD-review-eaten-time.html

May 2018

Bloomberg

Tyson Foods Inc., the largest meatpacker in the U.S., is co-leading
a $2.2 million investment in the Israeli startup - **Future Meat Technologies** -

Investors seem to be in favor of …

is Meat becoming:

a new social issue ?

a new challenge for industrials ?

"We've done a lot of work in scaling up the cell culture...
*to **something that can be used on an industrial scale**"*

Mosa's - Mark Post - Maastricht University

challenges
8 Meat Alternatives

a high quality meat produced independent of the animal's body

"Same Meat "
Different Way

Marketing is ready …

It's **Eco-Friendly**

Clean Meat will have a much smaller eco footprint requiring 99% less land, upto 96% less Greenhouse Gas emissions and upto 90% less water usage.

It's **Animal Friendly**

No animal needs to be used.
A single biopsy will allow for potentially indefinite production of meat products.

It's **Healthier**

SuperMeat's Clean Meat is grown under controlled and clean conditions, allowing for the elimination of food-borne diseases, bacterial resistance and much more.

Announcing two new job openings!

Want to work at **Mosa Meat**?

We're very excited to announce 2 new open roles in our scientific team:

Postdoctoral Fellow - **Adipogenesis**, focusing on creating fat tissue in consumable meat.

Postdoctoral Fellow - **Muscle Cell Biology**, creating muscle organoids for meat.

https://www.mosameat.com/blog/2018/5/30/announcing-the-first-job-openings

Thank you

Good luck for the future !