FOODTECH - Prodotti innovativi in campo zootecnico per la riduzione degli antibiotici

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LA RIDUZIONE DEGLI ANTIBIOTICI NEGLI ALLEVAMENTI

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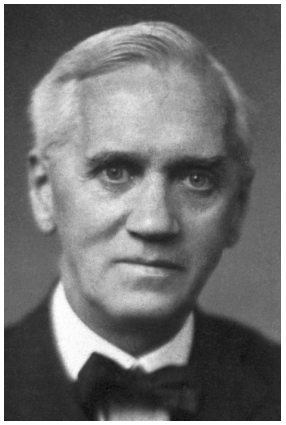
Dipartimento di Scienze veterinarie per la Salute la Produzione animale e la Sicurezza alimentare

ANTIBIOTICI



PERCHÉ SERVONO ALTERNATIVE AGLI ANTIBIOTICI?

NON E' UN PROBLEMA DI RESIDUI

Antibiotico-resistenza non è un problema nuovo ma…

ALEXANDER FLEMING

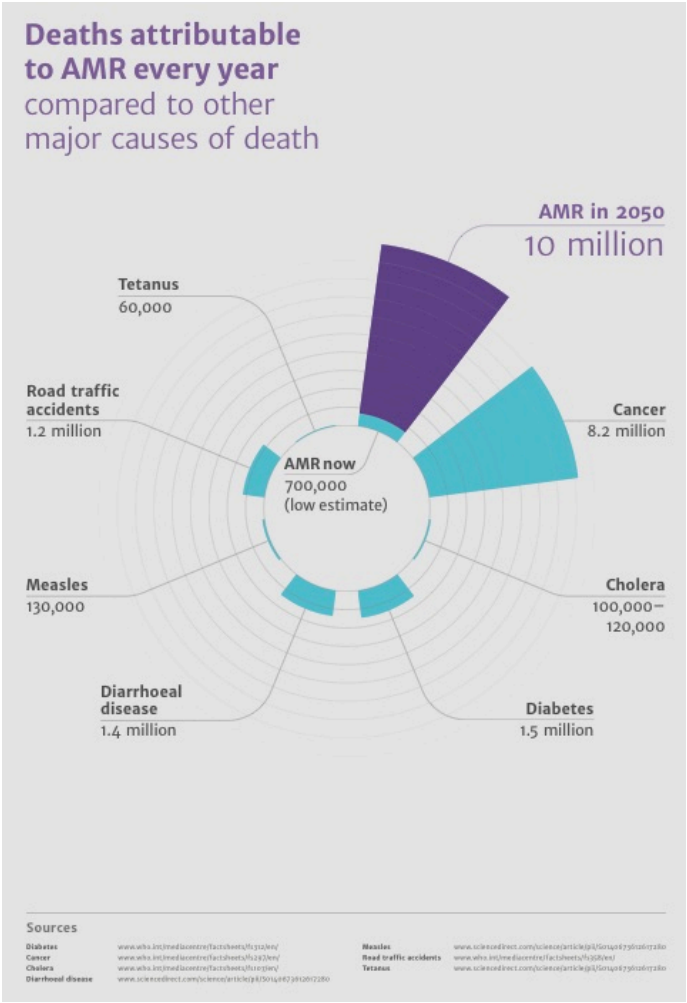
Penicillin

Nobel Lecture, December 11, 1945

I am going to tell you about the early days of penicillin, for this is the part of the penicillin story which earned me a Nobel Award. I have been frequently asked why I invented the name "Penicillin". I simply followed perfectly orthodox lines and coined a word which explained that the substance penicillin was derived from a plant of the genus *Penicillium* just as many years ago the word "Digitalin" was invented for a substance derived from the plant *Digitalis*. To my generation of bacteriologists the inhibition of one microbe by another was commonplace. We were all taught about these inhibitions and indeed it is seldom that an observant clinical bacteriologist can pass a week without seeing in the course of his ordinary work very definite instances of bacterial antagonism.

Sir Alexander Fleming

The Nobel Prize in Physiology or Medicine, 1945



Review on Antimicrobial Resistance

Tackling drug-resistant infections globally

Chaired by Jim O'Neill
December 2014

E' necessario difendere le nostre difese

Tackling antibiotic resistance in a food safety perspective (WHO, 2011).

La riduzione dell'uso degli antibiotici negli animali produttori di alimenti è efficace nel ridurre l'antibiotico resistenza?

Restricting the use of antibiotics in food-producing animals and its associations with antibiotic resistance in food-producing animals and human beings: a systematic review and meta-analysis

Karen L Tang, Niamh P Caffrey, Diego B Nóbrega, Susan C Cork, Paul E Ronksley, Herman W Barkema, Alicia J Polachek, Heather Ganshorn, Nishan Sharma, James D Kellner, William A Ghali

Systematic review, commissioned by WHO

Summary

Background Antibiotic use in human medicine, veterinary medicine, and agriculture has been linked to the rise of antibiotic resistance globally. We did a systematic review and meta-analysis to summarise the effect that interventions to reduce antibiotic use in food-producing animals have on the presence of antibiotic-resistant bacteria in animals and in humans.

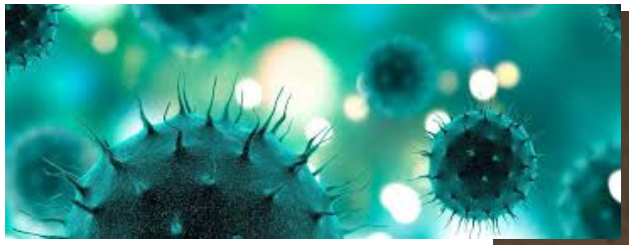
Lancet Planet Health 2017; 1: e316–27

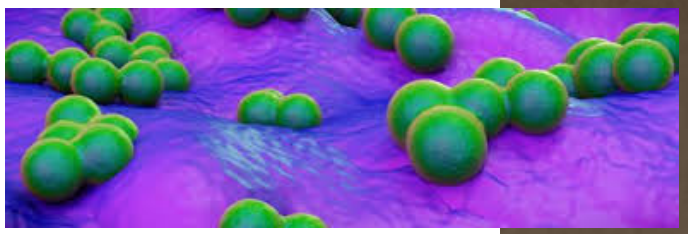
Published Online November 6, 2017 http://dx.doi.org/10.1016/S2542-5196(17)30141-9

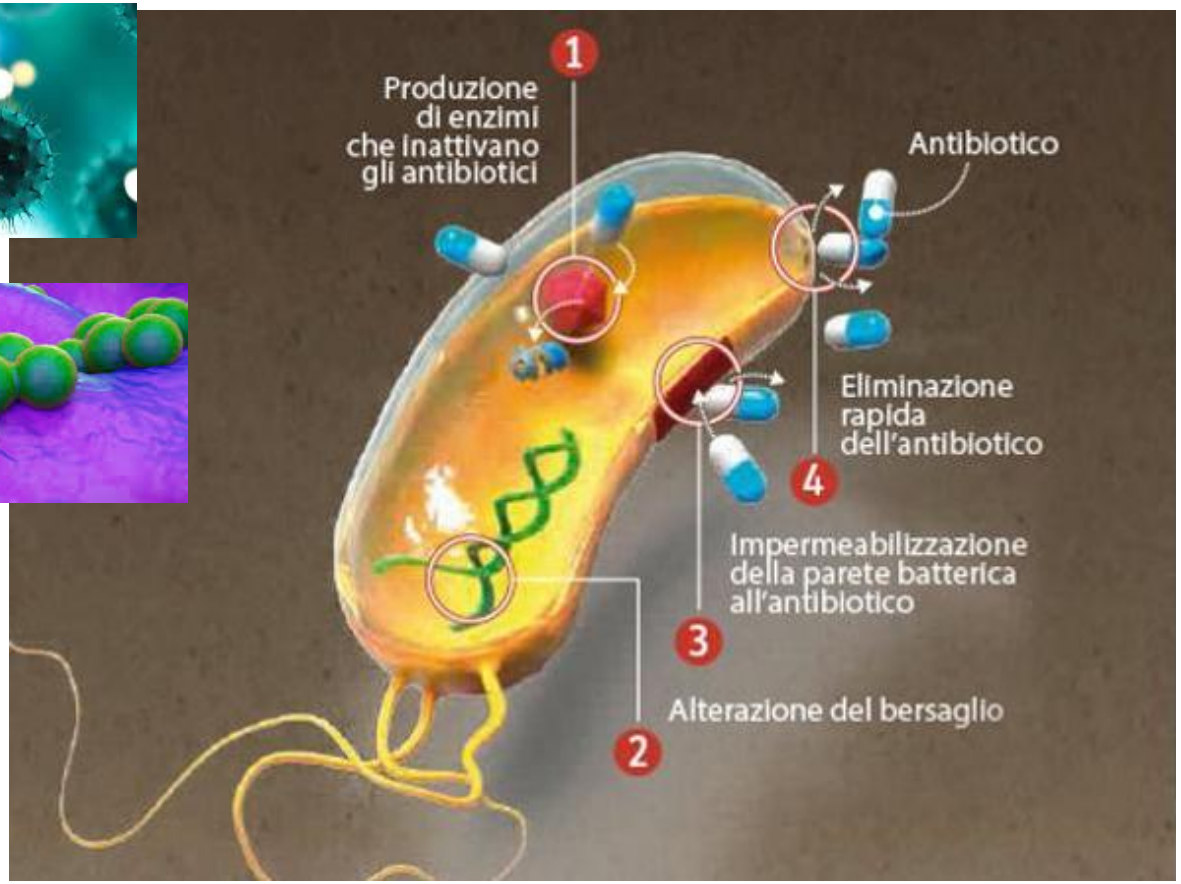
RIDUCE LA PRESENZA DI BATTERI ANTIBIOTICO-RESISTENTI DEL 15% E DEI BATTERI MULTI-RESISTENTI DEL 24-32%.

ANTIBIOTICO RESTITENZE SONO UN COSTO

I GENI PER LA RESISTENZA AGLI ANTIBIOTICI POSSONO ESSERE TRASFERITI TRA BATTERI DIVERSI







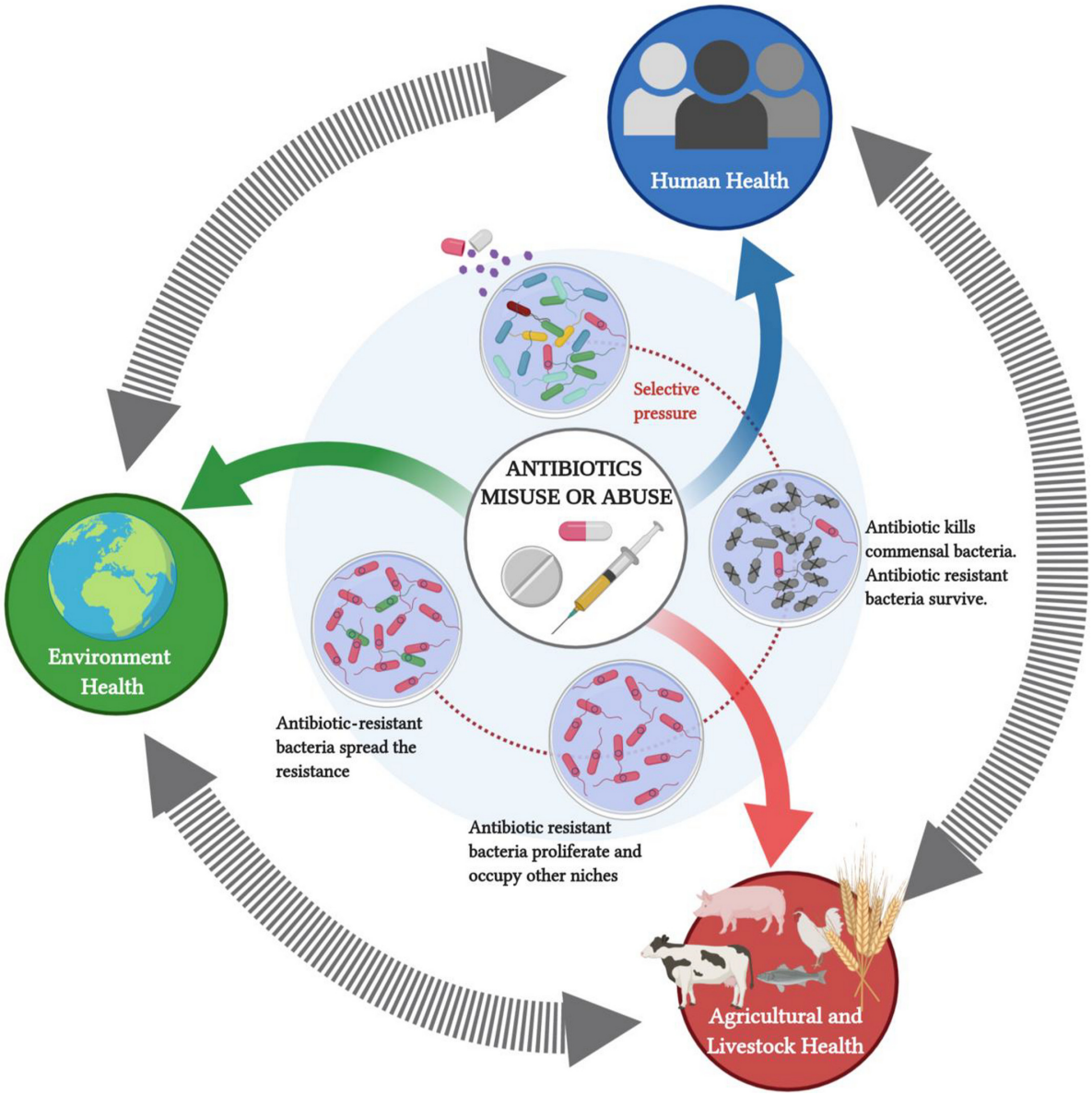
Fighting the enemy: one health approach against microbial resistance

UN System Influenza Coordination

unicef

World Health Organization

THE WORLD BANK



Microbial Biotechnology, Volume: 13, Issue: 4, Pages: 888-891, First published: 04 May 2020, DOI: (10.1111/1751-7915.13587)

QUALI SONO LE NUOVE TENDENZE DEL CONSUMATORE?

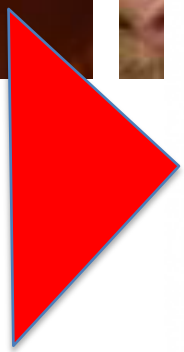
Global food trends

INFODEMIA (WHO, 2020)

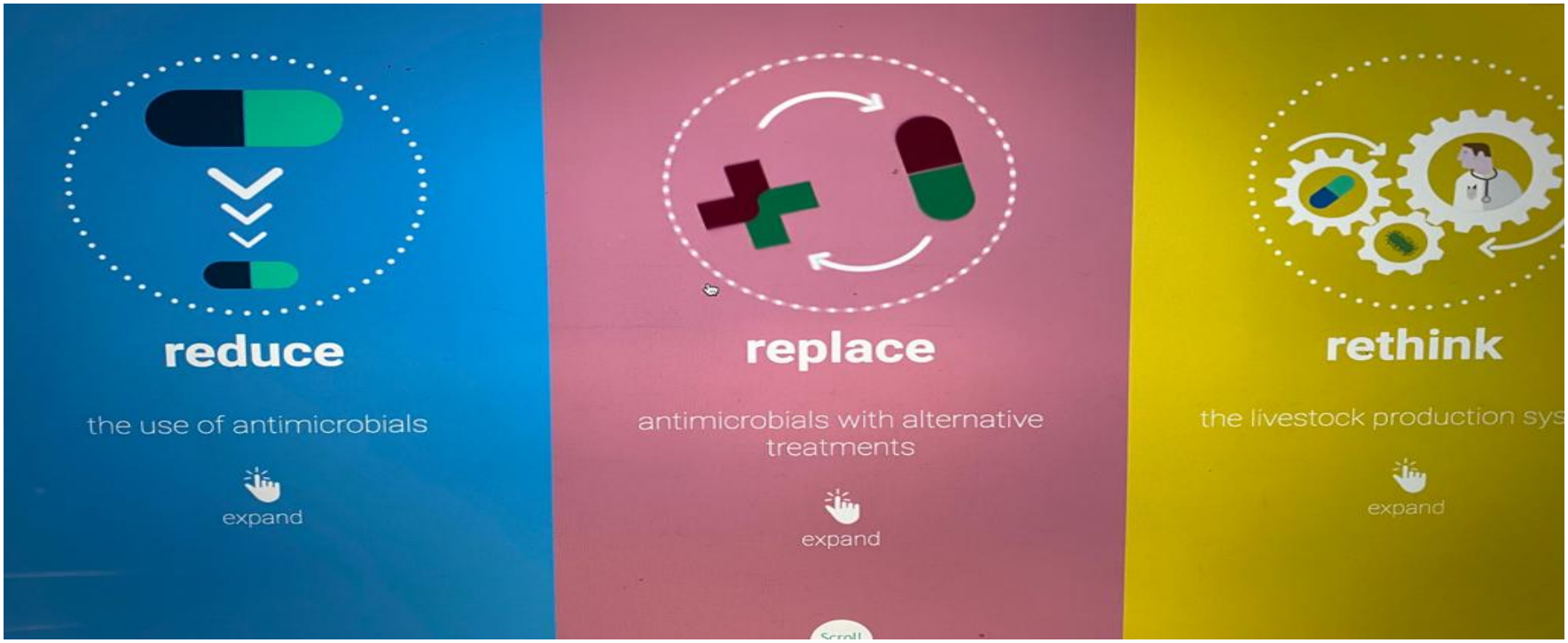
ELIMINAZIONE DEGLI ANTIBIOTICI NEGLI ALLEVAMENTI: E' POSSIBILE?

Antibiotics are pivotal
Antibiotics not a renewable resource

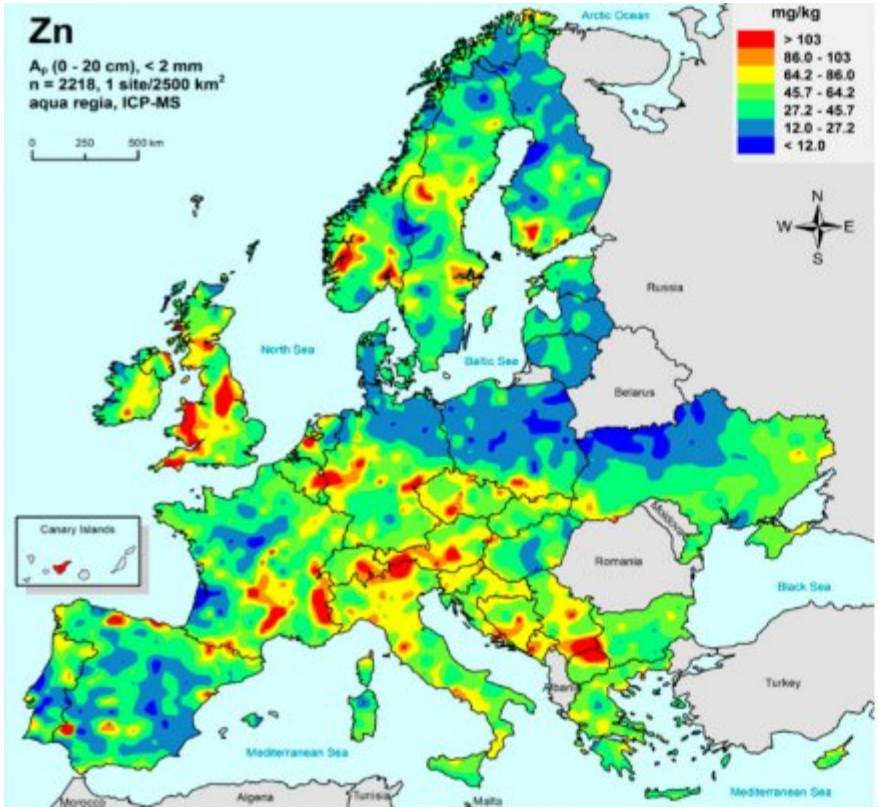
ELIMINAZIONE DEGLI ANTIBIOTICI NEGLI ALLEVAMENTI: E' POSSIBILE?



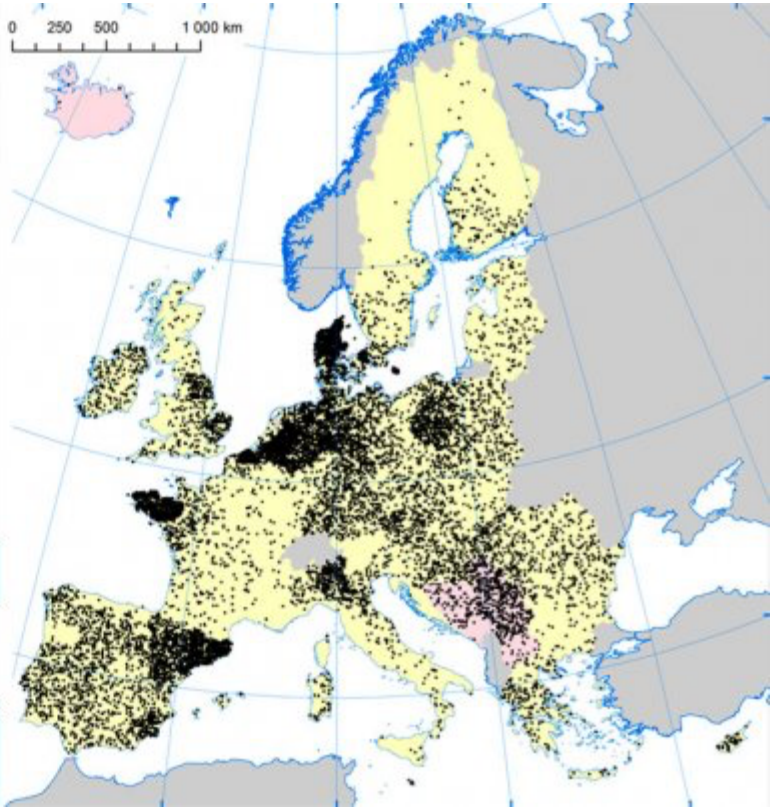
It's time to
-REDUCE,
-REPLACE and
-RE-THINK
the use of antimicrobials in animals



La prima alternativa agli antibiotici è stato l'ossido di zinco



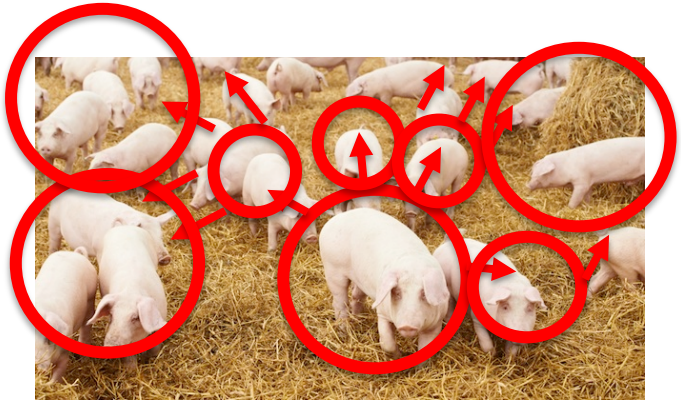
Zinc in EU agricultural soils (Gemas 2014): Top soil zinc levels (top 20cm) in agricultural land in Europe (Taken from Reimann et al., 2014).

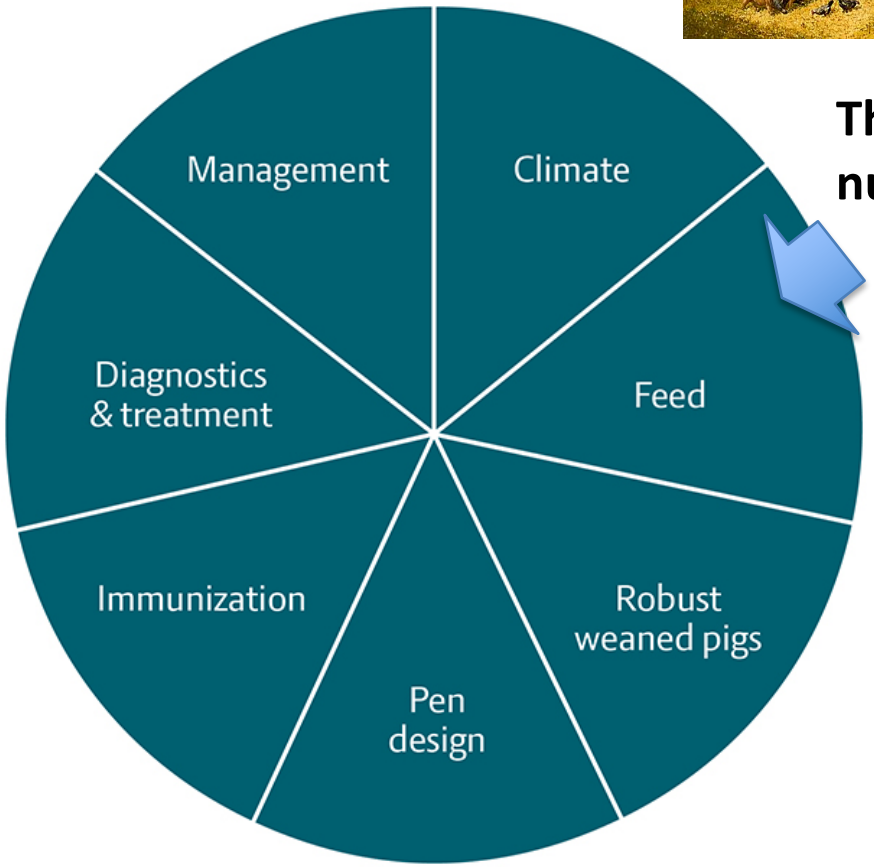


EU sow herds (Eurostat, 2014).

Obiettivo del progetto
PROMUOVERE LA SALUTE ANIMALE E RIDURRE L'INCIDENZA DELLE PATOLOGIE

Key: Prevention





The role of nutrition

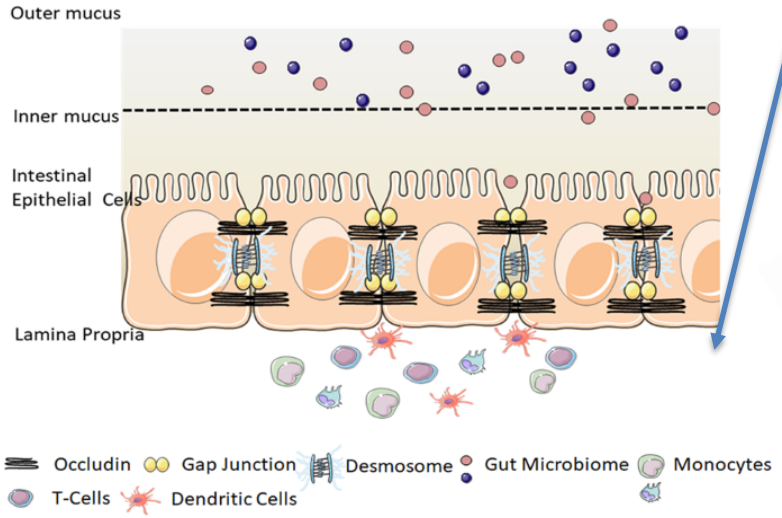
Animale

Nutrizione

Salute dell'intestino
Funzionalità della barriera intestinale

- **Gut barrier function** ⟷ **Gut microbiota**

Alimenti funzionali



- **Immune system**

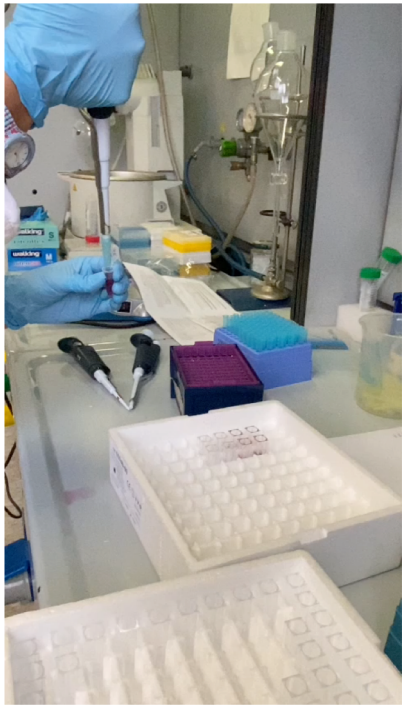
Microrganismi

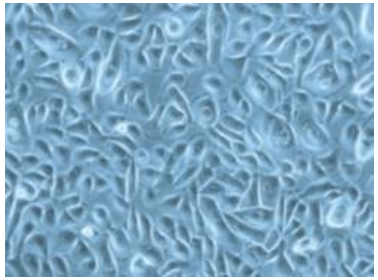
Chelakkot, C., Ghim, J. & Ryu, S.H. Mechanisms regulating intestinal barrier integrity and its pathological implications. Exp Mol Med 50, 103 (2018). https://doi.org/10.1038/s12276-018-0126-x

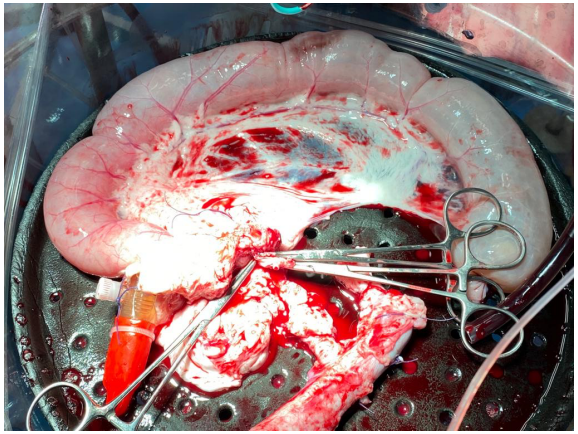
Multisciplinarità

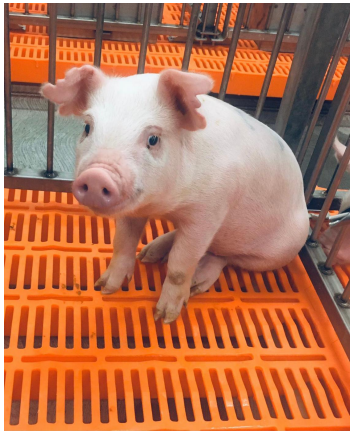
Integrazione e sinergismo delle competenze accademiche e industriali per sviluppare un approcci che siano realmente rispondenti alle esigenze di settore.

Approcci integrati che hanno previsto l'uso di modelli sperimentali molto diversi e funzioni complementari.









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ITALIAN JOURNAL OF ANIMAL SCIENCE
2020, VOL. 19, NO. 1, 103–113
https://doi.org/10.1080/1828051X.2019.1703563

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PAPER

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In vitro evaluation of antimicrobial and antioxidant activities of algal extracts

Matteo Dell'Anno[a]*, Stefania Sotira[a]*, Raffaella Rebucci[a], Serena Reggi[a], Bianca Castiglioni[b] and Luciana Rossi[a]

Animal Feed Science and Technology 266 (2020) 114519

Contents lists available at ScienceDirect

Animal Feed Science and Technology

journal homepage: www.elsevier.com/locate/anifeedsci

Evaluation of leonardite as a feed additive on lipid metabolism and growth of weaned piglets

Matteo Dell'Anno[a], Monika Hejna[a], Stefania Sotira[a,*], Valentina Caprarulo[a], Serena Reggi[a], Roberto Pilu[b], Francesco Miragoli[c], Maria Luisa Callegari[c], Sara Panseri[a], Luciana Rossi[a]

[a] Department of Health, Animal Science and Food Safety, Università Degli Studi Di Milano, Via Dell'Università 6, Lodi 26900, Italy

Mint oils:

in vitro anti-inflammatory effects tested in porcine alveolar macrophages

Monika Heja[1,2], Lauren Kovanda[2], Luciana Rossi[1], Yanhong Liu[2]

[1] University of Milan, Italy.
[2] University of California, Davis, USA.

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animals

MDPI

Article

Effects of Tributyrin Supplementation on Growth Performance, Insulin, Blood Metabolites and Gut Microbiota in Weaned Piglets

Stefania Sotira [1], Matteo Dell'Anno [1,*], Valentina Caprarulo [1], Monika Hejna [1], Federica Pirrone [2], Maria Luisa Callegari [3], Telma Vieira Tucci [4] and Luciana Rossi [1]

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animals

MDPI

In vitro

Article

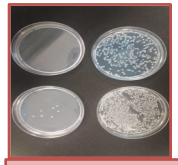
In Vitro Digestion of Chestnut and Quebracho Tannin Extracts: Antimicrobial Effect, Antioxidant Capacity and Cytomodulatory Activity in Swine Intestinal IPEC-J2 Cells

Serena Reggi †, Carlotta Giromini *,†, Matteo Dell'Anno, Antonella Baldi, Raffaella Rebucci and Luciana Rossi

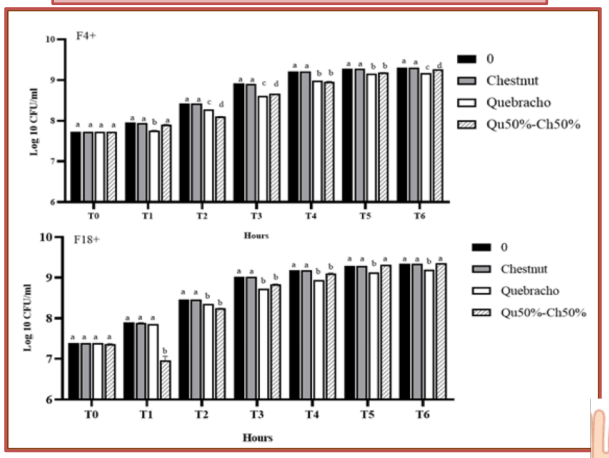
Tannin extracts

Quebracho
Schinopsis spp

Chestnut
Castanea sativa Mill.



Evaluation of antimicrobial properties against *E.coli* F4+ and F18+



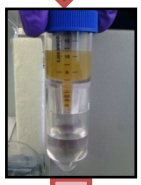
In vitro digestion

α-amylase

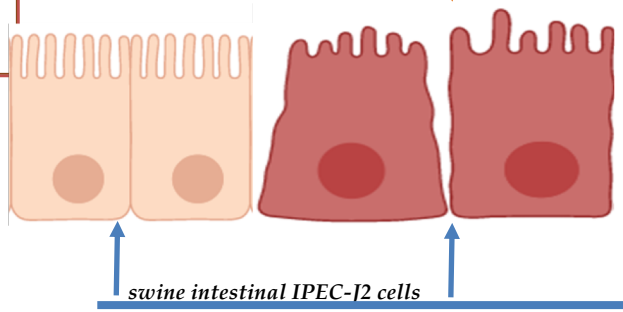
Pepsin

Pancreatin/bile

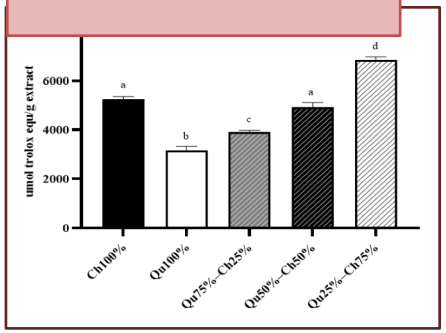
Digested tannin extracts



H_2O_2, DSS



Evaluation of antioxidant properties



Evaluation of cytomodulatory activity in swine intestinal IPEC-J2 cells

animals

MDPI

Article

Evaluation of Dietary Administration of Chestnut and Quebracho Tannins on Growth, Serum Metabolites and Fecal Parameters of Weaned Piglets

Valentina Caprarulo [1], Monika Hejna [1,2,*], Carlotta Giromini [1], Yanhong Liu [2], Matteo Dell'Anno [1], Stefania Sotira [1], Serena Reggi [1], Carlo Angelo Sgoifo-Rossi [1], Maria Luisa Callegari [3] and Luciana Rossi [1]

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Table 4
Zootechnical performance of *in vivo* trial (from day 0 to 40) divided by control (CTRL) and treatment (HAG supplemented with 0.25% of leonardite) group.

				P-values		
	CTRL	HAG	SEM ±	Trt	Day	Trt × Day
BW, kg				0.112	< 0.001	< 0.001
d 0	8.71	8.72	0.871			
d 14	11.11	12.21				
d 28	15.44	18.36				
d 40	20.17[a]	24.25[b]				
ADFI, kg/d				0.003	< 0.001	0.254
d 0 – 14	0.353	0.465	0.034			
d 14 – 28	0.651[a]	0.841[b]				
d 28 – 40	0.730[a]	0.891[b]				
ADG, kg/d				< 0.001	< 0.001	0.535
d 0 – 14	0.171	0.249	0.024			
d 14 – 28	0.310[a]	0.440[b]				
d 28 – 40	0.396[a]	0.491[b]				
FCR, kg/kg						
d 0 – 14	1,97	1,77	0,115	0.384	0.146	0.445
d 14 – 28	1,93	1,79				
d 28 – 40	2,03	2,09				

a–b means with different superscripts are significantly different between treatments ($P < 0.05$).
Data are expressed as least squares means (LSMEANS) and standard error of the mean (SEM).
BW: body weight; ADG: average daily gain; ADFI: average daily feed intake; FRC: feed conversion rate; CTRL: control group; HAG: humic acid enriched diet group supplemented with 0.25% of leonardite.

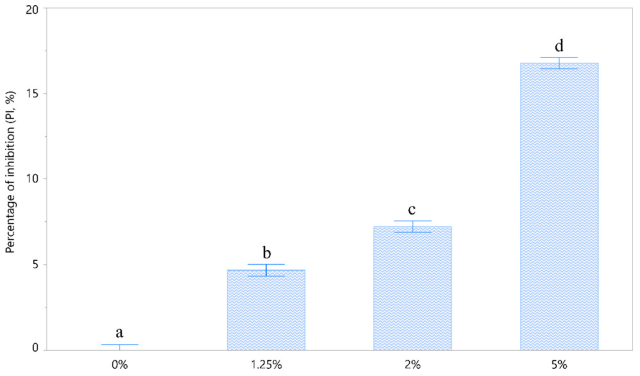

Fig. 1. Percentage inhibition of $ABTS^{\cdot+}$ of different concentrations of humic acids extract (blank: 0%; 1.25%; 2% and 5%) measured by Trolox Equivalent Antioxidant Capacity (TEAC) assay.
a–b means with different superscripts are significantly different between treatments ($P < 0.0001$). Data are expressed as least square means (LSMEANS) and Standard Error (SE).
ABTS: 2,2′-azino-bis (3-ethylbenzothiazoline-6-sulfonic acid).

Dietary supplementation with 0.25% leonardite improved the zootechnical performance, serum lipidic profile and gut epithelium integrity, thus indicating a good general health status. The increased serum HDL and decreased total triglycerides suggest that leonardite is a promising feed additive to improve lipid metabolism. The higher serum Mg content found also suggests that leonardite supports an improved stress response in weaned piglets.

Strategie nutrizionali per la riduzione degli antibiotici

- Alta qualità delle materie prime (contenuto di nutrienti essenziali, biodisponibilità, digeribilità appetibilità)
- Eterogenità dei prodotti commercializzati
- Costo/beneficio
- Mantenimento dell'eubiosi (probiotici)
- Additivi e ingredienti funzionali
- Innovazione

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