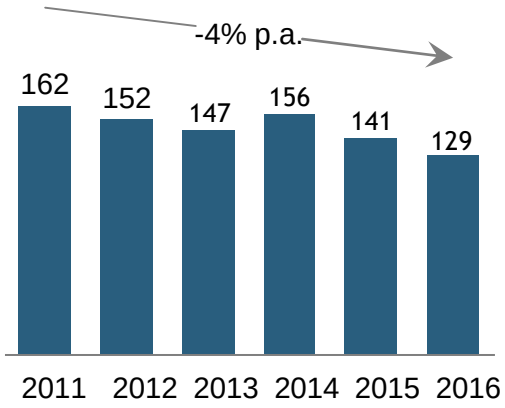
# Antibiotická terapie v chovech prasat- aktuální situace a budoucí prespektiva

**Daniel Šperling DVM, PhD**

# Současný trend Anti-infektiva: progresivní změna směrem k "racionálnímu" použití antibiotik ve veterinární medicíně

## Evropa: kontinuální pokles spotřeby antibiotik

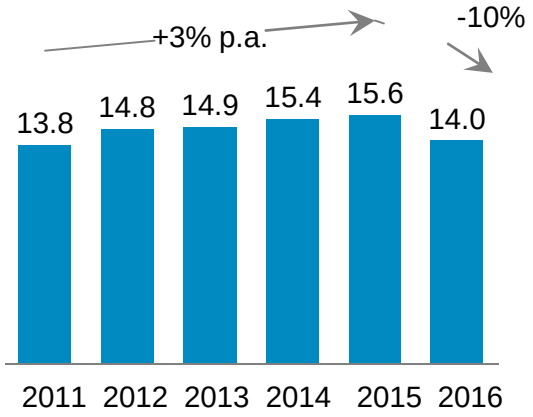
*Celkový prodej: mg/PCU[1]*




- Redukce spotřeby je řízena kampaněmi směrovanými na racionální použití, změnou spotřebitelských preferencí a restrikcemi regulátorů

## USA: pokles spotřeby ATB od roku 2015

*Celkový prodej v M kg účinné látky*




- **Producenti prasat pomalejší progress v porovnání s drůbeží**
- **Nová legislativa** 2016: ATB-preskribce

## China: regulace spotřeby ATB se očekává v kratké době

- Současnost: zvyšující se spotřeba ve veterinární medicíně 100K t 2014 (+18% vs 2013)
- Do současné doby, navyšování spotřeby z důvodu dosažení krátkodobých cílů
- **Situace se dramaticky změní - ASF**
- Tlak na AMR[3] a ochranu spotřebitele

Plán 2020, **očekávaný pokles spotřeby ATB**

1. Projekt na zákaz použití medikace krmiva
2. Projekt preskribce ATB

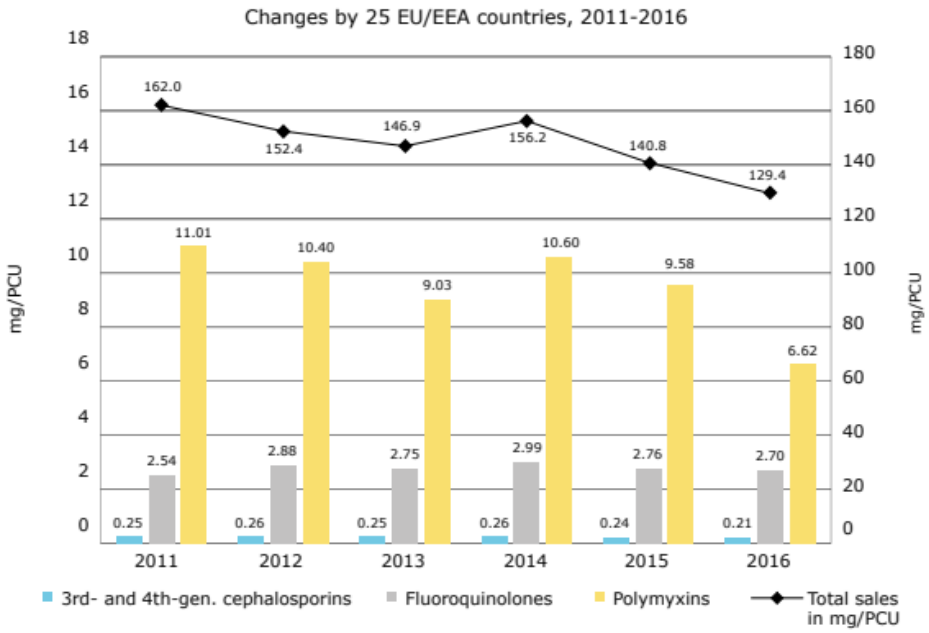
1. PCU = population correction unit, number of food-producing animals Source: ESVAC, FDA,

# Současná situace v Evropě?

- Redukce spotřeby ATB
- Kategorizace ATB
- Doporučení pro použití ATB

# Racionální použití ATB: EU perspektiva

Trend CIA: nová kategorizace v Evropě




ESVAC report 2017

Holandsko Maran report 2018

**Figure ABuse01** Antimicrobial veterinary medicinal product sales 1999-2017 in kg (thousands).

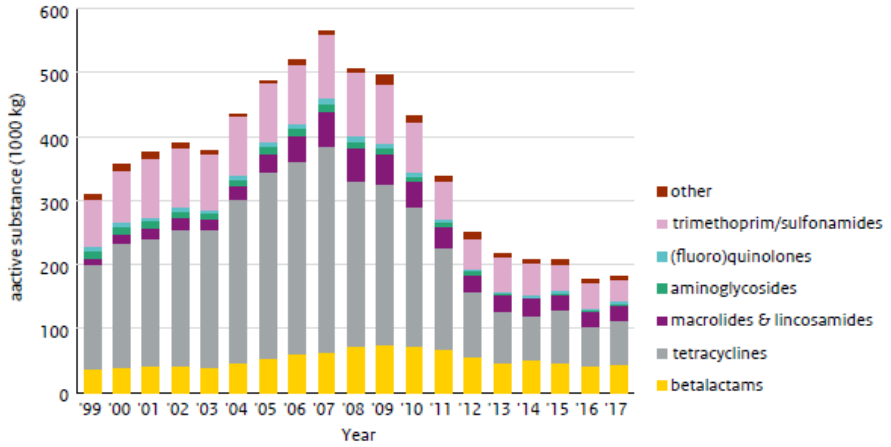
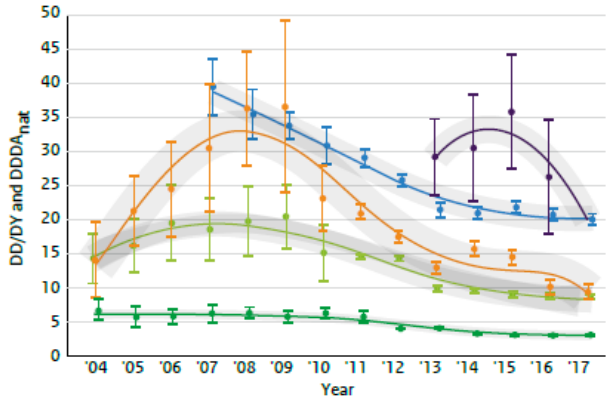



**Figure ABuse03** Animal-defined daily dosages for turkeys (purple), veal calves (blue), broilers (orange), pigs (light green) and dairy cattle (dark green) farms as reported by LEI WUR-MARAN (years 2007-2010 as DD/AY) and by SDa (years 2011-2017 as $DDDA_{NAT}$) depicting point estimates (dots), 95% confidence limits (error bars), smoothed trend line (penalized spline) and 95% confidence limits for the spline (shaded area).



# Racionální použití ATB: EU perspektiva

## France ANSES report 2018

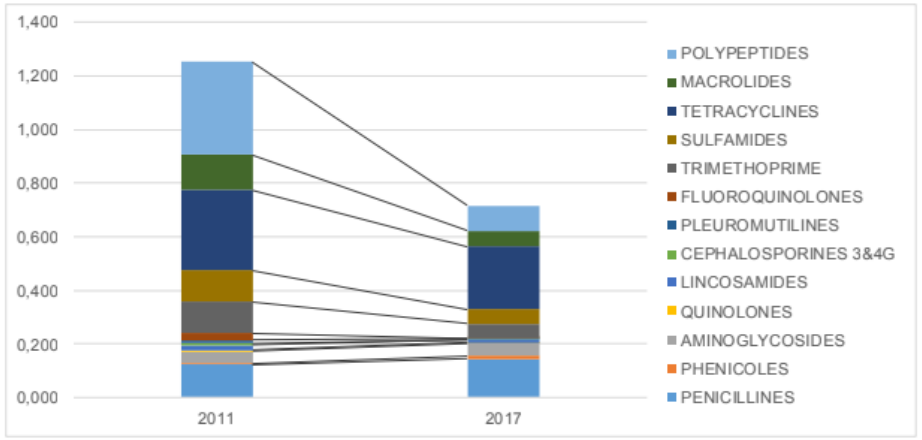
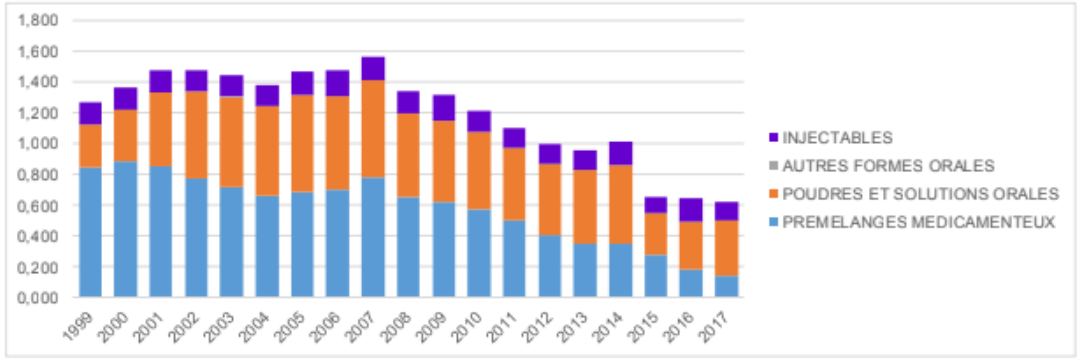
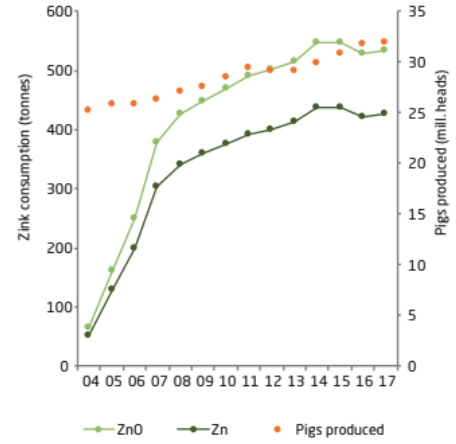



*Figure 11 : Evolution de l'exposition des porcs par formes pharmaceutiques depuis 1999 (ALEA)*




## Denmark DANMAP 2017

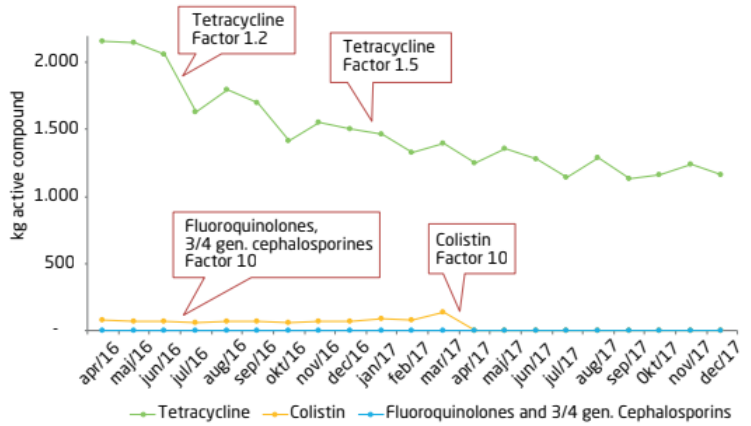
**Figure 4.6 Consumption (tonnes) of zinc oxide (ZnO) and zinc (Zn) in the pig production, Denmark** DANMAP 2017




Note: The most commonly used product is zinc oxide (ZnO) which contains 80% zinc and which is largely insoluble in water

**Figure 1 Use of selected antimicrobial agents in pigs per month (from april 2016), Denmark**

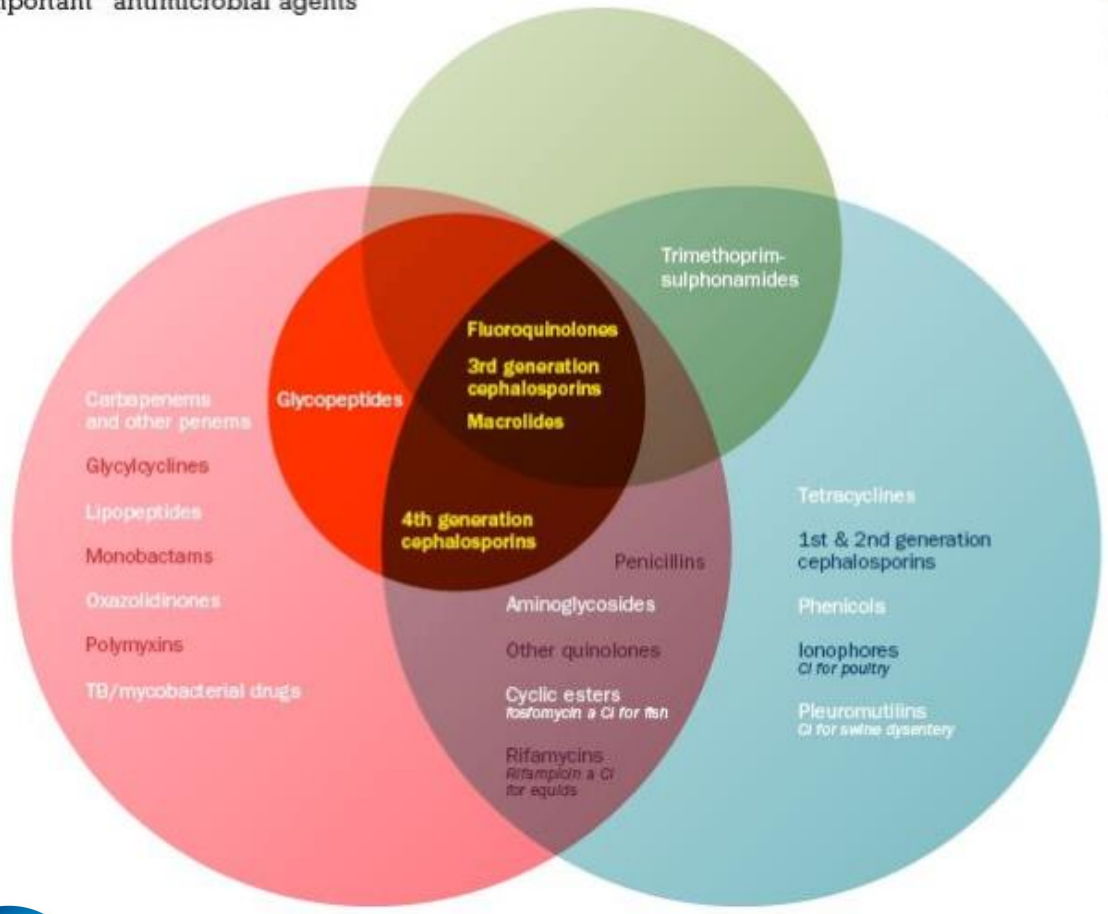
DANMAP 2017




Note: Data was extracted from VetStat in May 2018. The data from the database is dynamic and the numbers above can change over time due to retrospective corrections. The usage of fluoroquinolones, 3rd and 4th generation cephalosporines does not show in the figure as the use is close to zero. The same applies to the use of colistin since April 2017.

# Klasifikace antibiotik různými organizacemi - Kriticky důležitá skupina CIA

Classes of antibiotics included in the WHO, OIE and FDA lists of "critically important" antimicrobial agents




WHO critically important antibiotics for human medicine

WHO highest priority critically important antibiotics

OIE critically important antibiotics for veterinary medicine

FDA critically important antibiotics for human medicine

CI — Critically important

Classes of antibiotics highlighted in yellow are considered highest priority critically important in human medicine, and critically important in veterinary medicine.

Please refer to the original WHO, OIE and FDA lists for the categories of individual agents.

World Organisation for Animal Health

World Health Organization

Prepared by
March 2015

| Critically Important | Antimicrobial class | Criterion (Yes = ●) | | | | |
|---|---|---|---|---|---|---|
| | CRITICALLY IMPORTANT ANTIMICROBIALS | C1 | C2 | P1 | P2 | P3 |
| | *HIGHEST PRIORITY* | | | | | |
| Highest Priority | *Cephalosporins (3rd, 4th and 5th generation)* | ● | ● | ● | ● | ● |
| Highest Priority | *Glycopeptides* | ● | ● | ● | ● | ● |
| Highest Priority | *Macrolides and ketolides* | ● | ● | ● | ● | ● |
| Highest Priority | *Polymyxins* | ● | ● | ● | ● | ● |
| Highest Priority | *Quinolones* | ● | ● | ● | ● | ● |
| | *HIGH PRIORITY* | | | | | |
| | *Aminoglycosides* | ● | ● | | ● | ● |
| | *Ansamycins* | ● | ● | ● | ● | |
| | *Carbapenems and other penems* | ● | ● | ● | ● | |
| | *Glycylcyclines* | ● | ● | ● | | |
| | *Lipopeptides* | ● | ● | ● | | |
| | *Monobactams* | ● | ● | ● | | |
| | *Oxazolidinones* | ● | ● | ● | | |
| | *Penicillins (natural, aminopenicillins, and antipseudomonal)* | ● | ● | | ● | ● |
| | *Phosphonic acid derivatives* | ● | ● | ● | ● | |
| | *Drugs used solely to treat tuberculosis or other mycobacterial diseases* | ● | ● | ● | ● | |

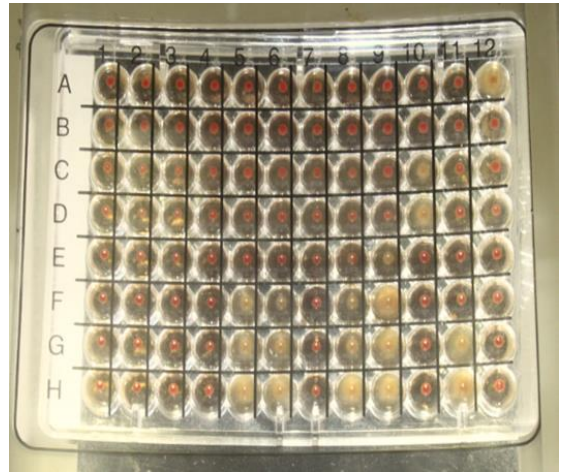
# Kategorizace antibiotik: EMA

EUROPEAN MEDICINES AGENCY
SCIENCE MEDICINES HEALTH

• **Kategorie A (Avoid)** Použití těchto skupin ATB je u potravinových zvířat zakázáno

• **Kategorie B (Restrict).** Tato ATB jsou ve svém použití omezena a mohou být používána pouze v případech, kde je prokázáno, že jsou jedinou účinnou volbou a **alternativy kategorie C a D jsou prokazatelně neúčinné**

• **Kategorie C (Caution).** Alternativy pro některé indikace




• **Kategorie D (Prudence).** Nejnižší stanovené riziko, léčba první volby, nejnižší míra rizika pro vývoj rezistence a její “ spolu- selekce”

# EMA kategorizace antibiotik ve veterinární medicíně

EUROPEAN MEDICINES AGENCY
SCIENCE MEDICINES HEALTH

1 4 February 2019
2 EMA/CVMP/CHMP/682198/2017
3 Committee for Medicinal Products for Veterinary use (CVMP)
4 Committee for Medicinal Products for Human Use (CHMP)

5 Answer to the request from the European Commission for
6 updating the scientific advice on the impact on public
7 health and animal health of the use of antibiotics in
8 animals - Categorisation of antimicrobials

| AMEG Categories | Antimicrobial class, subclasses, substances |
|---|---|
| **Category A** (*"Avoid"*) | • Amidinopenicillins<br>• Carbapenems and other penems<br>• Cephalosporins, Other cephalosporins and penems (ATC code J01DI)<br>• Glycopeptides<br>• Glycylcyclines<br>• Lipopeptides<br>• Monobactams<br>• Oxazolidinones<br>• Penicillins: carboxypenicillins and ureidopenicillins combinations with β-lactamase inhibitors<br>• Phosphonic acid derivates (e.g. fosfomycin)<br>• Pseudomonic acid<br>• Riminofenazines<br>• Streptogramins<br>• Sulfones<br>• Drugs used solely to treat tuberculosis or other mycobacterial diseases |
| **Category B** (*"Restrict"*) | • Cephalosporins, 3rd- and 4th-generation<br>• Polymyxins (e.g. colistin)<br>• Quinolones (fluoroquinolones and other quinolones) |
| **Category C** (*"Caution"*) | • Aminoglycosides and aminocyclitol<br>• Aminopenicillins in combination with β-lactamase inhibitors (e.g. amoxicillin-clavulanic acid)<br>• Amphenicols (florfenicol & thiamphenicol)<br>• Cephalosporins, 1st- and 2nd-generation and cephamycins<br>• Macrolides<br>• Lincosamides<br>• Pleuromutilins<br>• Rifamycins |
| **Category D** (*"Prudence"*) | • Aminopenicillins, without β-lactamase inhibitors<br>• Cyclic polypeptides (bacitracin)<br>• Nitrofuran derivatives (e.g. nitrofurantoin)*<br>• Nitroimidazoles*<br>• Penicillins: Anti-staphylococcal penicillins (β-lactamase-resistant penicillins ) |
| | • Penicillins: Natural, narrow spectrum penicillins (β-lactamase-sensitive penicillins)<br>• Steroid antibacterials (fusidic acid)*<br>• Sulfonamides, dihydrofolate reductase inhibitors and combinations<br>• Tetracyclines<br>(* Authorised for companion animals only) |

**Implementace do lokální ATB politiky**

# Různé přístupy již v praxi

## Dánský systém/přístup redukce spotřeby:

Monitoring, přepočet a možné penalizace veterinárního lékaře(chovu)

„nucená správa a sytém žlutých a červených karet“
ADDs systém- viditelná redukce

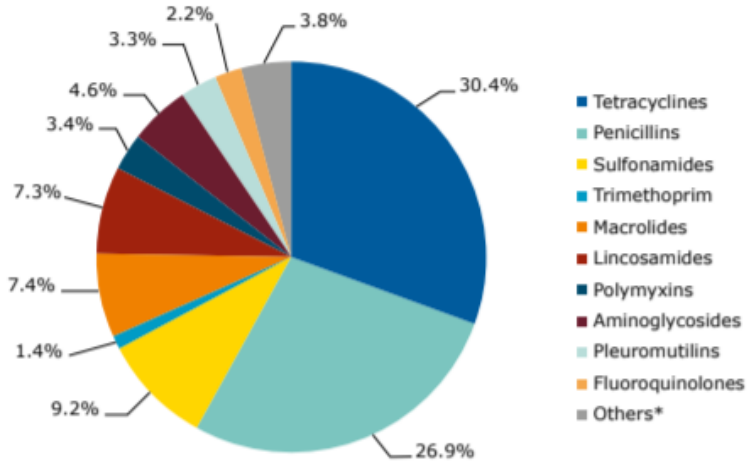
*? Kvalita dovážených zvířat, velká část produkce na export- realizace výkrmové fáze u odběratelů*

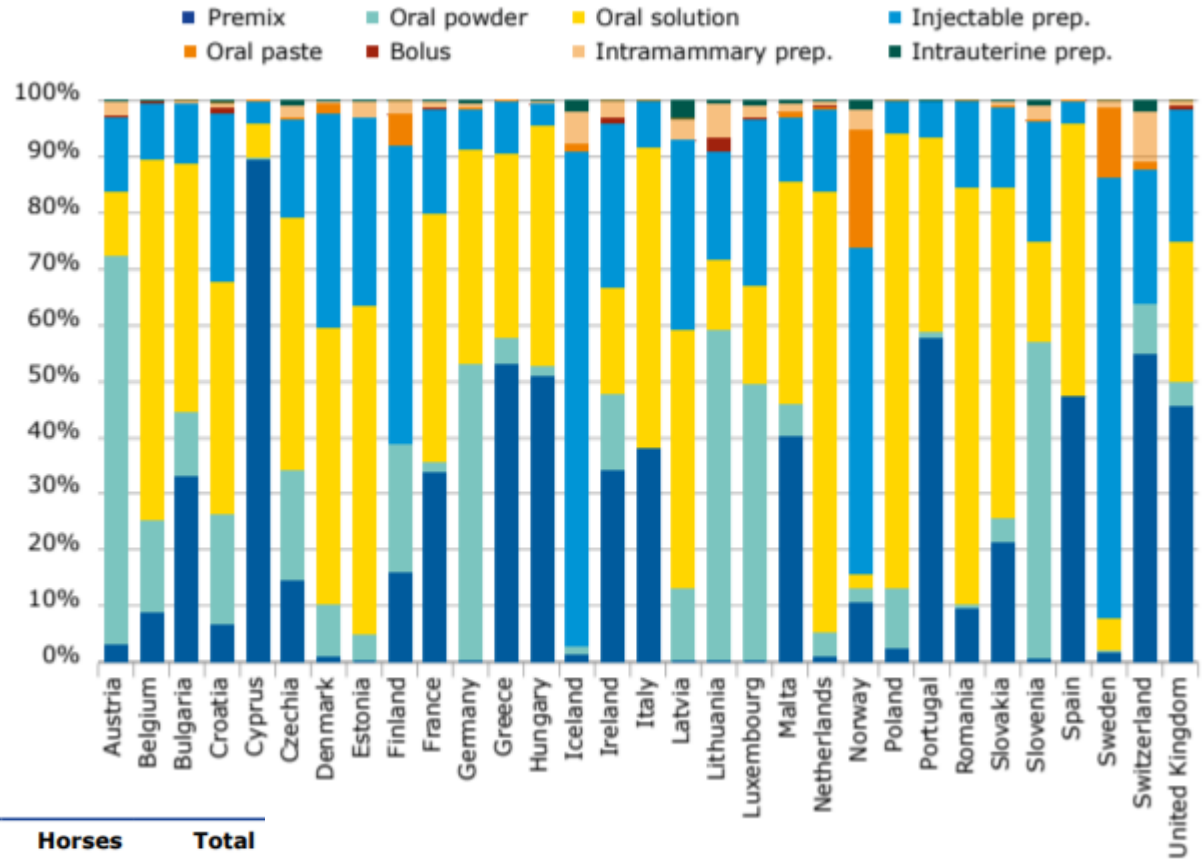
## Holandský přístup:

zákaz/limitace použití medikovaného krmiva (premixů)

## Zákaz použití fluorochinolonů a cefalosporinů u potravinových zvířat v některých zemích EU

# ESVAC report (2019)

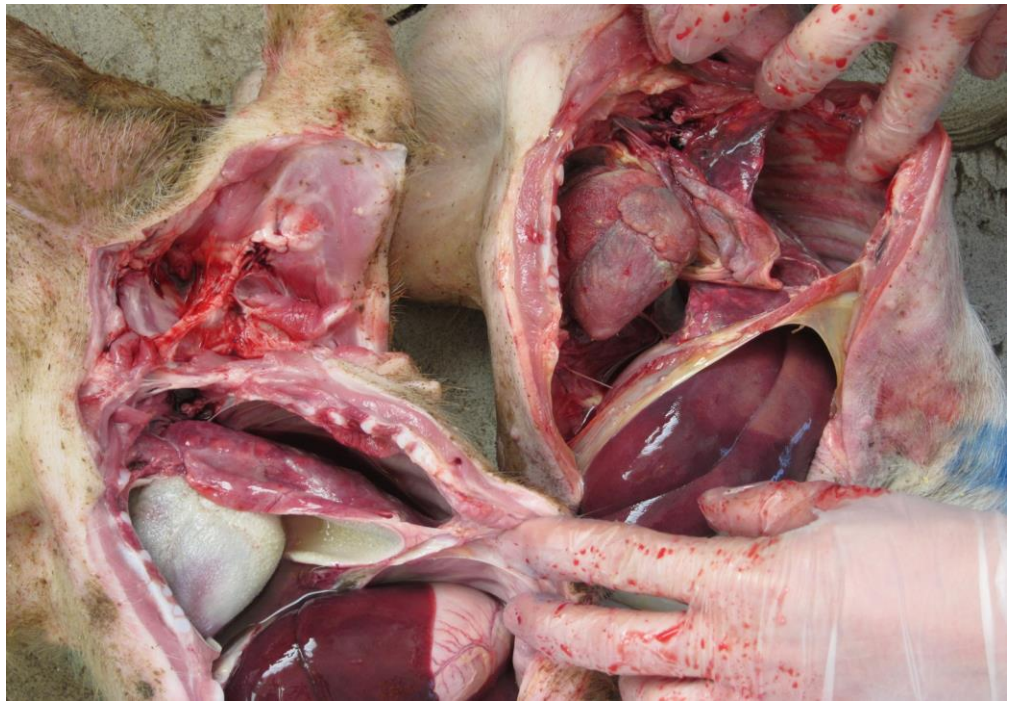



| Country | Cattle | Pigs | Poultry | Sheep/ goats | Fish | Rabbits | Horses | Total |
|---|---|---|---|---|---|---|---|---|
| Austria | 440 | 364 | 80 | 38 | 0 | 0 | 32 | 954 |
| Belgium | 449 | 842 | 248 | 14 | 0 | 4 | 126 | 1,683 |
| Bulgaria | 120 | 84 | 46 | 98 | 0 | 0.1 | 27 | 375 |
| Croatia | 104 | 88 | 39 | 48 | 17 | <0.01 | 0.1 | 296 |
| Cyprus | 18 | 45 | 13 | 29 | 0 | 0.1 | 2 | 107 |
| Czechia | 283 | 198 | 129 | 18 | 22 | 7 | 36 | 693 |
| Denmark | 387 | 1,752 | 132 | 13 | 43 | 0 | 70 | 2,398 |

# Praktické případy dopadu nové legislativy v praxi

# Sepse: *S.suis, H.parasuis*



- Omezení arzenálu dostupných ATB
- Lékem volby- peniciliny a aminopeniciliny (bez omezení kategorizací)
- Cefalosporiny a Fluorochinolony pouze v případě prokázané rezistence

# COMPARISON OF THE EFFICACY OF AMOXICILLIN WITH OTHER ANTIMICROBIALS AGAINST STREPTOCOCCUS SUIS

Daniel Sperling[1], Roman Krejci[1], Alois Cizek[2]

1 Ceva, France
2 Department of Infectious Diseases and Microbiology, VFU Brno

**Table.1 MICs for the tested antimicrobials**

| Atb | $MIC_{50}$ | % of sensitive isolates | Range of MIC | MIC breakpoint for resistance (µg/ml) |
|---|---|---|---|---|
| amoxicillin | < 0.125 | 100 | ≤0.125 - 0.5 | ≥ 2.0 |
| tulatromycin | 8 | ND | < 4.0 - >256 | unavailable |
| ceftiofur | < 0.25 | 100 | < 0.25 - 1.0 | ≥ 8.0 |
| enrofloxacin | 0.5 | 100 | < 0.125 - 1.0 | ≥ 2.0 |
| tetracyklin | > 8.0 | 36 | 0.5 - >8.0 | ≥ 2.0 |

**The determination of minimum inhibitory concentrations of selected antimicrobials for porcine *Haemophilus parasuis* isolates from the Czech Republic**

Kateřina Nedbalcová[1], Monika Zouharová[1], Daniel Šperling[2]

[1]Veterinary Research Institute, Brno, Czech Republic
[2]Ceva Santé Animale S.A., Libourne, France

- Ustálený profil citlivosti/rezistence
- Amoxicillin (peniciliny) vhodnou a efektivní volbou
- Ceftiofur- ESBL typ rezistence

| | Concentration of antimicrobials | Isolates N (%) | C N (%) | I N (%) | R N (%) | $MIC_{50}$ (mg/l) | $MIC_{90}$ (mg/l) |
|---|---|---|---|---|---|---|---|
| Penicilin | ≤ 0.06 | 6 (20) | 22 (73.3) | 2 (6.7) | 6 (20) | 0.25 | 4 |
| | 0.125 | 3 (10) | | | | | |
| | 0.25 | 13 (43.3) | | | | | |
| | 0.5 | 2 (6.7) | | | | | |
| | 2 | 2 (6.7) | | | | | |
| | 4 | 1 (3.3) | | | | | |
| | 8 | 3 (10) | | | | | |
| Amoxicilin | ≤ 0.03 | 10 (33.3) | 27 (90) | 0 | 3 (10) | 0.06 | 0.25 |
| | 0.06 | 12 (40) | | | | | |
| | 0.125 | 2 (6.7) | | | | | |
| | 0.25 | 3 (10) | | | | | |
| | 4 | 3 (10) | | | | | |
| Ceftiofur | ≤ 0.125 | 16 (53.3) | 30 (100) | 0 | 0 | ≤ 0.125 | 0.5 |
| | 0.25 | 5 (16.7) | | | | | |
| | 0.5 | 6 (20) | | | | | |
| | 1 | 3 (10) | | | | | |

# Enterální infekce

- Výrazné omezení dostupných terapeutických možností
- Zákaz použití Colistin, ZnO, fluorochinolony
- Antibiotická terapie podložená antibogramem

# Problematika PWEC

- Redukce vysoce účinných ATB (colistin, fluorochinolony)
- Kategorie s nejvyšším použitím ATB (profylaktický způsob, medikace krmiva)
- Management dochovu
- Funkční alternativy – acidifikace, vakcinace

# Problematika kolistinu

EUROPEAN MEDICINES AGENCY
SCIENCE MEDICINES HEALTH

27 July 2016
EMA/480583/2016
Media and Public Relations

**Press release**

## Countries should reduce use of colistin in animals to decrease the risk of antimicrobial resistance

Goal is to cut colistin sales by 65%

From literature review, the AMEG report mentions that « the *mcr-1* gene has been present in some bacterial species from animals for decades » (lines 146-147). Moreover, according to a recent European retrospective study on *E. coli* and *Salmonella* spp strains isolated from cattle and pigs between 2004 and 2014, the *mcr-1* gene was already present in 2004 and no trend towards an increase of this gene prevalence was noticed (El Garch *et al*, 2016). In front of these data, the AMEG report indicates that « the overall prevalence of colistin resistance in animals remains – so far and with some exceptions – low in food and in animals in the EU/EEA » (lines 144-145).


***Figure 1 :*** *Pays rapportant la présence du gène mcr-1 chez des souches bactériennes d'origines animales, humaines et environnementales (Xavier et al., 2016)*

# Problematika ZnO

## Zinc oxide to be phased out at EU level by 2022

*21st Jun 2017 / By Alistair Driver*

The European Commission has confirmed the EU-wide ban on the use of zinc oxide at medicinal levels in piglet feed, giving member states up to five years to phase it out.

- Enviromentální kontaminace
- Problematika MRSA
- Risk assesement +/-
- Zákaz v prostředí redukce dostupných ATB pro kontrolu PWEC

**Questions and answers on veterinary medicinal products containing zinc oxide to be administered orally to food-producing species**

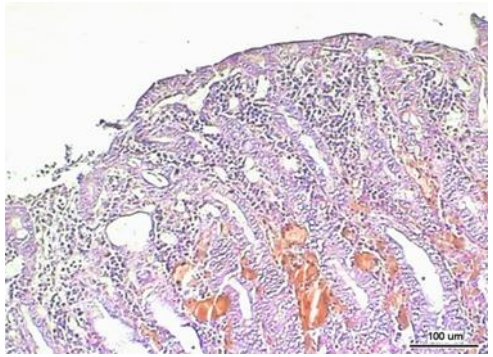
Outcome of a referral procedure under Article 35 of Directive 2001/82/EC (EMEA/V/A/118)

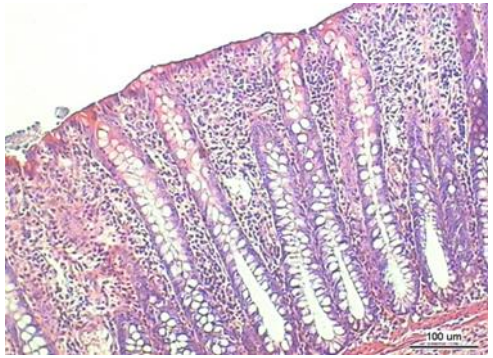
# Effect of zinc chelate and valnemulin for the treatment of swine dysentery in an experimental challenge study

Daniel Šperling [a,*], Alois Čížek [b], Jiří Smola [a]

[a] Ruminant and Swine Clinic, Faculty of Veterinary Medicine, University of Veterinary and Pharmaceutical Sciences, Brno, Czech Republic
[b] Institute of Infectious Diseases and Microbiology, Faculty of Veterinary Medicine, University of Veterinary and Pharmaceutical Sciences, Brno, Czech Republic

| Group No. | Pigs/ days | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. (zinc chelate) | 1 | | | death | | | | | | | | | | | | | | |
| | 3 | | | | | | | euthanasia | | | | | | | | | | |
| | 5 | | | | | | | | | euthanasia | | | | | | | | |
| | 13 | | | | death | | | | | | | | | | | | | |
| | 16 | | | | | | | euthanasia | | | | | | | | | | |
| 2. (valnemulin) | 2 | | | | | | | | | | | | | | | | | |
| | 7 | | | | | | | | | | | | | | | | | |
| | 8 | | | | | | | | | | | | | | | | | |
| | 11 | | | | | | | | | | | | | | | | | |
| | 19 | | | | | | | | | | | | | | | | | |
| 3. (zinc+valnemulin) | 4 | | | | | | | | | | | | | | | | | |
| | 10 | | | | | | | | | | | | | | | | | |
| | 12 | | | | | | | | | | | | | | | | | |
| | 18 | | | | | | | | | | | | | | | | | |
| | 20 | | | | | | | | | | | | | | | | | |
| 4. (positive control) | 6 | | | | | | | | | | | | | | | | | |
| | 9 | | | | | | | | | | | | | | | | | |
| | 15 | | | | | | | euthanasia | | | | | | | | | | |
| | 17 | | | | | | | | | | | | | euthanasia | | | | |



# Respirační infekce prasat

- Druhá nejčastější indikace k ATB použití v chovech prasat
- Dostupnost vakcinace pro ekonomicky významné infekce- “prostor pro zlepšení”
- Problematika spojená predevším s pozdní fázi produkce
- Kategorie “Restrict” pro fuorochinolony (marbofloxacin)
- Medikace krmiva je casto neefektivni

## Individuální injekční léčba

**Změna způsobu aplikace a přístupu k terapii**

- **Vyšší frekvence individuální aplikace**
- **Metaphylaxe u vybraných infekcí**

## Skupinová medikace (premix)

# Preference medikace vody

***Rychlejší nástup požadovaného efektu terapie***

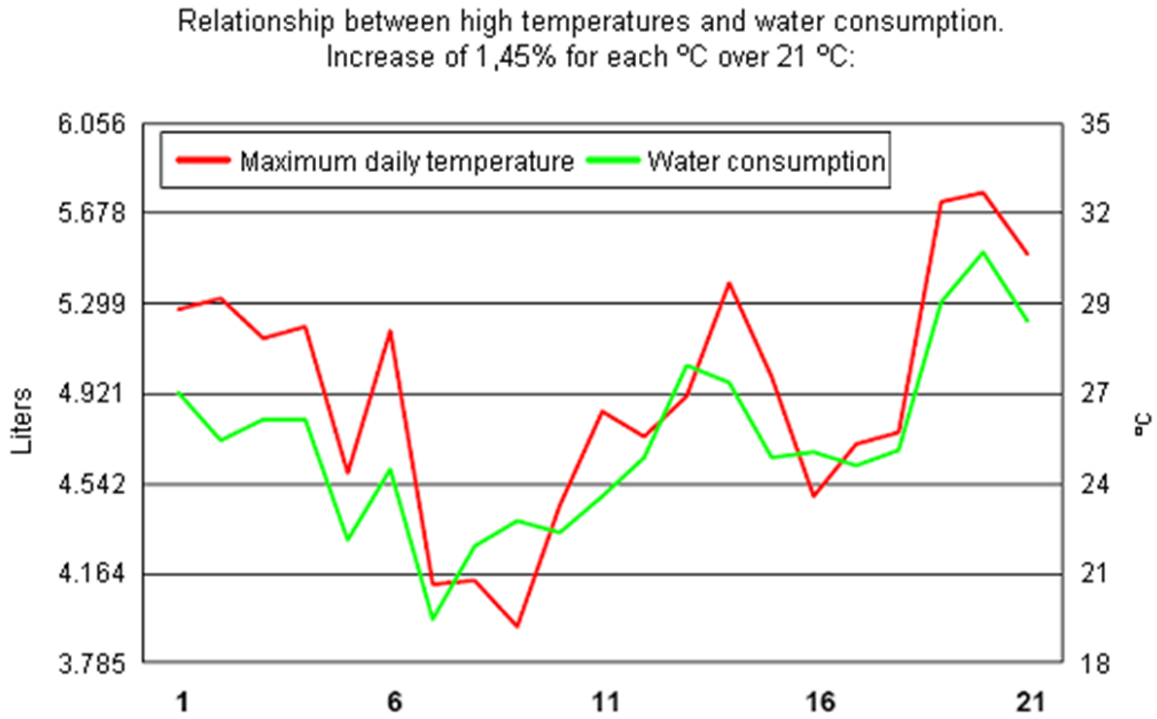
- Rychlejší distribuce účinné látky
- Zachovalý příjem vody v počátcích klinického průběhu infekce
- Výrazně vyšší příjem vody v porovnání s příjmem krmiva

**Nutné brát na zřetel:**
Rozpustnost daného léčiva (často limitovaná, omezena časem, charakterem vody a používaných Aditiv)

Nutno pravidelně hodnotit celkový příjem vody v dané sekci, upravovat na základě vlastní propočet a zohlednit další okolnosti (stájová teplota atd.)

Technologie

Aktuální otázka biofilmu a využití ATB



# Praktické příklady- medikace vody

• pH nutno kontrolovat především u skupiny penicilinových antibiotik, pH nižší než 3,5 může vést až k plné deaktivaci ATB

• Tetracyklinová ATB relativně špatně rozpustné v tvrdé vodě (stupeň okolo 30)

• Vyšší koncentrace železa ve vodě může výrazně snižovat koncentraci dostupného doxycyklinu při medikaci

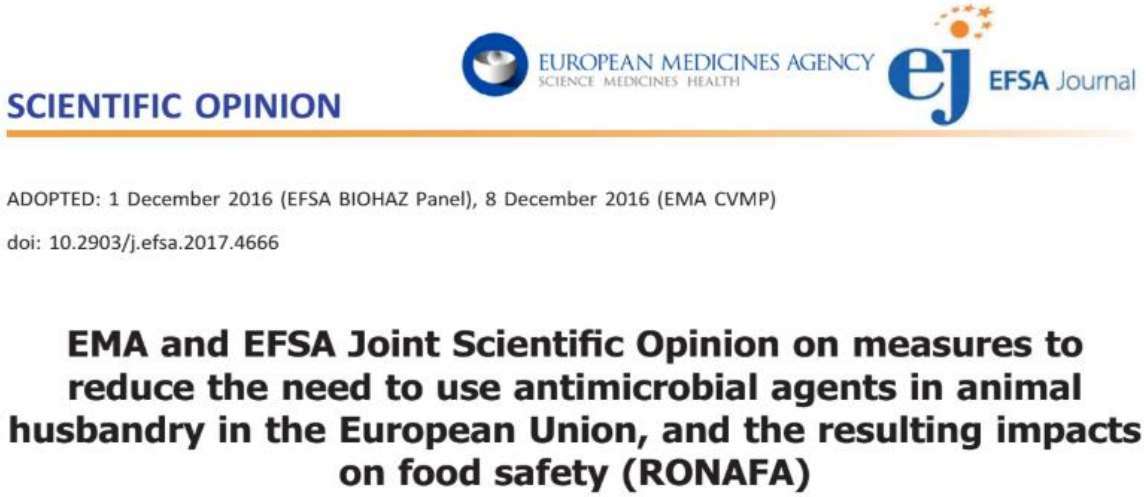
• Shodně vyšší množství železa- růstový faktor pro mnohé mikroorganismy (například *E. coli*)

• Některá antibiotika lépe rozpustná v kyselém prostředí- pleuromutiliny
Vit. C snižuje dostupnost aminoglikosidů

# Profilaxe/Metaphylaxe

Preventivní používání ATB je zakázáno

Metaphylaxe je stále relevantní způsob pro vybrané onemocnění/patogeny a specifickou situaci na farmě



SCIENTIFIC OPINION

EUROPEAN MEDICINES AGENCY
SCIENCE MEDICINES HEALTH

EFSA Journal

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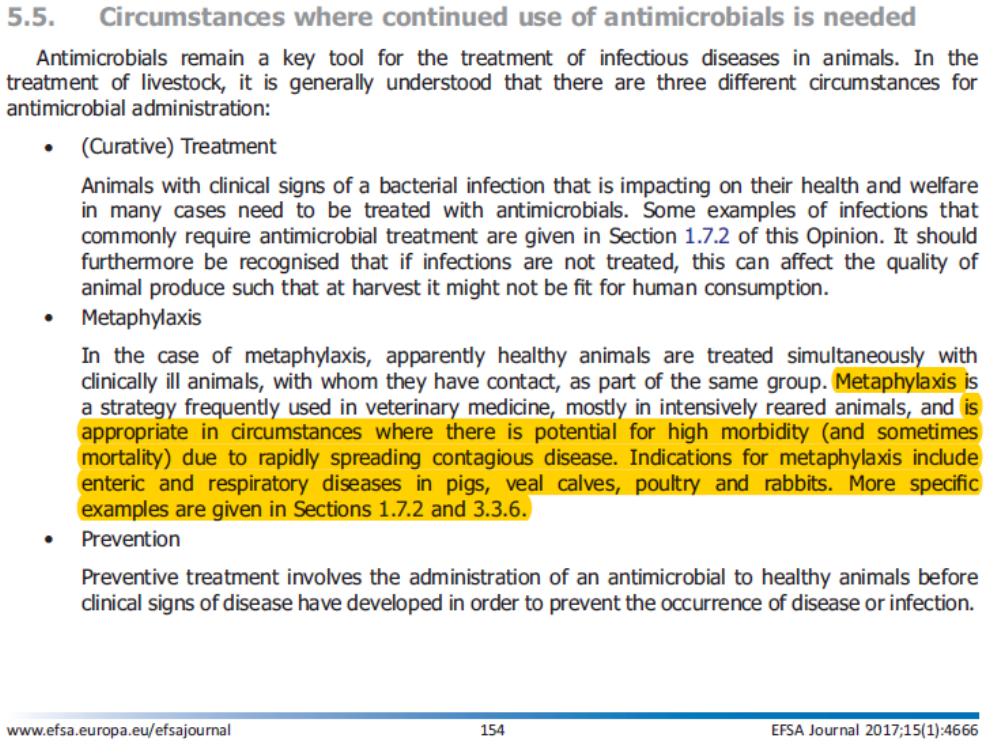
**EMA and EFSA Joint Scientific Opinion on measures to reduce the need to use antimicrobial agents in animal husbandry in the European Union, and the resulting impacts on food safety (RONAFA)**



### 5.5. Circumstances where continued use of antimicrobials is needed

Antimicrobials remain a key tool for the treatment of infectious diseases in animals. In the treatment of livestock, it is generally understood that there are three different circumstances for antimicrobial administration:

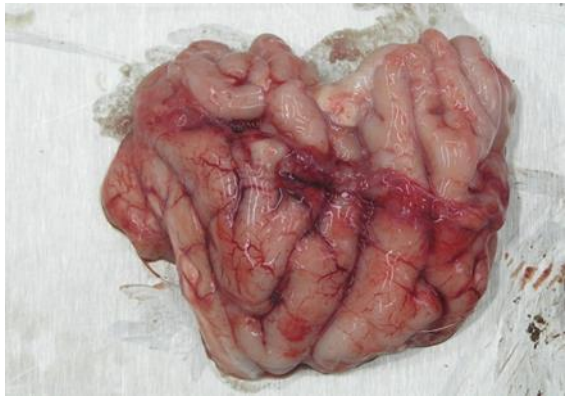
- (Curative) Treatment

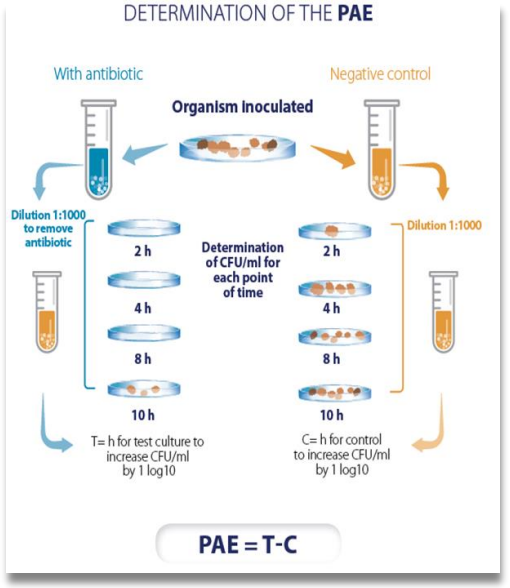
  Animals with clinical signs of a bacterial infection that is impacting on their health and welfare in many cases need to be treated with antimicrobials. Some examples of infections that commonly require antimicrobial treatment are given in Section 1.7.2 of this Opinion. It should furthermore be recognised that if infections are not treated, this can affect the quality of animal produce such that at harvest it might not be fit for human consumption.
- Metaphylaxis

  In the case of metaphylaxis, apparently healthy animals are treated simultaneously with clinically ill animals, with whom they have contact, as part of the same group. Metaphylaxis is a strategy frequently used in veterinary medicine, mostly in intensively reared animals, and is appropriate in circumstances where there is potential for high morbidity (and sometimes mortality) due to rapidly spreading contagious disease. Indications for metaphylaxis include enteric and respiratory diseases in pigs, veal calves, poultry and rabbits. More specific examples are given in Sections 1.7.2 and 3.3.6.
- Prevention

  Preventive treatment involves the administration of an antimicrobial to healthy animals before clinical signs of disease have developed in order to prevent the occurrence of disease or infection.

# Antibiotická terapie- volba a načasování

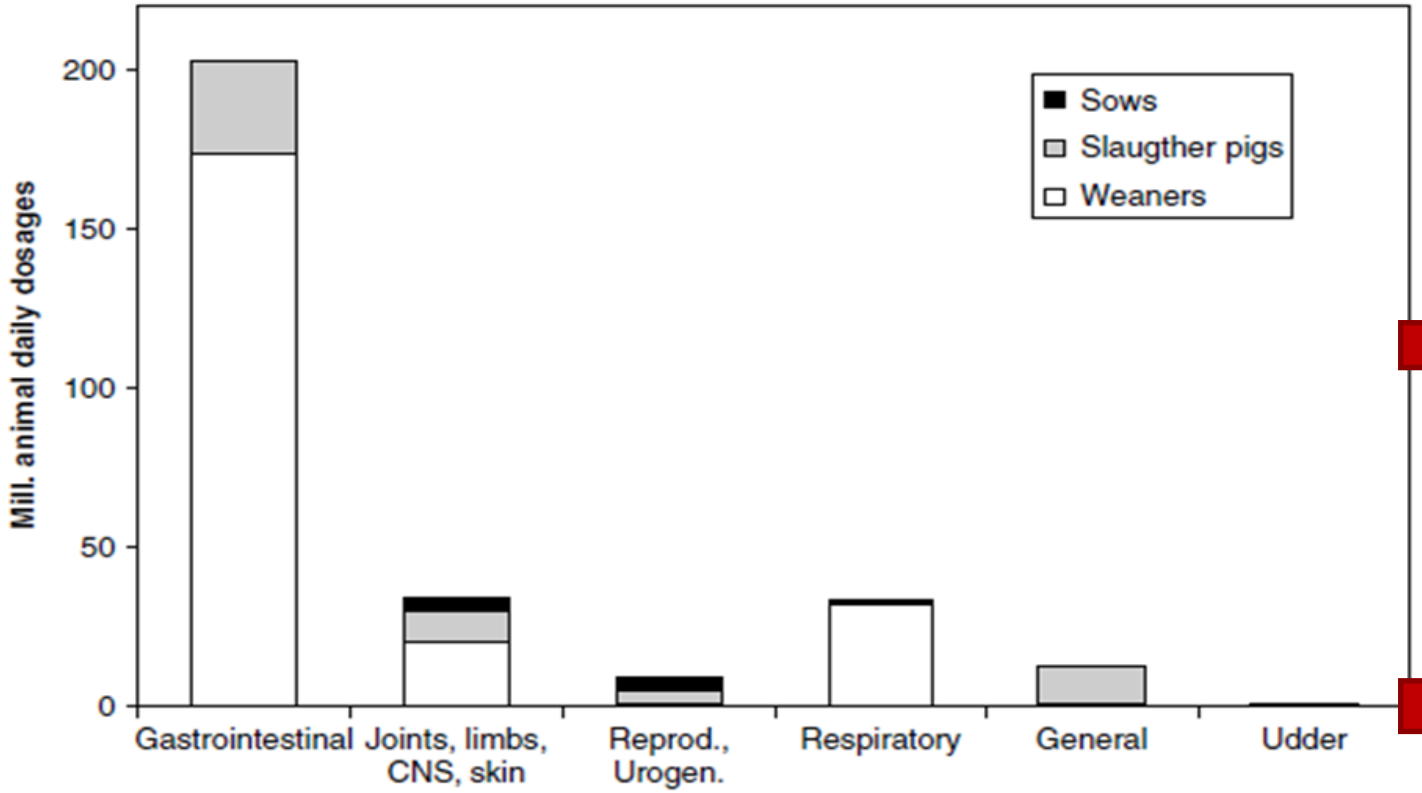





**Efektivita terapie ??**

- **“ Efekt velikosti inokula”**
- Efekt lokalizace infekce
- Pk/Pd principy

# Spotřeba ATB přepočtena na ADDs (animal daily dosage), Dánsko




58% standartizované ADDs- GIT infekce (2014)

# Budoucí perspektiva

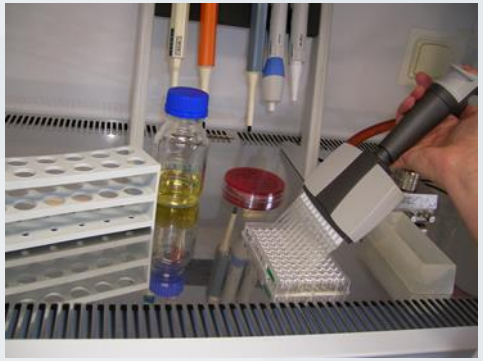
# “ Nové a staro-nové infekce”

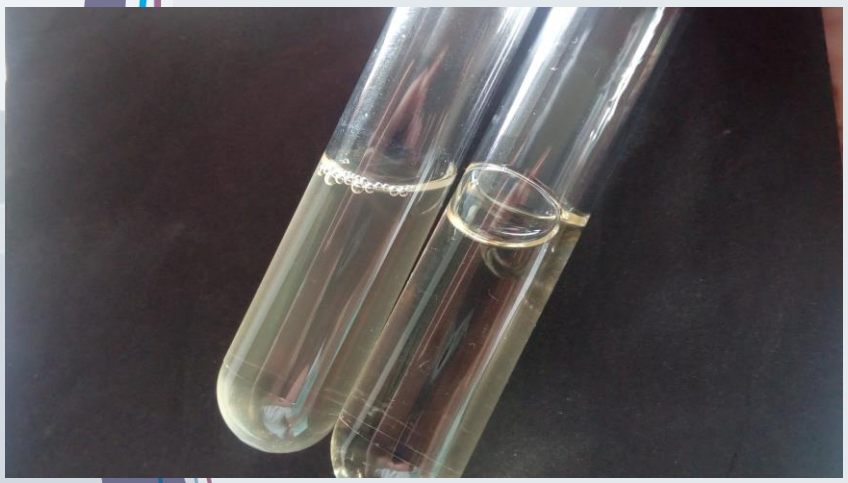
## Effect of infection by *Mycoplasma suis* on blood parameters of weaned piglets

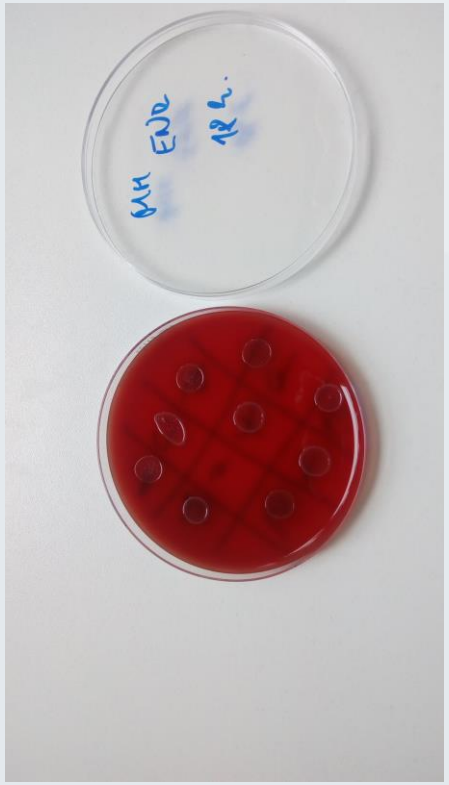
Smola Jiri [1], Karembe Hamadi [2], Daniel Sperling [2]

[1] Ruminant and Swine Clinic, VFU Brno, Czech Republic / [2] Ceva Sante Animale, France

# Laboratorní diagnostika





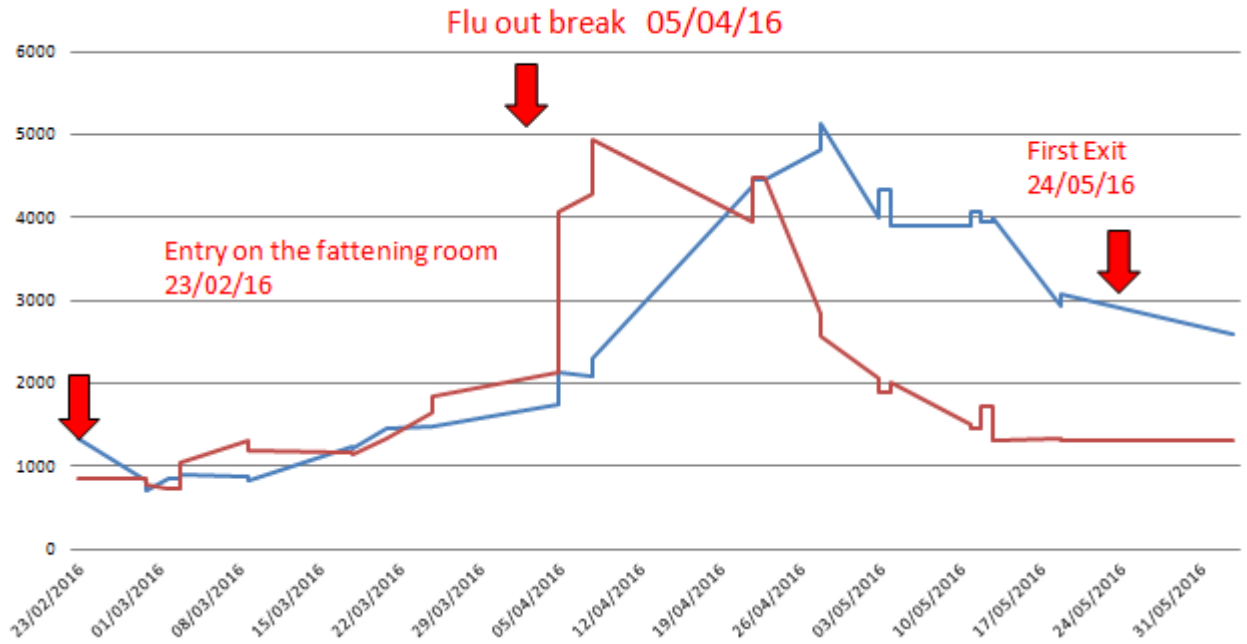


# Produkce “antibiotic free” prasat

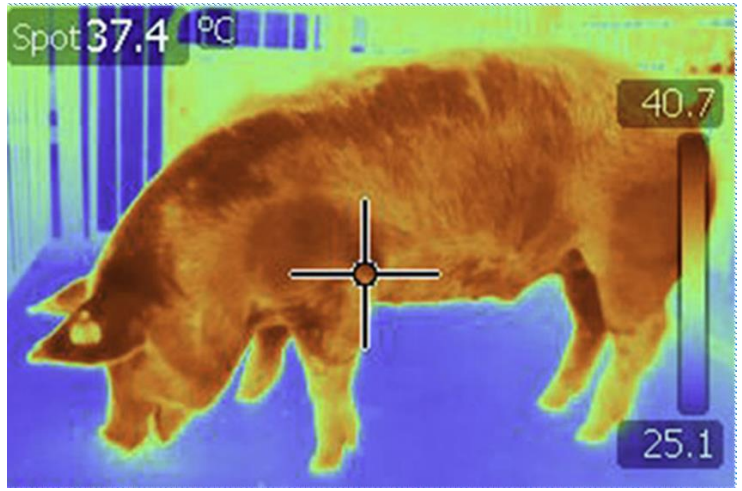
## Aplikace technologií:

- ATB Monitoring : umožnuje produkci definované populace bez léčby
- Monitoring operátora
- 0- 10 ml
- Intramusculární/Subkutánní aplikace, evidence a další benefity

Aplikace spojené s individuálním monitoringem




- **Optimalizace načasování a volby léčby**
- **Signifikantní redukce použití ATB**
- **Signifikantní redukce lézí na plicním parenchymu**



# Alternativy k ATB

- Celá řada skupin alternativ k ATB
- Různý charakter a mechanizmus účinku
- Různý systém hodnocení aktivity (*in vitro* x *in vivo*)
- Variabilita
- Regulérní využití v praxi- acidifikace, probiotika…..
- Biosekurita
- Vakcinace

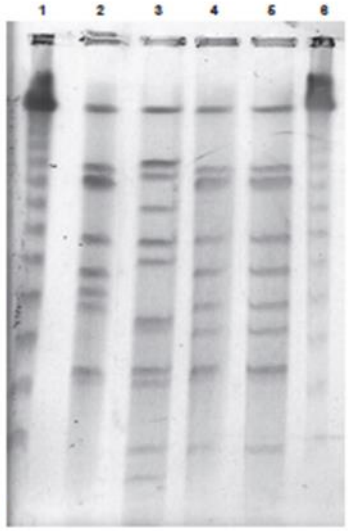



FIG 1: Pulsed-field gel electrophoresis (PFGE) patterns from Czech multiresistant *Brachyspira hyodysenteriae* isolates digested with *Mlu*I. Lanes 1 and 6 Lambda Ladder PFGE marker (Bio-Rad), Lane 2 Pulsotype B, Lane 3 Pulsotype D, Lanes 4 and 5 Pulsotype A

**EFFECT OF CITREX™ ON CLINICAL MANIFESTATION OF SWINE DYSENTERY AND BRACHYSPIRA HYODYSENTERIAE SHEDDING**

O Luksan[1], J Smola[2], A Cizek[2], D Sperling[2]
[1]DELACON Biotechnik Ges. m. b. h, STEYREGG, Austria
[2]Veterinary and Pharmaceutical University, BRNO, Czech Republic

**Table 2: Infections where new or improved vaccines would significantly reduce the need for antibiotic use in swine**

| Key syndrome | Primary pathogen(s) (disease) | Antibiotic use | Commercial* vaccine exists | Major constraints to use of vaccine / vaccine development | Vaccine research priority |
|---|---|---|---|---|---|
| Systemic (respiratory) | *Streptococcus suis* | High | Yes | • Strain coverage too narrow<br>• Lack of cross-protection<br>• Poor immunogenicity due to being a capsule based vaccine | High |
| | *Haemophilus parasuis* | Medium | Yes | • Serotype specific with variable cross-protection<br>• Maternal antibody interference | Medium |
| Respiratory | *Pasteurella multocida (for pneumonic disease)* | High | No | • No vaccine with approved label claim for pneumonia<br>(There is a vaccine for atrophic rhinitis) | High |
| | *Mycoplasma hyopneumoniae* | High | Yes | • Does not completely prevent lung lesions<br>• Animals continue to shed pathogen<br>• Diagnostics not always accurately done | Low |
| | *Actinobacillus pleuropneumoniae* | High | Yes | • Limited coverage<br>• Good immunity only if serotype specific<br>• Sub-unit vaccine which affords cross-protection | High |
| | Porcine Reproductive and Respiratory Syndrome virus (secondary bacterial infections) | High | Yes | • Strain coverage limited<br>• High virus mutation rate<br>• Modest cross-protection<br>• Vaccine evasion | High |
| | Swine Influenza Virus (secondary bacterial infections) | High | Yes | • Strain matching<br>• Vaccine-associated enhanced respiratory disease (VAERD)<br>• Lack of cross-protection<br>• Efficacy in piglets limited | High |
| Enteric – neonatal | *Escherichia coli* | High for the syndrome, Low for *E. coli* | Yes | • Maternal vaccine provides effective lactogenic immunity<br>• Coverage of enterotoxigenic *E. coli* may occasionally need to be updated | Low |
| Enteric (weaners/finishers) | *Escherichia coli* | High | Yes | • Maternal antibody interference<br>• Short window for induction of immunity | High |
| | *Lawsonia intracellularis* | High | Yes | • Other pathogens in the syndrome (*Brachyspira*) not included<br>• Antibiotic-free window for vaccination required (live attenuated oral vaccine) | Low (see also *Brachyspira*) |
| | *Brachyspira spp*<br>*B. hyodysenteriae,*<br>*B. pilosicoli* | Medium-high | No | • Low current research investment as changes in husbandry largely eliminated the disease<br>• Technical barriers to vaccine development | High |
| | Rotaviruses (secondary bacterial infections) | High | Yes | • Reasons limiting wider adoption unknown | High |

* does not cover autogenous vaccines

WORLD ORGANISATION FOR ANIMAL HEALTH

*Protecting animals, preserving our future*

*Original: English*
April 2015

**REPORT OF THE MEETING OF THE OIE *AD HOC* GROUP ON PRIORITISATION OF DISEASES FOR WHICH VACCINES COULD REDUCE ANTIMICROBIAL USE IN ANIMALS[1]**

**Paris, 21 – 23 April 2015**

# Racionální použití ATB- přístup


- Reduce
- Replace
- Refine

# Děkuji za pozornost!