



Target pathogen AMR monitoring: the Czech Republic experience

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CZ long term efforts to ensure high quality of use of ATM in animal husbandry and reducing the antimicrobial use

- **National antibiotic programme**

- **complex + multidiscipline programme: human and veterinary medicine**
 - Operated on the professional / scientific level **since the late 90's**
 - Formalised in 2009

- **Action plans**

- **National Action plan 2011 – 2013**

- One Health approach
 - Research activities delivering practical solutions – start of activities ref availability of veterinary diagnostic sets for susceptibility testing + interpretation criteria
 - Formal structure for AMR : MinAgri – WG on Antimicrobials established
 - Further improvement of national data collection system on sales of antimicrobials
 - National reports (trends on AMU available since 2003)
 - ESVAC / OIE

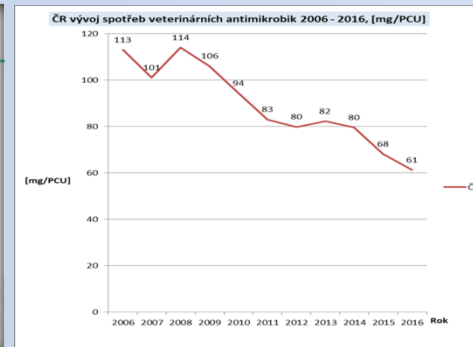
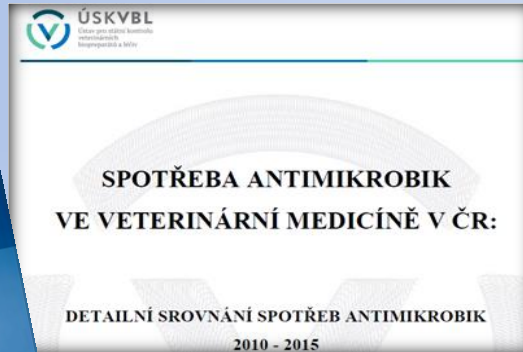
- **National Action plan 2019 – 2022**



NAP AMR 2019 – 2022

- Goal 1 – Improvement of evidence using surveillance programmes
- Goal 2 – Responsible use of antimicrobials
- Goal 3 – Improvement of knowledge of the society and strengthening of its responsibility for keeping of efficacy of antimicrobials and restriction of spread of AMR
- Goal 4 – Methodological and technical infrastructure
- Goal 5 – Prevention and control of infections
- Goal 6 – Research, development, innovations

Antimicrobials sales data collection in the CR



- Data collection system in the CZ – NATIONAL consolidated data since 2003
 - ÚSKVBL web (<http://www.uskvbl.cz/cs/informace/tiskove-centrum/tiskprohl>)
- ESVAC project (EU):
 - CZ (since 2009), first dataset „2005 – 2009“
 - CZ data delivery for DDDA setting
 - CZ participation in pilot – pigs
 - CZ participation stratification per species project

ACHIEVEMENT 2006 – 2016 :

56 % decrease of consumption (expressed in tonnes)
46% decrease of consumption (expressed in mg/PCU)

Monitoring of target veterinary pathogens

Primary Target:

to have available national data on veterinary target pathogens susceptibility/resistance at MICs level and trends

- To set the susceptibility/resistance surveillance system in veterinary pathogens identified as of high importance
 - To implement uniform and fully standardized the susceptibility testing methods for veterinary pathogens/antimicrobials
 - To harmonize the spectrum of antimicrobials to be tested considering also:
 - o class representatives involved
 - o results interpretation with a view to maximize usefulness for the veterinary clinical practice as well as indication of the specific patterns of resistance
 - To define harmonized interpretative criteria with maximum use of the international standards where available and appropriate
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- To motivate the vets in practice to use the laboratory antimicrobials susceptibility testing and provide tool for vets in practice for evaluation of resistance to antimicrobials in clinical practice and to promote responsible use of antimicrobials
 - To provide better quality of laboratory results (including MICs results which make it possible to evaluate the trends)
 - To gain pharma industry independent evidence reflecting the situation in the Czech Republic to allow more proper and evidence-based setting of antibiotic policies and elaboration of the recommendations/national guidelines for use of antimicrobials

Who is involved and how

Ministry of Agriculture - WG on AMR – 2014/15

Stakeholders agreed on necessity of project , voluntary base and principles of confidentiality (not publishing husbandry details)

State Veterinary Administration

- Leader of project
- Budgetary resource for MICs testing
- Validation of the data
- 2015/2016 **reports**

State Veterinary Institutes (SVI - Praha, Jihlava, Olomouc)

- Perform susceptibility testing/interpret results/fill the database

Antibiotic centre for Veterinary Clinical Practice (since 2017, Jihlava)

- Since 2017 **reports**

Veterinary Research Institute

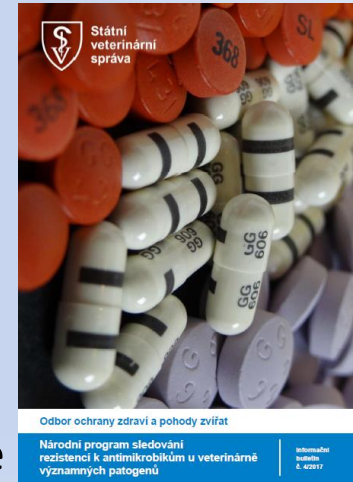
- Microplates development, production, validation

Institute for State Control of Veterinary Biologicals and Medicines

- Cooperation on the settings of antimicrobials tested - based on available antimicrobial contained in authorised VMPs

Veterinarians + farmers

Collection of samples, payment for identification



Monitoring of target veterinary pathogens: sampling

- standardized (including protocols accompanying sample),
- sampling methodology/specimen description specifically for:
 - o **respiratory diseases of pigs/cattle** (part of lungs; swab /Amies transport medium/ from lungs, trachea, bronchi, swab/Amies transport medium/ (deep nasal sampling); carcass of diseased animal; bronchoalveolar (transtracheal) lavage; haemocults, swab /Amies transport medium/ from tonsils)
 - o **gastrointestinal diseases of pigs/cattle** (faeces; rectal swab /Amies transport medium/; part of intestine) according to the disease
 - o **milk samples – mastitis dairy cows** (sterile sampling container, aseptically collected milk sample)
 - o **poultry** (carcass of diseased animal, swabs /Amies transport medium/ from internal organ, faeces)
- only diseased animals with suspect bacterial ethiology of the disease are sampled prior start of the treatment on CZ farms of cattle, pigs and poultry (*Gallus gallus* only); once the pathogens of concern of this surveillance programme (please see below) are identified (MALDI TOF used), the sample is involved into MICs testing.

Species of bacteria involved

- **Cattle (non - mastitis):**

- *Mannheimia haemolytica*
- *Pasteurella multocida*
- *Escherichia coli*
- *Histophilus somni*

- **Cattle (mastitis):**

- *Streptococcus agalactiae*
- *Streptococcus dysgalactiae*
- *Streptococcus uberis*
- *Staphylococcus aureus*,
- *Escherichia coli*,
- *Klebsiella* spp.
- *Raoultella* spp.

Pigs:

Actinobacillus pleuropneumoniae
Pasteurella multocida
Escherichia coli
Streptococcus suis
Staphylococcus hyicus

Poultry :

Escherichia coli
Pasteurella multocida
Enterobacter spp.
Enterococcus spp.
Staphylococcus aureus

Methods of susceptibility testing

Method of susceptibility testing and interpretative criteria

Standardised broth microdilution method is used to determine the minimum inhibitory concentration (MIC), as well as uniform interpretation criteria and spectrum of antimicrobials tested.

Specific unique testing microplates have been developed to cover:

Microplate I: Gram-positives (staphylococci, streptococci, enterococci)

Microplate II: Gram-negative (enterobacteria)

Microplate III: Veterinary specific pathogens

(*Actinobacillus pleuropneumoniae*, *Histophilus somni*,
Mannheimia haemolytica, *Pasteurella multocida*, *Streptococcus suis*).



Microplates are designed to contain culture media for specific group, defined spectrum of antimicrobials (mainly those authorised for use in clinical practice in the veterinary medicine) in range of concentrations covering the internationally harmonised clinical breakpoints

Sets of antimicrobials tested

Standard microplates, arrangement reflecting clinical breakpoints-some columns divided
Some antimicrobials involved as „indicators“ of specific AMR

Gram-negative

AMP
CTX
CEF
KF
CEQ
TET
ENR
FFC
SXT
COL
MAR
APR
DOX
GEN
AMC

Gram-positive

PNC
AMP
CEF
ERY
CLI
GEN
SXT
ENR
TET
FFC
RIF
FOX
OXA

Veterinary specific

PNC
AMP
CEF
TUL
TILM
TIAM
TET
ENR
FFC
SPE
DOX
TILD
GAM

Data collection, management, evaluation

- Laboratories participating in the project have available the protocols containing specific comments towards interpretative criteria of susceptibility/resistance as well as practical comments to used towards vets in practice as for the interpretation of the laboratory results.

	A	B	C	D	E	F	G	H	I	J	K	L	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	A
	P.Č.	Datum příjmu SVÚ	SVÚ	Číslo protokolu	ořez	kuř	Epidemiologická jednotka (hejno, stádo, lala)	Převod erole (Bo, mastičky, Ga, Su)	Kategorie	Materiál	Patogen (párada)	Datum stanovení citlivosti	1. AMP	2. CTX	3. EFT	4. KF	5. CEQ	6. TET	7. ENR	8. FFC	9. SXT	10. COL	11. MAR	12. APR	13. DOX	14. GEN	15. AMC	měsíc	
1	20.12.2016	Jihlava	16174146N	Znojmo	Jihomoravsk	stádo	Bo-mastitidy	tur domácí - dojnice	mléko - individ.vzorky	Escherichia coli var.haemolytic	28.12.2016	16	<=0,125	0,500	16	<=1	2	0,500	8	<=0,25	<=1	<=0,5	<=8	<=2	<=0,5	4	1		
2	13.12.2016	Jihlava	16172566N	Pelhřim	Vysočina	stádo	Bo	tur domácí - tele (obecně)	výtěr rektální	Escherichia coli	22.12.2016	>64	<=0,125	0,500	16	<=1	>64	<=0,03	4	<=0,25	<=1	<=0,5	<=8	8	<=0,5	>32	1		
3	20.12.2016	Jihlava	16174088N	Znojmo	Jihomoravsk	hejno	Ga	kur domácí - kuře	orgány	Escherichia coli	27.12.2016	4	<=0,125	0,500	16	<=1	>64	0,250	8	<=0,25	<=1	1	<=8	>16	<=0,5	4	1		
4	20.12.2016	Jihlava	16174088N	Znojmo	Jihomoravsk	hejno	Ga	kur domácí - kuře	orgány	Escherichia coli	27.12.2016	4	<=0,125	0,500	8	<=1	4	>4	4	1	<=1	4	<=8	4	<=0,5	8	1		
5	20.12.2016	Jihlava	16173038N	Žďár na	Vysočina	hejno	Ga	kur domácí - kuře	orgány	Escherichia coli	29.12.2016	>64	<=0,125	0,250	<=4	<=1	64	>4	4	>32	<=1	4	<=8	8	1	>32	1		

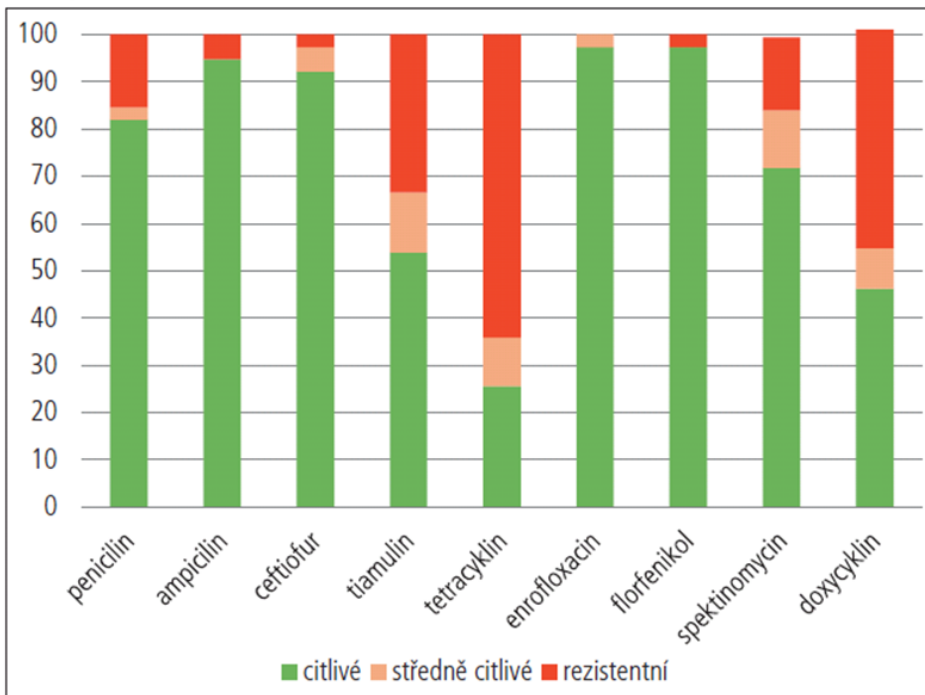
- Data are collected to **electronical protocols**/database:
- Variables collected:
 - Date,
 - Laboratory identification,
 - Protocol number
 - Regional identification,
 - Epidemiological unit,
 - Origin (Bo, Bo-m, Su, Ga) + category (e.g. piglet, calf, broiler, ...) + sample (tissue, milk, swab)
 - Pathogen
 - Date of susceptibility testing
 - MICs for the substances tested
- Monthly validated
- Yearly evaluated
- MIC trends analysed and published

Examples of publishing of the results

Results published not only in reports, but also in magazines for vets and farmers

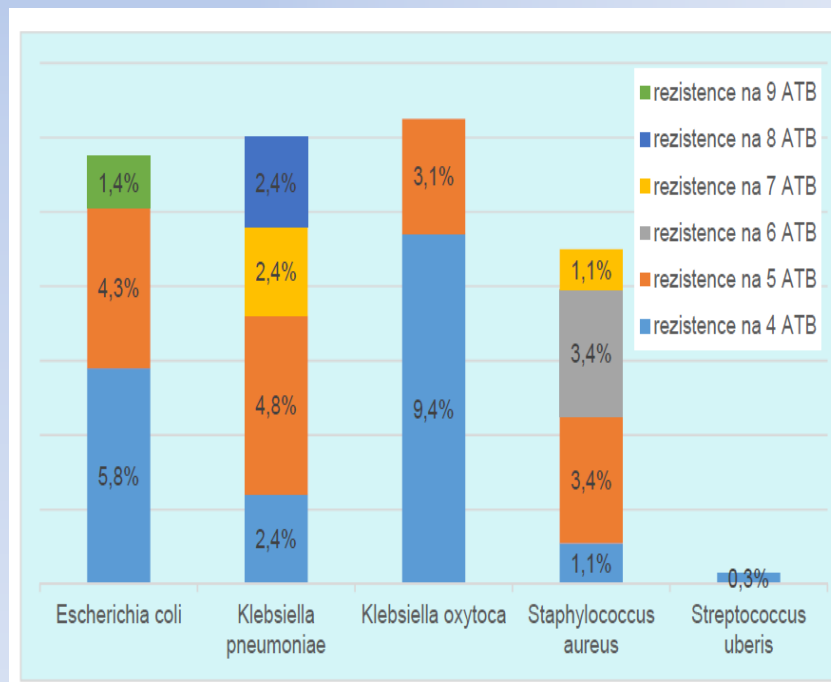
Streptococcus suis, S/I/R, pigs, I-VIII/2016

Graf 3 – *Streptococcus suis* (celkem 39 izolátů) – procento citlivých/rezistentních izolátů (leden až srpen 2016)



Veterinářství 10/2016: „Rezistence k antimikrobikům u významných patogenů prasat, K. NEDBALCOVÁ, L. POKLUDOVÁ, M. DUBSKÁ, H. PRÁTOVÁ, M. ZOUHAROVÁ, I. KUCHAROVIČOVÁ, T. ČERNÝ, J. BUREŠ, P. ŠATRÁN

MDR in pathogens from Bo-mastitis, 2016



Oddor ochrany zdraví a pohody zvířat

Národní program sledování rezistencí k antimikrobikům u veterinárně významných patogenů

Informační bulletin
č. 4/2017

Examples of publishing of the results (II)

Streptococcus suis, S/I/R, pigs, I-XII/2017

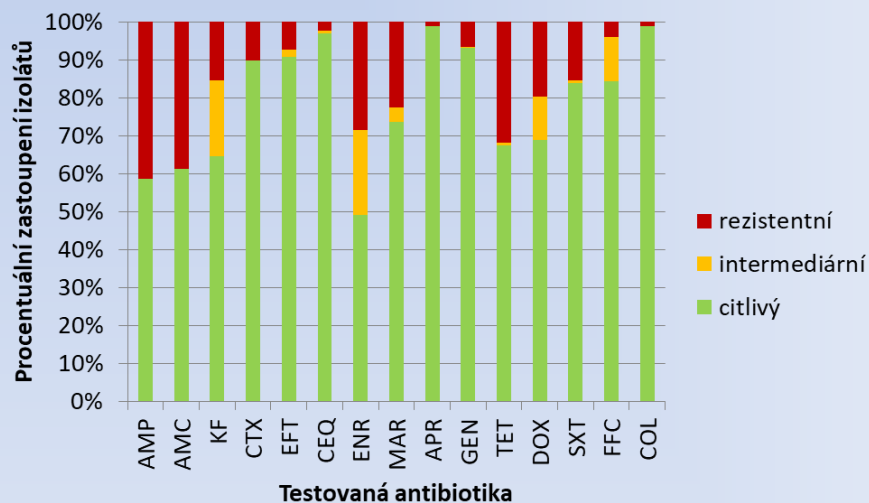
Tabulka č. 16: Výsledky fenotypových vlastností izolátů *Streptococcus suis* v roce 2017

ANTIMIKROBIKUM	počet izolátů	MIC ₅₀ mg/L	MIC ₉₀ mg/L	C (%)	I (%)	R (%)
Penicilin	52	≤ 0,06	0,5	82,7	9,6	7,7
Ampicilin	52	≤ 0,125	0,5	92,3	5,8	1,9
Ceftiofur	52	0,25	2	96,2	1,9	1,9
Tulathromycin	52	64	> 128	32,7	9,6	57,7
Tilmikosin	52	32	> 64	26,9	-	73,1
Tiamulin	52	8	> 64	44,2	26,9	28,8
Tetracyklin	52	16	64	21,2	5,8	73,1
Enrofloxacin	52	0,25	0,5	92,3	3,8	3,8
Florfenikol	52	2	2	92,3	3,8	3,8
Spektinomycin	52	32	> 128	78,8	1,9	19,2
Doxycyklin	52	4	> 4	42,3	-	57,7
Tildipirosin	52	> 64	> 64	5,8	-	94,2
Gamithromycin	52	1	> 8	nehodnoceno		

https://www.svujihlava.cz/intranet/publikace/Zprava_cast_I_NAP_2017.pdf

E.coli, S/I/R, poultry, 2015

Profil fenotypové citlivosti izolátů *Escherichia coli* z drůbeže (2015, n=274)^{1,2}



¹Dubská, M. a kol. (2016): Drůbežář 2/2016: 12-14.

²Dubská, M. a kol. (2016): Naš chov 7/2016: 60-63.

Links to international activities

Cooperation with VETCAST-I

VETCAST = Veterinary Committee for Antimicrobial Susceptibility Testing
http://www.eucast.org/ast_of_veterinary_pathogens/

DATA NEEDED FOR INTERPRETATIVE, VET SPECIFIC, EU CRITERIA !

- Some of **MIC profiles** from CZ target pathogen monitoring useful for the project
- Susceptibility to tetracyclines (TC, DOX) data already provided by DK, SE, NL, IT and **CZ** to VETCAST:
 - **Already processed:** *E.coli*, *Klebsiella* (different species), *Enterobacter* (different species)
 - **Further provided:** *Streptococcus* (different species), *Actinobacillus pleuropneumoniae*, *Histophilus somni*



Joint Action
Antimicrobial Resistance and
Healthcare-Associated Infections



Co-funded by the
Health Programme
of the European Union

WP7.4 Joint Meeting

06/09/2018

Rodolphe Mader
ANSES

Meeting objectives

- Start a collaboration between the human and veterinary sector for the surveillance and monitoring of AMR
- Description of the main challenges for an integrated surveillance of AMR in diseased patients and animals
- Find solutions for keeping a relevant One Health approach
- Think about the next work steps of our collaboration



www.eu-jamrai.eu

Conclusions

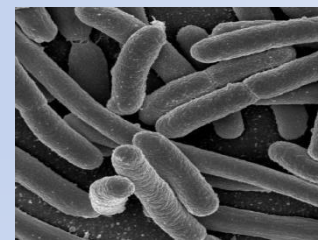
- Susceptibility/resistance data of veterinary target pathogens isolated from diseased animals are essential for responsible/rational use of antimicrobials
- Long term stable systems allows the trends monitoring
- AMU/AMR data on farm/local level comparisons
- Setting of national policies on INDEPENDENT data
- Evidence based recommendations/GLs for treatment

Thank you for you attention!

Acknowledgement:

Černý T., Kucharovičová I., Bardoň J., Nedbalcová K., Dubská M., Šátrán P., Bureš J.
All vets and farmers cooperating !

Questions?



Comments?

