Strategy on Antibiotic Resistance 2018 report

Strategy on Antibiotic Resistance
StAR

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Federal Office of Public Health FOPH

Federal Food Safety and Veterinary Office FSVO

Federal Office for Agriculture FOAG

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Note
The views expressed in the interviews in this report are those of the people interviewed and do not necessarily reflect those of the federal offices responsible for implementation of StAR.

Working together to combat antibiotic-resistant bacteria

The project team is pleased to present this year's report, which contains some highlights from the implementation of Switzerland's strategy on antibiotic resistance (StAR). It features short reports on the status of strategy implementation from members of the StAR project team, as well as interviews with other stakeholders who give their perspectives on its implementation. Once again this year, the high level of involvement of our partners was impressive. They work with us to ensure the long-term efficacy of antibiotics to preserve human and animal health. We intend to build on the many achievements to date and will continue our efforts to harness this joint potential going forward.

CORINNE CORRADI
Federal Office of Public Health (FOPH)

"Key actors have taken the lead and provided national guidelines and information on the proper use of antibiotics. This is a clear sign that the issue is being tackled across the board in human medicine."

DAGMAR HEIM
Federal Food Safety and Veterinary Office (FSVO)

"We are delighted that the measures are already working and that awareness continues to grow, as reflected by the decline in sales of antibiotics. New challenges such as the introduction of the antibiotics database and preventative measures are important steps forward."

MARKUS HARDEGGER
Federal Office for Agriculture (FOAG)

"All internal and external stakeholders have recognised the importance of effective antibiotics, which is why it's so inspiring to be working together towards a common goal."

SASKIA ZIMMERMANN
Federal Office for the Environment (FOEN)

"It's good to know that our wastewater purification plants are already removing antibiotic-resistant bacteria by a factor of 10–100."

8 fields of activity – 35 measures

The measures involved in the strategy on antibacterial resistance affect people, animals, agriculture and the environment and are split into eight fields of activity. The strategy follows the One Health approach.

MONITORING
The prevalence of resistance and antibiotic use needs to be monitored systematically in all areas. This is the only way that we can identify links between use, type of antibiotics and development of resistance in order to evaluate the success of the various measures.

PREVENTION
The factor that contributes most to combating antibiotic resistance is reduction of antibiotic use. The old motto 'prevention is better than cure' is relevant here. Fewer people and animals suffering from infections mean less use of antibiotics. Preventive measures such as better hygiene, targeted diagnostic tests, use of vaccines and optimised animal husbandry can reduce the use of antibiotics to a bare minimum.

APPROPRIATE USE OF ANTIBIOTICS
Excessive and inappropriate use is the main cause of the increasing resistance to antibiotics. Clear guidelines for prescribing, dispensing and use in medical and veterinary practice are needed, particularly for newly-developed antibiotics or those classified as critical.

RESISTANCE CONTROL
Resistance must be detected quickly and its proliferation prevented. In human medicine, this means reducing the risk of patients introducing resistant microorganisms to a hospital or nursing home at admission–for example with precautionary examinations. In veterinary medicine, it is important to restrict the spread of resistant pathogens among livestock.

RESEARCH AND DEVELOPMENT
The basis for effective measures is an understanding of causes and correlations. Targeted interdisciplinary research will fill the gaps in our current knowledge. New findings are the basis for product development, for example in the areas of diagnostic testing or antimicrobial agents.

COOPERATION
Dealing effectively with this problem requires cooperation. Interdisciplinary cooperation across various areas is therefore essential. A coordination committee and a panel of experts support implementation of the strategy. International networking and knowledge sharing will continue to be supported.

INFORMATION AND EDUCATION
The public also has an important role to play. Raising awareness at all levels will sensitise individuals to their personal responsibilities when dealing with antibiotics. Specialists in this area must update their specific knowledge of resistance, preventive measures, diagnostic tests and the responsible use of antibiotics.

GENERAL CONDITIONS
In order for antibiotics to remain effective in the future, the regulatory and political environment must be appropriate. Suitable measures, e.g. at the level of policy and legislation, are needed to support the development of new antibiotics and their rational use. In the livestock sector, incentives are also being developed to improve animal health and reduce the use of antibiotics.

Following a thorough examination of the sick animal, veterinarian Blaise Voumard decides whether or not to use antibiotics.

Implementing the measures

Sales of antibiotics in veterinary medicine continue to decline. Veterinarians and livestock owners are aware of the issue of antibiotic resistance, not least because of new regulations and guidelines. We join mixed practice vet Dr Blaise Voumard on his rounds in the Neuchâtel Jura.

When Blaise Voumard travels to his patients, his car becomes a mobile veterinary practice. Instruments for examinations and even surgical procedures are neatly stowed away in drawers. Today he is travelling from farm to farm treating livestock. "I can't cure them, but I can treat the animals and support their recovery," he says, while taking a cow's temperature. This cow has had a fever and cough for several days. Dr Voumard diagnoses a lung infection. Although he is not certain whether the animal's condition is viral or whether bacteria have penetrated its lungs, he has to make a decision about treatment on the spot. Appealing to researchers, Dr Voumard says: "What we need are fast and affordable diagnostic tools. If we could quickly determine that an infection is caused by a virus, then we wouldn't have to use antibiotics." But Dr Voumard has to play it safe to ensure the animal does not come to any harm.

> "We need fast and affordable diagnostic tools."

GUIDELINES: NO SUBSTITUTE FOR EXPERIENCE

Dr Voumard is able to draw on his many years of experience when making such decisions. The treat-

Office on wheels: the mobile veterinary practice includes a computer and a printer.

ment guides are particularly useful for young vets, and Dr Voumard explains that many of his young colleagues refer to them frequently. The guidelines were developed under the guidance of the FSVO and have been available since 2017. They contain clear and consistent recommendations on prescribing, using and dispensing antibiotics. "I read through a few sections out of interest and saw that fortunately I'm on the right track with my current approach," says Voumard. He explains that "ultimately the vet on site who has the sick animal in front of them and is aware of the herd's situation must decide on the right course of action."

> "The guidelines confirmed that my treatments are on the right track."

STOCKPILING ANTIBIOTICS?

The preventive use of antibiotics has come under particular scrutiny in recent years. The revision of the Veterinary Medicinal Products Ordinance (VMPO) in 2016 took this into account and prohibits antibiotics from being dispensed to livestock farmers for stockpiling purposes for preventive treatment of farm animals. Blaise Voumard believes this hasn't changed much and explains that his clients have always known him as someone who only dispenses antibiotics very sparingly. Dr Voumard believes the ban will have a positive impact and that it will make it easier for vets to stand up to such demands from livestock owners, and that advice will become all the more important. Dr Voumard notes that informative conversations with livestock owners are making an impact: "My clients no longer automatically give antibiotics to every cow during the dry period. Instead, they are increasingly carrying out bacteriological milk tests and only using antibiotics selectively."

SELECTIVE RATHER THAN BLANKET USE

The dry period is the period during which a dairy cow is not milked and is usually six to eight weeks before the birth of a calf. The dry period is well known as a risky period for udder infections. Many countries previously recommended treating all dry cows with antibiotics. This makes little sense for animals with healthy udders, which is why selective drying-off is becoming increasingly common. This development is playing an important role in reducing the use of antibiotics in veterinary medicine.

> "In tackling antibiotic resistance, we need to take effective action in human medicine too."

DATABASE ENSURES MORE TARGETED MEASURES

The total amount of antibiotics sold provides no indication of how antibiotics are actually used in veterinary medicine. From 2019, vets must therefore enter every antibiotic they administer or dispense in a national database (IS ABV) (see p. 12 "Central database for veterinary medicine"). Analysis of this information is intended to show the context in which antibiotic treatments are most often carried out. This will allow specific problems to be identified, targeted action to be taken and the impact of the measures to be reviewed. However, it would be too simple to focus solely on vets and in particular the livestock sector. "To tackle antibiotic resistance, it's essential that we systematically pursue the StAR One Health approach and also take effective action in the area of human medicine," stresses Voumard.

Small animal medicine

Progress with downsides

Veterinary medicine has made enormous progress in the last 20 years. There are more and more special clinics, particularly for small animals. But the risk of infection with resistant bacteria is high in places where many sick animals come together. Barbara Willi explains in the following interview why small animal medicine cannot do without antibiotics.

Ms Willi, what is the significance of antibiotics to small animals?
They are among the most valuable and frequently-used drugs we have at our disposal. Antibiotics must continue to be effective in future so that we can do our jobs properly.

What happens if these drugs no longer work?
That would be serious. We would no longer be able to treat even very straightforward bacterial diseases–for example urinary, bladder and lung infections. Major surgical interventions would also be too risky.

What is the level of awareness of antibiotic resistance in small animal medicine?
It is a hot topic at the moment, both in the training and development of vets and among pet owners themselves. I would stress that resistance is the price we pay for the use of antibiotics–even if they are used prudently. We also have to take care of what we have. There are very few new antibiotics on the horizon, and sooner or later bacteria will become resistant to new compounds, too.

Small animal medicine has become increasingly specialised in the last 20 years and there are more and more clinics. What are the downsides of this in relation to the antibiotics issue?
It is the same downside we are seeing in human medicine in hospitals and hospital-acquired infections. Veterinary clinics treat critically sick animals that are particularly susceptible to infection. If antibiotics are not used prudently, there is a greater risk of antibiotic-resistant bacteria developing. Such bacteria can be transmitted between animal patients, their owners and the clinic staff–for example if hand hygiene is inadequate. If we want to curb the development and spread of antibiotic-resistant bacteria, hospital hygiene needs to become established in veterinary medicine.

Male cat Leo is examined in a small animal practice.

DR BARBARA WILLI

Dr Barbara Willi is an associate professor in the Vetsuisse Faculty Zurich and Head of Clinical Infectious Disease and Hospital Hygiene at the Clinic for Small Animal Internal Medicine, University of Zurich.

An FSVO research programme is currently looking at the problem of hospital-acquired infections. It is investigating the role of small animal clinics and practices in the spread of highly resistant bacteria. The findings will be used to develop hygiene concepts for veterinary practices and clinics in Switzerland: these will also be made available to the veterinary community.

How do I tell my patients? Pharmacist Susanne Villalonga in conversation with Dr Carlos Quinto.

“They are sceptical, but not well informed”

“As often as necessary and as rarely as possible” is the motto regarding the use of antibiotics. The medical profession and pharmacists have a key role to play here. They support and advise patients on the right medication. Pharmacist Susanne Villalonga and general practitioner Carlos Quinto talk about the most important aspects of prescribing antibiotics.

Should I take antibiotics or not? More and more consumers are asking this question. What is your experience in the medical practice/pharmacy?
Quinto: When it comes to taking antibiotics, patients are more cautious and have lots of questions. That’s why every treatment starts with a discussion. Only afterwards do I proceed to the medical examination. I use all of my senses for this: sight, sound, smell and touch. Thanks to an on-site practice lab, we can make decisions fast and discuss them with patients.

Villalonga: Customers in the pharmacy have become more sceptical, but also more unsure. We’re often asked to provide a second opinion.

Taking time to get advice is therefore incredibly important. When we talk to patients, we often sense fear and concern. We take these concerns very seriously and sometimes we consult with the treating physician. This way we can confirm doctors’ orders and play a major role in boosting patient adherence. Antibiotics should be taken exactly as they are prescribed for optimum efficacy.

Does the public know too little about antibiotics and resistance?
Quinto: It often happens that therapies are abandoned as soon as patients start to feel better–or antibiotics are passed on to other people. That shows me there is a clear lack of knowledge out there.

Villalonga: For many people, the meaning of the term “antibiotic resistance” is not clear, let alone what the risks are. There is too little public knowledge about bacterial infections, resistance and about antibiotics in general.

A patient factsheet* was jointly put together by pharmaSuisse, the Swiss Medical Association (FMH) and the FOPH. Do you leave copies out in your waiting room/pharmacy?
Quinto: We usually give patients the factsheet to take away with them. The information it contains is correct but it can't replace or shorten the face-to-face discussion. But it is helpful for providing supporting and accessible information after the consultation.

Villalonga: This factsheet would simply get buried under all the information we display in the pharmacy. If an antibiotic has already been prescribed, we consider personal advice essential. And the factsheet won't plug the knowledge gaps we just mentioned. People don't realise how great the danger is of antibiotics becoming ineffective – and that this risk is higher than, say, the terror threat. A large-scale campaign is needed to educate the public about this.

Are alternative remedies an appropriate way to eliminate this risk?
Villalonga: Alternative remedies and complementary medicine have tremendous potential to help reduce the use of antibiotics. They can be used to treat common infections, such as bladder infections or inflammation of the respiratory tract from an early stage. In other words: start early and observe how the infection progresses. The key thing is not to miss the point at which the use of antibiotics becomes necessary. Unfortunately, not all alternative remedies are covered by health insurance.

> "Every treatment starts with a discussion – and that takes time."
>
> **CARLOS QUINTO**

> "Herbal medicine offers endless alternatives."
>
> **SUSANNE VILLALONGA**

Quinto: The fewer antibiotics we use, the better. Herbal remedies can quickly help to get viral infections under control and prevent a bacterial infection. We monitor disease progression very closely, and the decision about whether antibiotics are necessary is made together with the patient. Incidentally, the fact that health insurance does not cover costs is something we also encounter with antibiotics. There are cases when we are able to avoid a patient being admitted to hospital by giving them a daily antibiotic infusion (not a reserve antibiotic). But this infusion is not covered by health insurance – although it only costs twenty francs and hospitalisation would be much more expensive. These misguided regulations make the prudent use of antibiotics more difficult and need to be changed.

**Patient factsheet, poster and film available at: www.antibiotika-richtig-einsetzen.ch*

The leaf surface of plants–an ecosystem with great potential for novel antibiotically active substances.

A natural reservoir of novel antibiotics

In bacteria living on a widespread weed, scientists at ETH Zurich have discovered a significant potential for novel antibiotically active substances. They have shown that previously unknown antimicrobial compounds (which could lead to new drugs) can still be found in unexplored natural habitats.

Most antibiotics are derived from natural substances produced by bacteria as a defence against other bacteria. In the past, such products have mainly been discovered in soil. But in their search for new substances, scientists are now focusing on previously neglected ecosystems: for example, at the Institute of Microbiology at ETH Zurich, a group led by Julia Vorholt and Jörn Piel is investigating the surfaces of plant leaves–the so-called phyllosphere. In 2018, initial findings published by this group attracted considerable attention: on the leaves of thale cress *(Arabidopsis thaliana)*, a weed that grows throughout Europe, they discovered bacteria with great potential for novel antibiotics; the first antibiotically active substances have already been successfully extracted.

TAPPING UNEXPLORED RESERVOIRS

The project–supported by the Swiss National Science Foundation as part of the National Research Programme on Antimicrobial Resistance (NRP 72, see Box)–has thus reached an important goal: as Jörn Piel says, "We aimed to show that there are still many natural antibiotic substances waiting to be discovered, especially in ecosystems not previously investigated as sources of new substances." The phyllosphere is a relatively unexplored habitat, and the fact that it is poor in nutrients makes it highly attractive for antibiotic research, as Piel's colleague Silke Probst explains: "This gives rise to intense competitive pressure; as a result, bacteria produce a variety of substances that allow them to defend their habitat."

NEW MECHANISMS OF ACTION TO OVERCOME RESISTANCE

The newly discovered compound macrobrevin is just one of many antibiotically active substances produced by the leaf-surface bacteria. The more bioactive substances can be isolated, the greater the chance of finding a new mechanism of action which could overcome existing antibiotic resistance. But the road to a new drug is a long one: Silke Probst estimates that at best, it could take ten years for a new substance to be developed for clinical use.

EFFECTIVE IN HUMANS?

So the initial aim, according to Silke Probst, is to establish whether and how the bacteria in question can be cultured and made to produce the desired substances: "To carry out further analyses, we need larger quantities." If the researchers led by Piel and Vorholt manage to obtain a sufficient amount of active substance, they will first assess whether it is also effective against bacteria that cause diseases in humans. If so, additional questions will arise: does the substance already exhibit toxic effects at the laboratory research stage? To which bacterial proteins does the compound bind? What processes at the cellular level enable it to prevent bacterial reproduction?

FOUNDATIONS LAID BY ACADEMIC RESEARCH

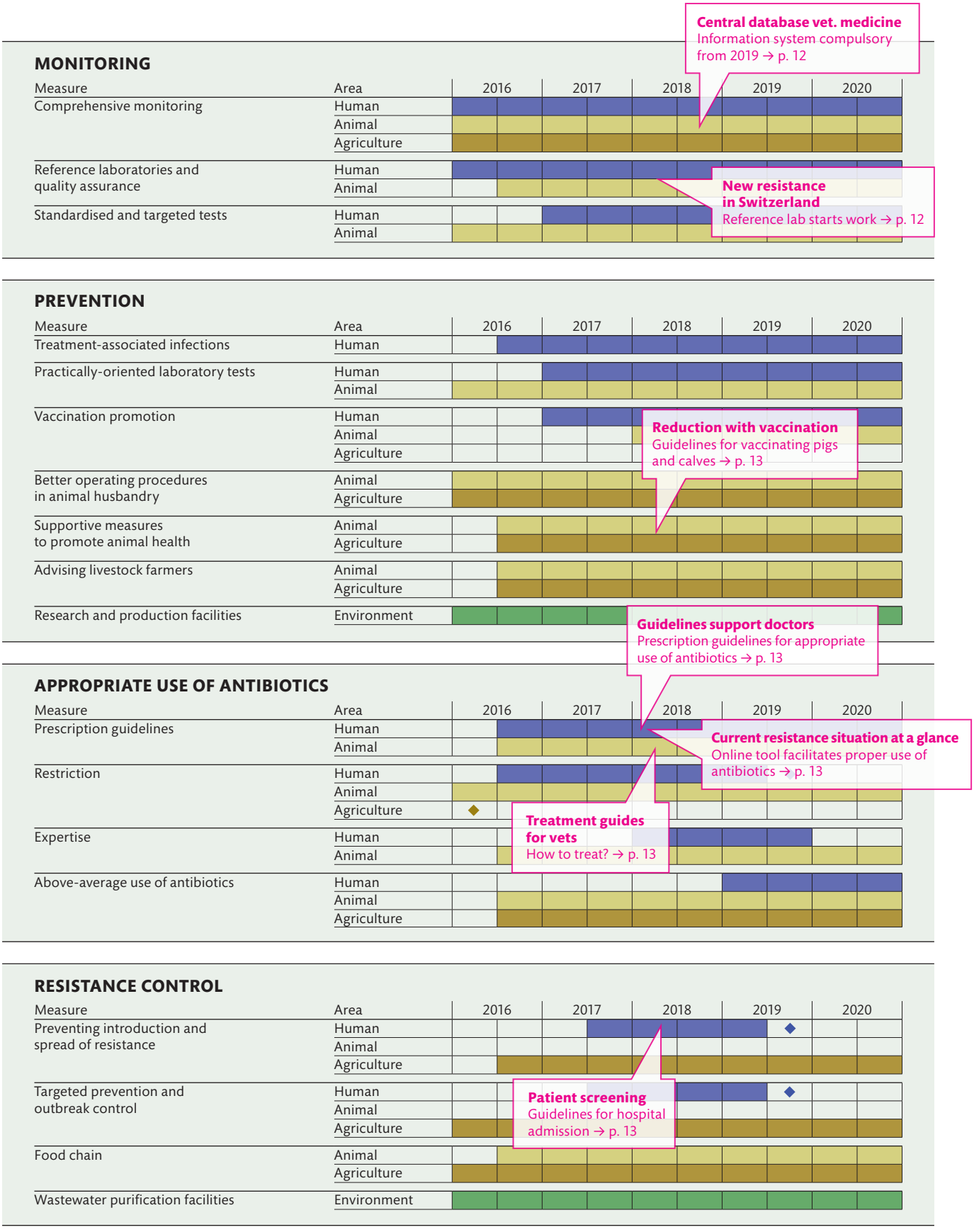
Jörn Piel says: "We'd like to clarify all these questions in the academic research setting, in collaboration with other groups offering appropriate expertise." Only then would industry be interested in commencing studies in humans, which involve much greater financial investment. This, he adds, makes it all the more important that public funds should be available to support research that can deliver promising new approaches. "A lot is happening in this area at the moment," says Piel. "Some of the findings will never have practical applications, but others are likely in the foreseeable future to help ensure that modern medicine retains one of its most important tools–effective antibiotics."

> "Substances with novel mechanisms can overcome resistance."
>
> **SILKE PROBST**

NRP 72–The "Antimicrobial Resistance" National Research Programme

All over the world, more and more pathogens are becoming resistant to today's antibiotics. Because medicines are losing their effectiveness, once easy-to-treat infections are turning into deadly diseases. The NFP 72 programme is aimed at finding possible counteractions to this development. It brings together specialists from various disciplines working together in an interdisciplinary setting. Their aim is to identify new approaches in the fight against antibiotic resistance. The One Health approach is pivotal, as when it comes to antibiotic resistance, human health is linked very closely to that of farm animals and to the environment, e.g. through the transmission of resistant bacteria in wastewater. The research programme has funding of CHF 20 million. The research projects are being conducted at several universities and higher education institutions throughout Switzerland and will be completed by 2021. More information is available at www.nfp72.ch

Status of StAR measures



RESEARCH AND DEVELOPMENT

Measure	Area	2016	2017	2018	2019	2020
Interdisciplinary platform	Human					
	Animal					
	Agriculture					
Basic principles for farmyard manure, soil and water	Agriculture					
	Environment					
Diagnostic methods	Human					
	Animal					
Transport of people and goods	Human					
	Animal					

Antibiotics in calf fattening
Two-day workshop with European experts → p. 14

COOPERATION

Measure	Area	2016	2017	2018	2019	2020
Cross-sector coordination body	Human					
	Animal					
	Agriculture					
Consultative expert body	Human					
	Animal					
	Agriculture					
Strengthening involvement of stakeholders	Human					
	Animal					
	Agriculture					
Networking with other countries	Human					
	Animal					
	Agriculture					
Support for developing countries	Human					
	Animal					
	Agriculture					

International networking
Switzerland takes part in meetings and training events → p. 14

Public awareness campaign
Launch of antibiotics campaign → p. 14

INFORMATION AND EDCUATION

Measure	Area	2016	2017	2018	2019	2020
Public information	Human					
	Animal					
	Agriculture					
Raising awareness among affected stakeholders	Human					
	Animal					
	Agriculture					
Basic and further training	Human					
	Animal					

Various information channels
How StAR spreads its message → p. 15

GENERAL CONDITIONS

Measure	Area	2016	2017	2018	2019	2020
Market mechanisms and incentive systems	Human					
	Animal					
	Agriculture					
General conditions for studies	Human					
	Animal					
	Agriculture					
Improve the availability of antibiotics	Human					
	Animal					
Strengthen enforcement	Human					
	Animal					
	Agriculture					
Programme to encourage appropriate use of antibiotics	Human				◆	
	Animal					

Factors influencing the use of antibiotics
Two studies examine the incentives → p. 15

Human **Animal** **Agriculture** **Environment**

Ongoing work

Measure is implemented/established

Reference to short reports on ongoing StAR measures → p. 12–15

Short reports on ongoing StAR measures

Monitoring

Central database for veterinary medicine

Antibiotic sales figures in veterinary medicine have been systematically recorded and analysed since 2006. However, these data cannot be used to draw conclusions regarding how much, why and how often antibiotics are used per animal species. But it is precisely this information that is significant in the development of resistance. For this reason, a national veterinary medicine database has been set up–the Information System on Antibiotics in Veterinary Medicine (IS ABV).

The local IS ABV application can be integrated into vets' day-to-day work from November 2018. From January 2019 it will be compulsory to enter the prescription of collective treatments. Transmission of data on individual animal treatments will be mandatory from October 2019. The Information System on Antibiotics in Veterinary Medicine fills an important gap. It allows us to assess how often individual species are treated with antibiotics. The database will also provide information on antibiotic use in the different forms of production–for example piglet rearing, calf fattening and dairy cattle farming. Veterinarians and livestock farmers will therefore have a tool at their disposal with which they can compare the use of antibiotics in their own practice or farm with that of other practices or farms. If need be, they can also implement appropriate measures to reduce the use of antibiotics in general. The database is designed to allow meaningful analyses to be carried out while minimising the amount of work required for vets.

New resistance in Switzerland

A new generation of multi-drug resistant bacteria has arrived in Switzerland: carbapenemase-producing Enterobacteriaceae (CPE). CPE pose a serious problem for public health on account of their highly-developed multi-drug resistance. The available figures indicate that while such pathogens are still rare in Switzerland, they are spreading rapidly worldwide. For this reason, CPE have been subject to a reporting obligation in Switzerland since 2016. In close collaboration with the Centre for Antibiotic Resistance (www.anresis.ch) and the NARA*, this form of resistance is being carefully monitored. Microbiological laboratories can now send samples in which they have detected this form of resistance to the NARA. The NARA then analyses the samples further regarding the different subtypes, thus enabling their spread to be comprehensively monitored. The NARA was set up in December 2016 and commenced operation in early 2017. It is run by the Medical and Molecular Microbiology Unit at the University of Fribourg. It offers analyses and genetic comparisons of resistant bacterial strains to all microbiological laboratories in Switzerland. It also offers consulting services.

**National Reference Centre for the Early Detection and Monitoring of Antibacterial Resistance and Resistance Mechanisms.*

Prevention

Reducing the use of antibiotics with vaccination

Infections that necessitate the use of antibiotics should be prevented whenever possible. This goal can be achieved with targeted preventive measures, one of which is immunisation. A set of guidelines has been put together on the vaccination of pigs; these guidelines contain specialist and scientific recommendations to provide veterinarians with a quick overview and help them to select the right vaccination strategy. In the area of calf rearing, some basic principles are being developed as part of a research project, and the results will be incorporated into the vaccination guidelines at a later date.

Appropriate use of antibiotics

Treatment guide for veterinarians

Treatment guides can help vets to decide whether antibiotics should be used and if so, which ones. Coordinated by the FSVO and in collaboration with the Swiss Veterinary Association (GST), the Vetsuisse Faculty and the specialist sections of the GST have drawn up a treatment guide. The first version on the most important diseases in pigs and cattle was published at the beginning of 2017. Based on initial experience, the guide has been revised and expanded. Recommendations on diseases in sheep and goats are currently being developed. A similar set of guidelines for small animal medicine is in the pipeline. All the recommendations from the treatment guides can also be found in the online instrument "AntibioticScout"*.

**AntibioticScout is an online decision aid for the prudent use of antimicrobial agents. The project was launched as part of StAR with scientific support from National Research Programme 72 (NRP72). Find out more at www.antibioticscout.ch*

Guidelines support doctors

Within the framework of StAR, the Swiss Society for Infectious Diseases (SSI) has published prescription guidelines to encourage the appropriate use of antibiotics. An initial guide is now available to general practitioners and specialists. For the treatment of urinary tract infections, acute bacterial sinusitis and acute middle ear infections in particular, the guidelines will help medical professionals to use antibiotics in an appropriate manner. Experts from various specialist associations are involved in the ongoing development of the guidelines. They take account of international guidelines and the evolution of the antibiotic resistance situation in Switzerland.
The prescription guidelines can be accessed at https://ssi.guidelines.ch

Current resistance situation at a glance

A new online tool has been designed to make it easier for doctors to use antibiotics in an appropriate manner. The latest data on the antibiotic resistance of various bacteria are presented in a clear and intuitive way on the website www.infect.info. The data are available at both national and local level.
A smartphone app is to be developed in 2019, and the data will be linked to the prescription guidelines.
More information at: www.infect.info

Resistance control

Patient screening

People are still getting sick and dying in Swiss hospitals and care homes from nosocomial infections – i.e. infections that are directly associated with treatment in a hospital. Multi-drug resistant bacteria (MRB) are often to blame. Patients who are carriers of MRB must therefore be identified as early as possible – ideally at admission to hospital. An online survey of Swiss hospitals and private clinics conducted in early 2018 showed that these institutions examine patients when they are admitted. However, the examinations vary a great deal and are sometimes sub-optimal. Under the guidance of the National Centre for Infection Prevention (Swissnoso), a set of clear and easily accessible guidelines have therefore been developed for swab tests to be carried out at admission to hospital.

Research and development

Antibiotics in calf fattening

What incentive schemes are there for vets to reduce antibiotic use in calf fattening? A research project at the Vetsuisse Faculty at the University of Zurich is exploring this question. A two-day workshop with experts from eight European countries was held in March 2018. Participants shared their experiences, discussed factors for success and failure with regard to reducing antibiotic use in calf fattening, and developed potential solutions. In all countries, livestock practice seems to be in increasing difficulty. Both in this area and in calf production, improvements are urgently needed and radical changes are required to ensure that they are sustainable. The job profile of livestock farmers has to be reconsidered–from the selection of suitable students and training courses to the way cooperation is organised between veterinarians and livestock farmers.

Cooperation

International networking

StAR is involved in various international initiatives and exchange platforms. Switzerland has been supporting the Global Antibiotic Research and Development Partnership (GARDP) for several years. This organisation works to develop and deliver new treatments for bacterial infections. Switzerland is now a partner of the Research and Development Hub launched in May 2018 to promote the development of new antibiotics. The One Health approach is also being strongly promoted at European level. In February 2018, Switzerland was invited to attend the meeting of the European Commission's Antimicrobial Resistance One Health Network. Representatives from the StAR project team also had the opportunity in June 2018 to discuss the issue of antibiotic resistance as well as national and international measures to combat it with European partners at a training event in Bulgaria.

Information and education

Raising public awareness

Communications within the framework of StAR are based on three pillars that support each other. The first pillar concerns information such as prescription guidelines, which is communicated to the specialists who prescribe and dispense antibiotics. The second involves communications targeted at people who have received antibiotics (e.g. patients or livestock farmers) or those who are affected by resistant bacteria.
The third concerns the wider population: the federal government informs the public about the value of antibiotics for humans and animals and the problem of antibiotic resistance in mass media campaigns. Zurich-based agency Havas came up with a convincing concept "Antibiotics: use wisely take precisely." In line with the One Health approach, the campaign's protagonists are not only humans but also living organisms from the whole cycle, for example in the form of animated characters. The awareness campaign will be launched in November 2018 and is scheduled to run for four years.

Various information channels

Various activities are under way to inform the veterinary community and livestock farmers about StAR and implementation of its projects. Presentations given at events have met with keen interest.

A multiplier system has therefore been set up, where agricultural advisors and official veterinarians are updated on current StAR projects and new research findings at a one-day course. Information disseminators then distribute this information within their fields. Events of this type are run once a year in collaboration with Agridea.

The FSVO had a stand at the Suisse Tier fair in Lucerne. They not only distributed information material, but also gave talks and had many interesting discussions with visitors. Livestock farmers were also given the opportunity to get nasal swabs tested for MRSA*.

**MRSA is the abbreviation for "methicillin-resistant Staphylococcus aureus," which is also commonly known as "multi-drug resistant Staphylococcus aureus". It is used to describe a particular strain of the bacterium Staphylococcus aureus (Staphylococcus). Staphylococci are common bacteria. The distinctive feature of MRSA bacteria is that most antibiotics have no effect on them – they are therefore multi-drug resistant.*

MRSA bacteria are generally harmless for healthy individuals. However, in certain circumstances (for example following surgery) they may cause serious infections.

General conditions

Factors influencing the use of antibiotics

Two different studies have analysed the incentives associated with the use of antibiotics. One of the studies focused on patients and pet owners. The study looked at how risk-conscious Swiss people are in terms of how they use antibiotics and how effective they expect them to be. The study's conclusion is encouraging: most respondents are reasonably well informed about antibiotics and are generally prepared to play their part in ensuring prudent use. This willingness now needs to be reinforced. The focus here is on balancing the conflicting priorities of rapid and safe recovery from individual illness and the future risk of ineffective antibiotics. The second study addressed medical professionals in hospitals and general practices to gauge what influences their decision as to whether or not to use antibiotics. Prescription guidelines, quick tests and antimicrobial stewardship programmes are obviously central guiding principles in deciding whether to prescribe antibiotics and if so, which ones. But vaccinations and improved hospital hygiene also play a key role in preventing resistant bacteria from spreading in hospitals in the first place, so that the use of antibiotics can be reduced.

AMR is also a challenge for Europe

Antibiotics are seen as a miracle cure. But bacteria are becoming ever more resistant to antimicrobial treatments all over the world. Switzerland is actively involved in the World Health Organization's strategy to curb this resistance. As manager of the antimicrobial resistance control programme of the WHO Regional Office for Europe, Danilo Lo Fo Wong champions the global fight against antimicrobial resistance (AMR).

Danilo Lo Fo Wong: "The WHO's action plans also follow the One Health approach."

Mr Lo Fo Wong, Switzerland has adopted a national strategy and is continually implementing measures. How is Switzerland doing in relation to other European countries?
The data submitted to the WHO show that Switzerland is still doing relatively well, with a low to medium resistance to the most common monitored pathogens.

The northern European countries (Sweden, the Netherlands) seem to be well advanced in the fight against antibiotic resistance. What are they doing better?
The countries of northern Europe started to tackle the problem back in the mid-90s. They have had guidelines on the use of antibiotics in humans and animals for many years and resistance is monitored. What's more, major efforts have also been made to inform both healthcare professionals and the public about the danger of antibiotic resistance.

What are the European framework conditions in the fight against antimicrobial resistance?
The WHO supports its member states with basic and further training, monitoring and prevention programmes and studies. These measures are part of regional and global action plans. Two action plans to combat antimicrobial resistance were launched in 2011: the strategic action plan of the WHO Regional Office for Europe and the European Commission action plan. In 2015 the WHO adopted a global action plan on antimicrobial resistance. These action plans offer member states a framework in which to tackle antibiotic resistance in line with the One Health approach.

Are there areas in which global cooperation is particularly important to Europe?
Antimicrobial resistance knows no boundaries. Pathogens can be spread between animals, humans and the environment, as well as within and between countries. This is why global cooperation is key in all areas.

> "Switzerland is doing relatively well internationally."
>
> **DANILO LO FO WONG**

What parallels do you see between human and veterinary medicine in the fight against antimicrobial resistance?
Despite the different use of antibiotics in veterinary and human medicine, in both areas the principle "prevention is better than cure" applies. Every infection we can prevent helps to reduce antibiotic use.

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