

# Strategy on Antibiotic Resistance 2017 Report

Strategy on Antibiotic Resistance



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## Contents

- 1** One strategy, four federal offices
- 2** "Talking about it is not enough"
- 5** 8 fields of activity-35 measures
- 6** Where we stand with StAR
- 8** Short reports on selected StAR measures
- 12** "The more concrete the guidelines, the better"
- 14** "The extra work was worth it - my farm is clean again"
- 16** Crossing borders

# One strategy, four federal offices



**PASCAL STRUPLER**  
Director Federal Office  
of Public Health (FOPH)



**HANS WYSS**  
Director Federal Food Safety  
and Veterinary Office (FSVO)



**BERNARD LEHMANN**  
Director Federal Office  
for Agriculture (FOAG)



**MARC CHARDONNENS**  
Director Federal Office  
for the Environment (FOEN)

Antibiotics are increasingly losing their efficacy, and as a result bacterial infections again pose a threat to both people and animals. The Federal Council reacted by launching the Strategy on Antibiotic Resistance, StAR, in 2015.

The health of humans and animals as well as a sound environment are closely interlinked and affect each other. Therefore, the problem of antibiotic resistance cannot be addressed from a single perspective. It requires close cooperation between all sectors and stakeholders—known as the One Health approach. Switzerland is implementing this approach in a pragmatic and model way compared with other countries.

Representatives of the FOPH, FSVO, FOAG and FOEN make up the StAR project team. The team coordinates the activities of the individual sectors, benefits from the experiences of others, and jointly seeks solutions. The work of this cross-departmental team is focused consistently on ensuring that antibiotics remain effective in the long term and thus help to maintain public health.

On behalf of the StAR project team, we thank all those who are actively involved in implementing StAR and who are cooperating in the spirit of One Health!



**Solving the problem of antibiotic resistance requires concerted effort at the political, economic and scientific levels.**

## “Talking about it is not enough”

The fact that more and more bacteria are becoming resistant to antibiotics is not only a medical problem. Human and animal welfare are at stake. How should we handle antibiotic resistance? Three key personalities from politics, industry and science discuss various approaches: Bea Heim, Jürg Granwehr and Malcolm Page.

**The WHO published its global strategy for containment of antimicrobial resistance back in 2001. In Switzerland, a first National Research Programme on antibiotic resistance (NRP 49) was launched in 2009 to address the problem. But since then, antibiotic resistance has grown rapidly - and little else has happened. Who has failed?**

Heim: The economic and political systems! What is lacking internationally - and Switzerland is no exception - is a consistent antibiotics policy that holds all the stakeholders to account. Switzerland is just at the start of this process. It monitors antibiotic

consumption and the development of resistance in human and veterinary medicine. It is also important to observe resistance levels in the soil and in water, to use antibiotics only when essential, to keep reserve antibiotics for human medicine only, and to boost research efforts.

Granwehr: Science in the 1980s and 1990s may have been too optimistic. Thanks to the highly effective antibiotics available during those decades, for a long time there was no need or interest in developing new antibiotics. There was no obvious new market for

industry. High levels of financial investment in research were considered to be a risk. Now nature seems to be outwitting us once again and new research efforts are required.

Page: Between 1990 and 2000 there was actually an “innovation gap” in research. No new classes of antibacterial substances were discovered. Things are catching up with us now. Although we do have eight new antibacterial substances, just five of those are effective against multi-resistant bacterial strains. It might take up to ten years before a new antibiotic can be developed from any of these. It’s just a long way from the discovery of a molecule through to usable medication. Often, businesses simply lack the money for clinical research. It’s something only big companies can do.

**All eyes seem to be on the pharmaceutical sector. Is that justifiable, Mr Granwehr?**

Granwehr: First, we are finding that the prices for tried and tested antibiotics are very low. There is hardly any money to be made in this market nowadays. For one thing, the market mechanisms are unfortunately not working: industry has no incentive to develop



**“New market mechanisms are needed.”**

**JÜRIG GRANWEHR**

lic. iur., Lawyer, Head of Pharma at scienceindustries, the Business Association Chemistry Pharma Biotech.



**“A genuine antibiotics policy is well overdue!”**

**BEA HEIM**

National Councillor for the Canton of Solothurn; studied medicine and has been doing her utmost to place antibiotic resistance on the political agenda for the last ten years.

new drugs for which there may never be a market. This is because new, effective antibiotics will have to be used sparingly and, if possible, not be used at all. So new incentive models are needed.

Heim: Investment in research and development of active antibacterial substances is urgently needed. The private and public sectors must play their parts – and work together. New market models are needed to develop effective drugs at sustainable prices. Switzerland could play a leading role in the search for those models.

**What might such a market model look like?**

Granwehr: There are already discussions today about ways of separating the costs of research and development from sales – such as market entry premiums. This means paying out an amount of money when a company has a new reserve antibiotic ready. In other models, the manufacturers of new antibiotics receive an annual payment from a fund. In return, they make pharmaceutical products available at a lower price. At the same time, we must not forget that development costs are high – we’re talking



## “New molecules exist but it takes ten years to reach market maturity.”

**MALCOLM PAGE**

Member of the lead group of the National Research Programme (NRP) 72, which in the next five years will investigate new solutions in the fight against antimicrobial resistance; has worked in pharmaceutical research for 26 years.

one billion US dollars per drug, or more! The industry needs security of funding, not least because the investors demand it.

Heim: Politics needs to give the initial impetus: to get more national and international commitment from the economy and the state. Basic research and advances in phage therapy research also have to be strengthened. What’s required is the entire Federal Council because the subject of resistance is becoming more and more of a safety issue. Public health is at stake.

### **Time is short – are there any short-term measures that can be taken?**

Heim: Yes, certainly. For instance, stewardship programmes in human and veterinary medicine: these support and promote the prudent use of antibiotics. Further measures include: an obligation to state reasons when using critical antibiotics, no handing-out of antibiotics without a prescription, quick tests for diagnosis and more intensive prevention in veterinary medicine.

Granwehr: A good starting point would be to simplify licence renewal for well-established antibiotics. This would mean they could be kept on the market and used for as long as possible until they really cease to be effective. At the same time, we could exercise restraint in using newer antibiotics. This ought to at least slow down the vicious circle of the emergence of new resistance.

Page: A surveillance database for human medicine is an urgent requirement for research. In fact, new antibiotics are not always what is needed. We have substances that can “recover”, i.e. those which – when they are not used for a certain length of time – allow non-resistant bacteria to replace the resistant ones. However, this requires reliable data.

### **And what needs to be done at the highest level to ensure that the fight against resistance is successful?**

Heim: A more intensive exchange between politics, industry and science is called for. But just talking is not enough. Concrete proposals are now needed for a new market model that will give private industry incentives to invest in research into new medicines, which (hopefully) will never come to be used. Switzerland must lead the way in this.

Granwehr: In various statements, industry has already shown it is open to discussion about new incentive systems. However, it is worth bearing in mind that national endeavours quickly run up against a brick wall in the globalised pharmaceutical market. Closer research collaboration offers enormous potential: science and industry can complement each other perfectly with fundamental and clinical research. The recently launched National Research Programme on antibiotic resistance (NRP 72) might open up new possibilities in this area.

### **What other aspects does NRP 72 intend to focus on, Mr Page?**

Page: I greatly welcome an exchange of knowledge and experience with industry. NRP 72 wants to get partners at all levels on board. We are investigating how resistance emerges and spreads, we are seeking new active substances and faster diagnostic methods. Finally, we also want to support the optimised use of antibiotics with our research. ■

# 8 fields of activity – 35 measures

The measures of the Strategy on Antibiotic Resistance concern human medicine, veterinary medicine, agriculture and the environment and are divided into eight fields of activity. The strategy follows the One Health approach.



## **MONITORING**

The antibiotic resistance situation and consumption must be monitored systematically in all sectors. This is the only way that correlations between usage, the nature of the antibiotics and the development of resistance can be identified, so that the success of the measures taken can be assessed.

## **PREVENTION**

Lower antibiotic use contributes the most to fighting resistance. The time-honoured saying "prevention is better than cure" applies: the fewer people and animals that suffer from infections, the fewer antibiotics need to be used. Preventive measures such as better hygiene, targeted diagnostics, vaccination and optimised animal husbandry can reduce the use of antibiotics to what is strictly necessary.

## **APPROPRIATE USE OF ANTIBIOTICS**

The excessive and inappropriate use of antibiotics is primarily responsible for the increase in resistance. Clear guidelines on prescription, dispensing and use in human and veterinary medicine are needed, especially for newly developed antibiotics or those classified as critical.

## **RESISTANCE CONTROL**

Resistance must be identified quickly and its further spread prevented. In human medicine, the risk of bringing resistance into hospitals or nursing homes when patients are admitted needs to be reduced—notably by preventive screening. The focus in veterinary medicine is on limiting the spread of resistant pathogens between herds.

## **RESEARCH AND DEVELOPMENT**

An understanding of causes and correlations is the basis for effective measures. Targeted and interdisciplinary research fills gaps in our knowledge. New findings will lay the foundations for product development, for example in diagnostics or in the field of antimicrobial substances.

## **COOPERATION**

Cooperation is needed to tackle the problem successfully. This is why multidisciplinary and cross-sector coordination is essential. A coordinating and expert body is supervising the implementation of the strategy. International networking and knowledge exchange will also continue to be encouraged.

## **INFORMATION AND EDUCATION**

The general public also has an important role to play. Information at all levels aims to raise the awareness of individuals so that they realise their own responsibility in dealing with antibiotics. The aim among professionals is to increase their specific knowledge about resistance, preventive measures, diagnostics and the correct use of antibiotics.

## **GENERAL CONDITIONS**

The general conditions have to be right for antibiotics to remain effective in the future. Appropriate measures, e.g. at the political or legislative level, should support the development of new antibiotics and their sensible use. The question of finding incentives in animal husbandry which will lead to better animal health and less antibiotic use is also being examined.

# Where we stand with StAR

## MONITORING

Measure	Area	2016	2017	2018	2019	2020
Comprehensive monitoring	Human	█	█	█	█	█
	Animal	█	█	█	█	█
	Agriculture	█	█	█	█	█
Reference laboratories and quality assurance	Human	█	█	█	█	█
	Animal	█	█	█	█	█
Standardised and targeted tests	Human	█	█	█	█	█
	Animal	█	█	█	█	█

## PREVENTION

Measure	Area	2016	2017	2018	2019	2020
Treatment-associated infections	Human	█	█	█	█	█
Practically oriented laboratory tests	Human	█	█	█	█	█
	Animal	█	█	█	█	█
Vaccination promotion	Human	█	█	█	█	█
	Animal	█	█	█	█	█
	Agriculture	█	█	█	█	█
Optimised operating procedures in animal husbandry	Animal	█	█	█	█	█
	Agriculture	█	█	█	█	█
Supportive measures to promote animal health	Animal	█	█	█	█	█
	Agriculture	█	█	█	█	█
Advising livestock farmers	Animal	█	█	█	█	█
	Agriculture	█	█	█	█	█
Research and production facilities	Environment	█	█	█	█	█

## APPROPRIATE USE OF ANTIBIOTICS

Measure	Area	2016	2017	2018	2019	2020
Prescription guidelines	Human	█	█	█	█	█
	Animal	█	█	█	█	█
Restriction	Human	█	█	█	█	█
	Animal	█	█	█	█	█
	Agriculture	█	█	█	█	█
Expertise	Human	█	█	█	█	█
	Animal	█	█	█	█	█
Above-average use of antibiotics	Human	█	█	█	█	█
	Animal	█	█	█	█	█
	Agriculture	█	█	█	█	█

## RESISTANCE CONTROL

Measure	Area	2016	2017	2018	2019	2020
Preventing introduction and spread of resistance	Human	█	█	█	█	█
	Animal	█	█	█	█	█
	Agriculture	█	█	█	█	█
Targeted prevention and outbreak control	Human	█	█	█	█	█
	Animal	█	█	█	█	█
	Agriculture	█	█	█	█	█
Food chain	Animal	█	█	█	█	█
	Agriculture	█	█	█	█	█
Waste water purification facilities	Environment	█	█	█	█	█

## 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					

## 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					

## INFORMATION AND EDUCATION

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

## 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					
Programmes to encourage appropriate use of antibiotics	Human					
	Animal					

Human



Animal



Agriculture



Environment



Ongoing work



Measure is implemented/established

# Short reports on selected StAR measures

## Monitoring

### One Health in monitoring

A study by the Universities of Zurich, Basel and Fribourg investigated the spread of colistin-resistant organisms in humans and animals in Switzerland. Colistin is a reserve antibiotic primarily used in human medicine when conventional antibiotics are no longer effective. Basically, there is no risk of colistin resistance from “healthy” bacteria. However, when colistin resistance is transmitted to pathogenic bacteria, this makes it much more difficult to treat certain infections. This risk of transmission is particularly high when the resistant organism carries a so-called *mcr1* gene. Researchers in this One Health study tested for the presence of the *mcr1* gene in bacteria from healthy and sick humans, from household pets and farm animals, as well as in Swiss chicken meat. They did find colistin resistance among the human subjects, but none—except for three cases—carried the *mcr1* gene. The study revealed no resistant germs with the *mcr1* gene in Swiss farm animals or pets or in poultry meat of Swiss origin. However, resistant germs were present in imported poultry meat.

The authors’ conclusion: the degree of spread of *mcr1* gene-bearing bacteria is currently very low in humans and farm animals in Switzerland. Nevertheless, an insidious spread, e.g. via imported poultry meat, cannot be ruled out and should continue to be monitored.

### “Pigs Plus” creates transparency

The “Pigs Plus” healthcare programme aims to record and optimise antibiotic use in Swiss pig production. It is intended to promote animal health and reduce the use of antibiotics without substantial loss of output. First, data must be recorded to provide an overview of animal health and of antibiotic use on farms with brood sows, weaned piglets and fattening pigs. The individual producer can compare his results with national averages. This transparent process confirms the good work that a producer has done or highlights what action they need to take and enables the sector to improve continuously.

### Usage database in the veterinary sector

A central database is being created to record the use of antibiotics in the veterinary sector. This will make it possible to assess the frequency of treatment for individual species or forms of production (e.g. meat production, dairy farming).

It will also allow users to draw conclusions about antibiotic consumption in their own practices or on their own farms. This work is underway; the database is due to be launched in 2019.

As soon as the usage data are available for a long enough period, it will be possible to identify farms and practices with above-average antibiotic use.

A discussion is currently in progress as to what appropriate measures could then be taken in the Swiss context. These measures will be defined incrementally.



### Early detection of new resistance

The National Reference Laboratory for Early Detection of New Antimicrobial Resistance and Resistance Mechanisms (NARA) started its work in early 2017. It is under the management of the Unit for Medical and Molecular Microbiology of Fribourg University, with a second site at the Lausanne University Hospital (CHUV). NARA has the objective of detecting new antibiotic

resistance and resistance mechanisms early enough so that their spread can be prevented or contained. NARA offers analyses and genetic comparisons of resistant bacterial strains to all microbiology laboratories in Switzerland. It also provides consultancy services.

#### Prevention

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## Complementary medicine

Anyone who keeps livestock can rely on support and advice from veterinarians as well as natural health practitioners who have recognised further training in complementary medicine. These professionals provide round-the-clock support by telephone. Around one third of consultations relate to mastitis in dairy cattle. Advice concerning calves is another key focus. A new offer now available is herd health management. Since 2016, Kometian has been supported financially by the Federal Office for Agriculture (FOAG). The impact of the advisory service is being scientifically evaluated by the Research Institute of Organic Agriculture (FiBL). Initial figures will be available from 2018.

#### Appropriate use of antibiotics

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## Guidelines for hospitals

Hospitals in Switzerland are expected to adopt programmes that support and promote appropriate prescribing, dispensing and use of antibiotics. These serve as guidelines with the aim of ensuring that the right antibiotic is prescribed at the right time, in the right dosage and for the correct duration. The Federal Office of Public Health (FOPH) is supporting the relevant professional bodies (Swissnoso, Swiss Society for Infectious Diseases, Swiss Society



of Microbiology) in drawing up national guidelines for mid-2019. As an initial step, a survey was conducted in hospitals at the end of 2016 in order to build on existing programmes and experiences. By the end of 2019, national guidelines will be available that define the procedure for within-hospital outbreaks of resistant pathogens and their prevention.

## Treatment guide for veterinarians

The Vetsuisse Faculty, in collaboration with the Swiss Veterinary Association (GST), has drawn up a treatment guide providing clear and consistent recommendations on the prescription, dispensing and use of antibiotics. Important basic principles of antibiotic treatment are described in a general section. The specific section concentrates on the most important diseases in pigs and cattle. More species and diseases are expected to be added at a later stage. As well as recommendations on which antibiotics to use as a priority, advice on diagnostics and prophylactic measures is also incorporated into the guide. Furthermore, the online instrument "AntibioticScout" is being developed as part of the National Research Programme NRP 72. This contains the recommendations from the above treatment guide but also shorter guidelines for antibiotic treatment of dogs, cats and horses.

#### Resistance control

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## Antibiotic resistance in waste water

Waste water from pharmaceutical plants usually contains very few antibiotic-resistant bacteria, whereas hospital waste water is more heavily contaminated than municipal waste water: these are the key findings of a study on antibiotic resistance in waste water commissioned by the Federal Office for the Environment (FOEN). The study conducted by researchers from Eawag (Swiss Federal Institute of Aquatic Science and Technology) concluded that waste water purification plants eliminate more than 90% of antibiotic-resistant bacteria, although the remaining resistant organisms still find their way into the water. It was further stated that the expansion of waste water purification facilities designed to remove micro-contaminants that was started in 2016 has made a contribution towards minimizing the entry of resistant germs. However, the problem of advancing antibiotic resistance cannot be solved purely by expanding waste water purification facilities. Instead, it is essential to tackle the main users. The issues of antibiotics in hospitals, veterinary medicine and the pharmaceutical industry need to be addressed specifically.

## Promoting diagnostic methods

Comprehensive diagnostics tests are part of good herd health management. Nowadays, they are relatively expensive. The very decision about whether (or which) antibiotics are therapeutically required ought to be based on suitable tests. Two projects have been initiated in order to promote diagnostics in this area. Since 2014, the "PathoPig" project has enabled pig farmers to have certain livestock problems investigated by means of subsidised diagnostic methods. A similar programme called "PathoCalf" has been initiated for calves in cooperation with the Swiss cattle health service.

### Cooperation

## International networking

Switzerland has regular exchanges with other countries. The aim is to derive mutual benefit from shared experiences and to develop a joint approach to antibiotic resistance. Last year, a Swiss delegation travelled to the Netherlands and this year it was to Norway. The delegation brought home experiences which may be helpful in implementing the Swiss strategy. Although the problem of antibiotic resistance is rather minor in Norway, the government aims to reduce the use of antibiotics by 30% by 2020. For instance, data on antibiotic consumption are made public. Hospitals are extremely interested in these data for the purposes of quality management because patients have a free choice of hospitals in Norway. Furthermore, prescription guidelines have been available since 2008. They are very widely accepted – 97% of GPs use them. Since then, antibiotic consump-



Norwegian colleagues with the delegation from Switzerland.

tion and inappropriate use have markedly declined. In agriculture, Norway has no resistance problem because only a tenth of antibiotic use comes from the veterinary sector. Norwegian animals are very healthy and live in small farms with a low level of specialisation. In addition, there are few animal imports and the biosafety standards in animal husbandry are high.

The success story in salmon farming is unique. Complete vaccination coverage was achieved by suitable vaccination systems, and use of antibiotics was virtually reduced to zero.

### Information and education

## What does the average Swiss resident know about antibiotics?

Compared to other countries in Europe, the Swiss public is well informed about the effects of antibiotics and trusts the medical profession when it comes to a sensible use of antibiotics. This was revealed by the analysis of an initial survey on the subject of antibiotic resistance. It is also essential to maintain this level of awareness in the future.

The population survey was conducted in 2016 on behalf of the Federal Office of Public Health (FOPH). It is based on the Eurobarometer survey on antibiotic resistance in the EU and shows that Switzerland ranks as one of the best in terms of low antibiotic consumption and displays a high level of knowledge. However, the survey did expose some knowledge gaps. There are misunderstandings about the use of antibiotics for colds and flu, especially among the younger generation. That is why it is important to provide information in a targeted manner. A good level of knowledge and easy access to reliable specialised information form the foundation for citizens to act responsibly and help preserve effective antibiotics. On this basis, the FOPH has devised a concept which, as a first step, aims to inform patients about antibiotic resistance.

## International Antibiotics Awareness Week

International organisations such as the World Health Organization (WHO) have chosen 13–19 November 2017 as World Antibiotic Awareness Week. The aim is to raise awareness of antibiotic resistance among the general public, healthcare professionals and policymakers worldwide. The federal offices for Public Health, Food Safety and Veterinary, Agriculture and the Environment are coordinating and supporting events and activities. For more information, visit [www.star.admin.ch](http://www.star.admin.ch)

## Promoting exchange of expertise

How can udder health management of dairy cattle be improved while at the same time antibiotic consumption is reduced? One research project is seeking new approaches to this problem: veterinarians are undertaking further training in working groups and are discussing issues concerning diagnostic methods, treatment, herd sanitation and communication. Another topic in the past year was the implementation of new regulations on the dispensing of antibiotics (revised VMPO–Veterinary Medicinal Products Ordinance). Initial feedback about the new training format has been rather positive. In the future, it is hoped that other target groups will benefit from an exchange of expertise in working groups.

## Improved further training

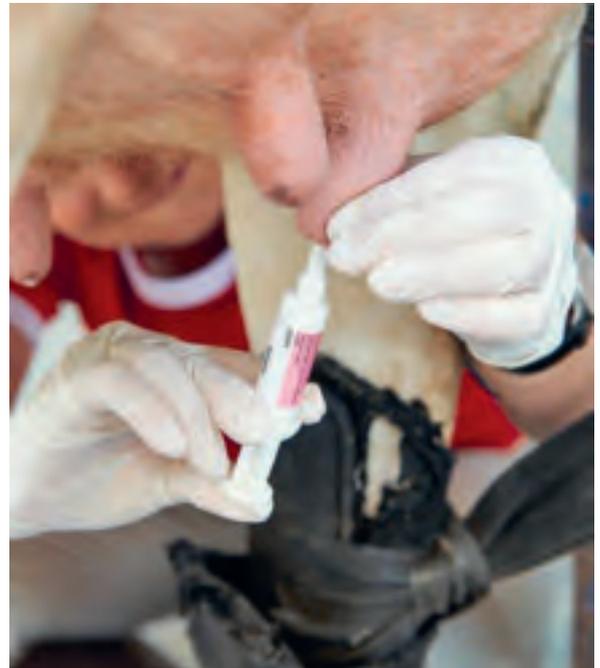
It is a new requirement for all veterinarians who dispense antibiotics held on stock to attend mandatory further training. About 140 people attended the three-day course in 2017. The course covered rights and obligations associated with dispensing antibiotics as well as knowledge about how resistance emerges and spreads. Attendees also expanded their knowledge about the importance of prevention, maintaining animal health and the appropriate use of antibiotics. It required a great deal of persuasive power to enforce this mandatory training but it was worth it: now, the veterinarian community is dealing with the subject of antibiotics with greater awareness and restraint than in the past.



### General conditions

## First-line antibiotics

From time to time, necessary and appropriate antibiotics for the treatment of animals are not available for various reasons. This means veterinarians are often unable to follow treatment recommendations. In conjunction with industry partners, the Swiss Veterinary Association (GST), Vetsuisse Faculty and the Federal Office for National Economic Supply (FONES), the Federal Food Safety and Veterinary Office (FSVO) has established initial areas for improvement. Communication and coordination are to be improved and Clinipharm has been further expanded as a central platform. The compulsory stockpiles of veterinary antibiotics should help ensure that shortages can be overcome efficiently and appropriately. ■



# “The more concrete the guidelines, the better”

As more and more bacteria are becoming resistant to antibiotics, in future they will have to be used more carefully in human and veterinary medicine. Prescription guidelines are an important tool in the fight against resistance.



**Exchange of expertise among professionals at the workshop in Bern entitled “Guidelines on the appropriate use of antibiotics”.**

At the end of 2016, a treatment guide for veterinary medicine was adopted. It was drawn up by the Vetsuisse Faculty in collaboration with the Swiss Veterinary Association (GST) and coordinated by the Federal Food Safety and Veterinary Office (FSVO). It is now the turn of human medicine: as part of a joint project involving Swissnoso, the Swiss Society for Infectious Diseases (SSI) and the Swiss Society for Microbiology (SGM), an expert committee under the direction of Prof. Pietro Vernazza is now working diligently on drawing up national guidelines on the appropriate use of antibiotics. The first guidelines are to be adopted by the end of 2017. These will contain recommendations on the diagnosis and treatment of infectious diseases and on the prescription of medicines.

Pietro Vernazza is Head of the Department of Infectious Diseases and Hospital Hygiene at St. Gallen Cantonal Hospital and a board member of the SSI, which had long intended to draft treatment guidelines. “When the National Centre for Infection Prevention, Swissnoso, approached us, the idea became reality. Now we are putting in a huge effort to publish eleven guidelines by the end of 2017,” explains Vernazza.

## **NOT REINVENTING THE WHEEL**

“For a country such as Switzerland, it is almost impossible to develop guidelines from scratch according to current quality standards. We lack the financial and human resources.” This is why there is a strong reliance on existing guidelines, which have been compiled and reviewed according to clearly defined criteria – just as in veterinary medicine. “We want to start with those guidelines that are most useful for daily practice. That means guidelines on upper airway diseases, cystitis in women, sexually transmitted diseases and gastrointestinal inflammation. From experience, large amounts of antibiotic are used in these cases and inappropriate use is relatively common”, according to Vernazza.

## **ADAPTING FOR USE IN SWITZERLAND**

The detailed work is done in small groups of experts who deal with individual issues in depth. Starting from an international guideline on their particular issue, the experts check what adaptations are needed for the Swiss context. Vernazza advocates restraint in this respect: “Contrary to popular opinion, our situation in Switzerland is quite similar to elsewhere in terms of epidemiology. Of course, there are some particularly Swiss features. But, as a rule, an international guideline is sufficient.”

## **EXCHANGE OF VIEWS AMONG PROFESSIONALS**

Exchanges of views with colleagues are of great help to the work of the expert groups. On 9 May 2017, physicians from different disciplines met to consider the subject of prescription guidelines. “There were intense discussions at this workshop. Now let us hope that it doesn’t stop at the discussion stage”, adds Vernazza.

## PRACTICAL

Based on individual guidelines, the committee is trying to work out simple instructions. "The more concrete the guidelines, the better. This is the only way to ensure that they are practical and will be used." Every exception or element that might be important in a rare context is explained in the detailed original version that has already been published.

## CHALLENGING

Vernazza attaches importance to involving other professional bodies in the process as early as possible: "In the case of meningitis, for instance, we want to have neurologists as part of the team when drawing up the first version. Other colleagues should gradually be included in the process." Coordinating the guidelines with all the other 34 professional bodies is probably too ambitious in view of time pressure, says Vernazza. Is the language divide in Switzerland a challenge as well? Vernazza is confident: "Though German-speaking and French-speaking Switzerland do have different medical cultures, in infectious diseases we have long worked well together."

## PLATFORM FOR ALL

Prudent handling of antibiotics takes priority in the guidelines. "But the aim is not to produce a mere antibiotic manual", says Vernazza. "Diseases will also be described for which not much antibiotic is used but which frequently raise issues in clinical practice." One such example is Lyme disease, which is mainly spread by tick bites. Its diagnosis poses major difficulties. Vernazza hopes to create a platform that is simply



**Prof. Pietro Vernazza is Head of Department for Infectious Diseases and Hospital Hygiene at St. Gallen Cantonal Hospital.**

“Switzerland is not so different.”

**PROF. PIETRO VERNAZZA**

and quickly accessible: "The aim is for medical professionals throughout Switzerland to have access via an electronic handheld device to a platform that will provide answers to their questions." ■

## Children are not miniature adults

We need guidelines that apply throughout Switzerland and can be implemented in practice. They need to be adapted to the daily routine of medical professionals but also to the age of the patients. For example, children are not simply small adults. It is not enough to reduce the dose of a medicine simply because a child has a lower bodyweight. A treatment guide must also contain diagnostic criteria. It is not enough to know whether an infection is viral or bacterial—because not every bacterial infection has to be treated with

antibiotics. But if they do need to be used, the guidelines should contain recommendations on suitable medicines. There are good guidelines from other countries which can be adapted to the healthcare and resistance situation in Switzerland.



**PROF. CHRISTOPH BERGER**

FMH Infectious Diseases and FMH Paediatric and Juvenile Medicine, Zurich Children's Hospital



Mastitis successfully confronted: Rémy Boder has healthy cows again in his cattle shed.

## “The extra work was worth it – my farm is clean again”

Mastitis is a relatively common problem in cows, whose inflamed udders give a poorer quality milk and less of it. A study shows how one of the pathogens responsible for mastitis can be diagnosed quickly and efficiently and how transmission to other cows can be avoided. This means that antibiotic use is reduced because dispensing of antibiotics is often the only possible form of treatment for mastitis.

Orvin is a village in the Bernese Jura with around 1200 inhabitants, some 670 metres above sea level. Here in the valley of Orvin lies Rémy Boder's farm. His main income comes from dairy farming. For a long time his cows were delivering milk and producing calves just as Boder wanted. Yet problems suddenly arose a few years ago. His Holstein cattle were giving

less and poorer-quality milk. “We just couldn't explain it. Until then the milk quality had always been good, then suddenly we had huge fluctuations and even had to accept deductions on the milk price”, explains Rémy Boder.

### DIFFICULT TIMES

In Switzerland, raw milk from all producers is officially checked twice a month (bulk milk tank inspection). These inspections show whether the health requirements with respect to milk production are being met and whether the regulations governing medicines have been complied with. The test laboratories report the

“We couldn't explain the poor milk quality.”

RÉMY BODER

results to the producers. If the quality of the milk does not meet requirements, price deductions or even a suspension may be imposed.

"If it had carried on, I'd probably have had to give up milk production", says Rémy Boder, "and what then? I was desperate and felt helpless." The recollection of that difficult time is written all over Boder's face. Then his vet told him about a study that might help. "I applied to take part and have my cows' milk tested."

#### **FAST AND EFFICIENT DIAGNOSIS**

As part of her ongoing doctoral thesis, agronomist Carlotta Sartori is studying how the contagious mastitis pathogen *Staphylococcus aureus* genotype B (GTB) can be eliminated from dairy farms. Diagnosis and prevention are key aspects. "We have developed a new molecular method for diagnosing *Staphylococcus aureus* GTB, then tested it in a field study", explains Sartori. "That's the study that Rémy Boder participated in." The test is quick and highly sensitive: "We can find the pathogen in the milk of 130 cows even if only a single cow is GTP-positive", says Sartori. "What is more, farmers are able to collect the necessary milk samples themselves. Until then, only an expensive sample collection by professionals was possible."

#### **AVOIDING CONTAMINATION**

Twenty farms whose milk had tested positive for *Staphylococcus aureus* GTB were chosen for the field study. Hans Graber, veterinarian and head of the mastitis research group at Agroscope, took care of Rémy Boder's farm: "Here we tested each of the 40 cows. The test proved positive in eleven animals. We treated them with antibiotics, the only possible treatment for this form of mastitis." To avoid infecting

other cows, the herds were divided into three groups and milked in the following sequence: first the GTB-negative animals (group 1), then the freshly calved, treated or newly purchased cows (group 2). Only at the very end were the GTB-positive cows milked (group 3).

After milking, the milking machine was thoroughly cleaned and disinfected so that the pathogens could not be transferred to the GTB-negative cows during the next milking session.

**"The new test greatly simplifies sanitation."**

**CARLOTTA SARTORI**

#### **FRESH HOPE**

The extra cost of the milking sequence and hygiene was worth it: "After six months the pathogen was eliminated from my farm! When we received good results from the milk inspection for the first time, it was a huge relief and I had a brighter future again." Meanwhile, the quality has risen to such an extent that Boder now receives bonus payments. "What is more, I have lower veterinary costs and hardly have to use antibiotics any more for mastitis", says a beaming Boder. He continues to maintain the milking hygiene and regularly has his milk tested for *Staphylococcus aureus* GTB: "If the pathogen resurfaces, I will react at once and take all the measures again. This extra cost is worth it!" ■



**Carlotta Sartori**  
Agricultural engineer  
(ETH Zurich), doctoral student



**Hans Graber**  
Head of the Mastitis Research  
Group at Agroscope



**Rémy Boder**  
Milk producer in Orvin,  
Canton Bern

# Crossing borders

Switzerland aims to move forward with the fight against antibiotic resistance at both the national and international levels. Tania Dussey-Cavassini was Head of the International Department of the Federal Office of Public Health (FOPH) until the end of June 2017. As an ambassador for global health, she represented Switzerland on the international stage.



The Swiss Ambassador for Global Health, Tania Dussey-Cavassini.

**Ms Dussey-Cavassini, antibiotic resistance is a global problem. We have adopted a national strategy and are currently implementing its measures. Where does Switzerland stand compared with other countries?**

Switzerland is on track but there's still a great deal to do! The Netherlands and Sweden, for instance, took measures to combat antibiotic resistance much earlier. Norway, Denmark and the UK are also much further ahead than Switzerland.

**So Switzerland is not top of the class?**

As far as results go—no. One example is that we've been unable to provide the OECD with figures on antibiotic consumption in human medicine. We're already a step further in veterinary medicine. But what is often cited internationally is the Swiss One Health approach. The StAR project is an excellent platform for bringing together the four areas of human and veterinary medicine, agriculture and the environment.

**Why is it that Switzerland cannot catch up with the northern countries you mentioned?**

In federalist Switzerland, the matter of implementation is left to the cantons and local authorities. That's not always straightforward, which is why national cooperation and dialogue are extremely important. Success relies on political will—in Switzerland too. I would compare Swiss politics to a mountain-climber who climbs the mountain slowly but steadily. He approaches his goal step by step. Obviously, this means he won't be one of the fastest, but he won't be out of breath either and he will have given careful thought to the path he is taking. But there is one advantage we do have—institutional continuity. When members of our government change, everything isn't turned upside down and reinvented.

**In what areas is international cooperation particularly important to Switzerland?**

Research is a major challenge for Switzerland. In this area, global cooperation and involvement in projects is of the utmost importance.

For instance, Switzerland has extended until 2019 its support for GARDP, a joint initiative of WHO and the Drugs for Neglected Diseases Initiative DNDi.

**“Success relies on political will—in Switzerland too!”**

TANIA DUSSEY-CAVASSINI

**What lies behind this initiative?**

The Global Antibiotic Research & Development Partnership GARDP is working at the global level to ensure that new antibiotics are developed and existing substances with antibiotic action are pushed through to market maturity. The transverse project Antimicrobial Memory Recovery Programme is a particular focus for Switzerland ([www.gardp.org/programmes/amrp](http://www.gardp.org/programmes/amrp)). ■

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