StAR One Health Action Plan 2024–2027

Strategy on Antibiotic Resistance
StAR

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Confederation

Federal Office of Public Health FOPH

Federal Food Safety and Veterinary Office FSVO

Federal Office for Agriculture FOAG

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Foreword

Antimicrobial resistance is one of the most pressing challenges of our 21st century society. More people already die from infections caused by resistant bacteria than from HIV or malaria, for example. This trend is also referred to as a 'silent pandemic'. Given the scale of the threat, countries all over the world have put in place measures to prevent and combat antimicrobial resistance. In Switzerland, the Federal Council adopted Switzerland's Strategy on Antibiotic Resistance (StAR) back in late 2015.

Through implementation of the StAR Strategy, many actions have been successfully initiated and significant successes already achieved. For example, surveillance of both the development of resistance and antibiotic consumption is now well established. The data collected show that antibiotic use is in decline and resistance rates have stabilised. Despite this progress, there is still a great deal of work to do. COVID-19 clearly highlighted the huge impact that pandemics can have on all areas of life, particularly if the necessary preparedness and response measures are insufficient or put in place too late. As the global anti-microbial resistance situation continues to intensify, it is key that implementation of StAR is driven forward in an active and targeted way and that it takes account of the latest scientific evidence.

To this end, the Federal Council is launching implementation of the StAR One Health Action Plan, which was developed in a participatory process. Through this Action Plan, it is reaffirming its commitment to systematically continue the fight against the 'silent pandemic' and to step it up in a targeted way. It draws on the One Health principle, makes the measures more binding where necessary, and paves the way for innovative approaches. The federal government and cantons, as well as many other stakeholders from the fields of human health, animal health, agriculture, and the environment are called upon to be better coordinated and pool their strengths even more effectively in order to tackle the challenges of antimicrobial resistance.

Let's all work together to control the spread of resistant bacteria and to ensure the long-term effectiveness of antibiotics for humans and animals – both internationally and here in Switzerland.

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Summary

Through the Swiss Strategy on Antibiotic Resistance (StAR), the Federal Council has been pursuing the goal of ensuring the long-term effectiveness of antibiotics for humans and animals since 2015. After eight years of implementation, some initial successes are evident. Numerous measures have been successfully initiated, antibiotic consumption has been reduced, and the resistance situation in Switzerland has stabilised for the time being. Nevertheless, antimicrobial resistance (AMR) remains a significant health risk, and on account of national and global developments, there is still a great deal of work to do in preventing and tackling AMR, including for Switzerland.

The interim review of the StAR shows that its strategic objectives are still relevant, but that there is some optimisation potential in terms of implementation. Further impetus is also coming from new scientific evidence and political initiatives to review in depth or prioritise individual measures. In view of these insights and challenges, the StAR One Health Action Plan 2024–27 was developed with the input of key stakeholders. The aim of this Action Plan is to enhance implementation of the StAR Strategy with binding, innovative and sustainable measures. The six priority action areas and objectives of the One Health Action Plan outlined below prioritise the implementation of StAR between 2024 and 2027:

Priority action area 1: **Appropriate use of antibiotics** in healthcare facilities, in outpatient settings and in veterinary medicine. Switzerland will reduce antibiotic use in inpatient settings to the level of the best-performing European countries. Its internationally leading position in the proper use of antibiotics in outpatient settings will be consolidated and regional differences reduced. In veterinary medicine, Switzerland aims to reach the level of the five best-performing countries in Europe in terms of the sale of critical antibiotics, without compromising animal health and welfare.

Priority action area 2: **Preventive measures** and health promotion in healthcare facilities, in veterinary medicine (clinics, practices, livestock farming) and in wastewater management. In human medicine, Switzerland will reduce the incidence of healthcare-associated infections involving resistant pathogens and in veterinary medicine the incidence of infections involving resistant pathogens in animal clinics and veterinary practices. Animal health will be improved across the board in Switzerland, through the promotion of preventive measures to maintain and improve animal health by veterinarians and implementation of the available instruments and recommendations by livestock owners. In terms of the environment, Switzerland will minimise antibiotic-resistant pathogens getting into waterways through direct discharges of contaminated wastewater.

Priority action area 3: Use of whole-genome sequencing methods for **One Health surveillance**. Switzerland will use whole-genome sequencing for the surveillance of antibiotic resistance in a more systematic and more coordinated way across different sectors. The data collected will be analysed using shared infrastructure to deliver further insights into the transmission paths of resistant pathogens.

Priority action area 4: **Research and development and ensuring availability** of new and existing antibiotics and diagnostics. Switzerland aims to ensure that new antibiotics and diagnostic and preventive tools against priority pathogens are launched and available in Switzerland. To this end, it will play an active role in promoting the research and development of new antibiotics and of diagnostic and preventive tools and work towards making a contribution to international push and pull incentives that is commensurate with its economic stature. The availability of existing antibiotics for humans and animals in Switzerland will be improved.

Priority action area 5: Switzerland will engage **internationally** to advocate sustainable and appropriate use of antibiotics. This involves active involvement in the development of international agreements and programmes, participating in key multilateral initiatives, and engaging in direct dialogue with neighbouring countries. By supporting and helping shape initiatives to tackle antibiotic resistance globally, Switzerland will be a committed actor on the global stage.

Priority action area 6: **Information and awareness raising**. Switzerland will ensure that medical professionals are appropriately informed about the issue of antibiotic resistance and are aware of the resources and tools developed as part of StAR. It will work to ensure that selected target groups in the population are educated about the issue of antibiotic resistance and the appropriate use of antibiotics, taking account of regional and sociocultural differences.

For the majority of the priority action areas, implementation of the StAR One Health Action Plan is to be led by the four participating federal agencies: the Federal Office of Public Health (FOPH), the Federal Food Safety and Veterinary Office (FSVO), the Federal Office for Agriculture (FOAG), and the Federal Office for the Environment (FOEN). They will liaise closely and implement the measures in collaboration with the cantons and many other stakeholders. A review will be conducted at the end of the term of the StAR One Health Action Plan to evaluate the success of its implementation. The strategic approaches to prevent and combat AMR initiated in the One Health Action Plan will be subsequently continued and secured in the long term through the necessary legal framework as part of the ongoing partial revision of the Epidemics Act.

1 Introduction

The 'silent pandemic' – a global challenge

The development and spread of AMR and the associated loss of effectiveness of antibiotics and other antimicrobials present growing risks and challenges to national and global health. The issue of AMR – also known as the 'silent pandemic' – is considered one of the ten biggest threats to global health according to the World Health Organization (WHO). The European Union (EU) also lists it as one of the top three priority health threats. According to a study, it is estimated that 1.27 million people worldwide died from infections caused by resistant pathogens in 2019 – more than malaria or HIV. This figure could rise significantly between now and 2050 if no action is taken.

Developments in Switzerland

These projections also affect Switzerland: the disease burden caused by AMR has risen steadily in recent years. It is estimated that drug-resistant infections lead to 300 deaths a year in Switzerland. Globalisation and rising mobility further elevate the risk. According to estimates by the Organisation for Economic Cooperation and Development (OECD),[1] this will result in direct and indirect annual costs of between CHF 198 million and CHF 748 million by 2050.[2] Measures to tackle the 'silent pandemic' are therefore also of utmost importance to Switzerland.

Swiss Strategy on Antibiotic Resistance (StAR)

In order to ensure that antibiotics remain effective for humans and animals in the long term, the Federal Council adopted the Swiss Strategy on Antibiotic Resistance (StAR) in late 2015.[3] Because AMR affects various cross-cutting dimensions, the strategy is designed in a multisectoral way based on the One Health approach (encompassing human health, animal health, agriculture, the environment). The four federal agencies involved – the Federal Office of Public Health (FOPH), the Federal Food Safety and Veterinary Office (FSVO), the Federal Office for Agriculture (FOAG) and the Federal Office for the Environment (FOEN) – also liaise closely and implement the measures with the cantons and many other stakeholders.

Interim review after eight years of implementing StAR

An interim review after eight years of implementation shows that StAR's strategic objectives are still relevant. In addition, many key foundations have been established, important tools have been developed to promote the appropriate use of antibiotics and preventive measures, and surveillance structures have been created (e.g. surveillance of antibiotic consumption and resistance; national guidelines; information for veterinarians and doctors, livestock owners and patients; broad outreach programmes). An overview of implementation of StAR can be found in Annex 4.

However, the COVID-19 pandemic delayed and hampered implementation while clearly highlighting the dramatic impact that global environmental and health threats can have on all areas of life. Insights from the pandemic response underscore the urgency of bolstering measures to tackle AMR, of better focusing on the achievement of the strategic objectives, and of optimising the coordination of national and international efforts. New scientific evidence has also been obtained in national and international research projects on AMR (National Research Programme 'Antimicrobial resistance' (*NRP 72*)) and in particular in Horizon 2020 and Horizon Europe). These findings must be taken into account in implementation of the measures. Furthermore, various political initiatives requests are calling for an in-depth review and prioritisation of various StAR measures (see chapter 2).

1 OECD (2023): Embracing a One Health Framework to Fight Antimicrobial Resistance, OECD Health Policy Studies, OECD Publishing, Paris. Accessible at: *https://doi.org/10.1787/ce44c755-en*

2 Health costs: CHF 102–444 million, losses in productivity: CHF 96–304 million

3 Federal Office for Public Health (2015): Strategy on Antibiotic Resistance Switzerland Accessible at: *https://www.star.admin.ch/star/en/home/strategiestar/landingstar.html*

StAR One Health Action Plan 2024–2027

The **StAR One Health Action Plan 2024–27** was developed with these insights and challenges in mind. The Action Plan aims to provide fresh multisectoral impetus, close existing gaps and remedy shortcomings, bolster implementation, and use resources more effectively in close collaboration with all stakeholders.

The StAR One Health Action Plan follows a **three-pronged strategy**:

- Existing instruments, products and resources to support measures (e.g. guidelines and stewardship programmes) will be promoted among target groups, they will be made more **binding**, and will be applied routinely.
- **Innovative approaches** will be encouraged to remedy shortcomings and close gaps. They include, for example, strengthening multisectoral One Health surveillance through the systematic collection of sequencing data and the promotion of systemic research into resistance flows, fostering the development of new antibiotics and improving the security of supply of existing ones.
- Measures to tackle the 'silent pandemic' require a long-term commitment. The relevant structures and processes will therefore be bolstered to secure the available resources in the **long term**. Switzerland will design its interventions to prevent and combat AMR at national and international level in a targeted way in order to take adequate account of the seriousness of the threat.

The One Health Action Plan is an important and necessary step in the targeted implementation of StAR and the realisation of a binding, innovative and sustainable national health policy to tackle the 'silent pandemic'. The ongoing partial revision of the Epidemics Act (EpidA) will provide an additional legal framework to be able to put in place the measures needed to prevent and combat AMR in the longer term. The StAR One Health Action Plan and the stepping-up of prevention and control measures in Switzerland fit into international efforts to counter the global threat in a coordinated way.

2 New insights and recommendations

This StAR One Health Action Plan is based on the analysis and consideration of various scientific evidence, insights and recommendations from various sources. The most important ones are outlined below.

National Research Programme 72

To complement StAR, the Federal Council launched the National Research Programme (NRP 72) 'Antimicrobial resistance – a One Health approach' in 2015. This NRP supported research in all affected areas (human health, animal health and the environment) and was completed in 2022. The research findings highlight concrete solutions and tangible measures in three areas:

- Augmenting comprehensive antibiotic resistance monitoring in all areas (human health, animal health and the environment) with whole genome sequencing data, and jointly analysing this data;
- Curbing the emergence and spread of resistant organisms, promoting prevention and optimised use of antibiotics;
- Overcoming existing types of resistance; developing new antibiotics through the promotion of basic research and economic incentives.

The StAR One Health Action Plan was informed by the findings from NRP 72 and adopted the recommendations from it – such as optimisation of surveillance and monitoring through whole genome sequencing data, ongoing development of treatment guidelines, implementation of longterm antibiotic steward-ship programmes in hospitals, and active participation in international initiatives on research and development of new antibiotics.

Formative evaluation of StAR (2017–23)

The implementation of StAR underwent an external formative evaluation on behalf of the FOPH from 2017 to 2023. The evaluation sought to bring about a continuous learning process among stakeholders and therefore to optimise implementation of the strategy on an ongoing basis. The evaluation report[4] delivered a largely positive provisional assessment and set out some concrete recommendations. They include developing the substance of StAR, promoting adoption of the measures and behavioural change in the target groups, and optimising the management of StAR in line with the One Health approach (particularly in terms of a multisectoral design that reflects the One Health principles, developing surveillance and monitoring, integrating strategic coordination and leadership). The need for action identified in the provisional assessment was a key factor in the development of the StAR One Health Action Plan.

Current resistance situation and antibiotic consumption in Switzerland

As part of StAR, key measures in human and veterinary medicine and in agriculture have been implemented in recent years to reduce the use of antibiotics and to minimise the emergence of resistance.

The Swiss Antibiotic Resistance Report SARR[5] by the FOPH and FSVO shows a decline in antibiotic consumption in Switzerland in key areas. Antibiotic consumption in human medicine has declined slightly in the last ten years. Great progress has been made in particular in the use of critical 'Watch' antibiotics[6] (decline of over 40%). In veterinary medicine, antibiotic consumption has been roughly halved since 2016, and prescribing practice for critical antibiotics has been significantly improved.

Compared to other countries in Europe, Switzerland is still one of the countries with the lowest antibiotic consumption, although there are marked regional disparities in human

4 Once the One Health Action Plan has been approved by the Federal Council, the report will be published online at: *www.bag.admin.ch/bag/de/home/das-bag/publikationen/evaluationsberichte/evalber-uebertragbare-krankheiten.html*

5 Federal Office of Public Health and Federal Food Safety and Veterinary Office (2022): Swiss Antibiotic Resistance Report, Bern. Accessible at: *https://www.star.admin.ch/star/en/home/sarr/sarr.html*. The report was launched by StAR and analyses the surveillance data on antibiotic consumption and AMR every two years.

6 According to WHO, antibiotics are classified as standard ('Access'), special indication ('Watch') and reserve ('Reserve').

medicine, with consumption per inhabitant much higher on average in the French- and Italian-speaking parts of the country than in the German-speaking part. In specific areas, too, such as in appropriate use in hospitals, there is still room for improvement. Representative population surveys also show low awareness of the threat posed by AMR and sizeable knowledge gaps regarding the correct use of antibiotics.

Following an increase up until around 2015, the resistance situation has remained fairly stable in recent years: for some bacteria and antibiotics, resistance rates have significantly increased, while others have fallen or barely changed. Due to much higher resistance rates internationally, the resistance situation is expected to worsen again, including in Switzerland. The analysis of surveillance data that shows a further need for action was included in the StAR One Health Action Plan.

Selected political initiatives on AMR

AMR is attracting attention among policymakers. A number of political initiatives have called for a review of various aspects, which have been taken into account in this StAR One Health Action Plan. In particular, this concerns the calls for:[7]

- the introduction of individual dispensing of antibiotics (follow-up mandate Mo. Tornare *17.3942*);
- a One Health strategy with systemic research into the spread of antibiotic resistance (*Mo. Graf 19.3861*);
- the institutionalisation of wastewater monitoring and the sequencing of pathogens for a safer Switzerland (Postulate *22.4271*);
- security of supply and the incentivisation of research and development into new antibiotics (e.g. *20.3166*, *21.4539*, *22.3256*).

Joint external evaluation of the implementation of the International Health Regulations (2005)

In 2017, WHO conducted an *evaluation of implementation of the 2005 International Health Regulations* in Switzerland and Liechtenstein. Among other things it looked at capabilities for dealing with antibiotic resistance and made the following recommendations: Develop screening and outbreak management guidelines for multidrug resistant organisms; enhance surveillance of AMR infections; expand and consolidate monitoring of healthcare-associated infections; foster adherence to antibiotic prescription guidelines in hospitals (including stewardship programmes) and by the veterinary community. A package of proposed amendments to the IHR, which arose from the challenges of COVID-19, is currently being discussed.

International AMR initiatives

Antibiotic resistance is a global challenge. Besides national activities, effective action therefore also requires international alignment and coordination of measures. Implementing the strategy in a more concerted and focused way, as set out by the StAR One Health Action Plan, is in keeping with the bolstering of efforts internationally. This includes, for example:

- 2021: Revision of the *Codex Alimentarius*[8] (International Food Standards) with regard to AMR;
- 2022: Formation of a 'Quadripartite' with the United Nations Environment Programme (UNEP) joining the Tripartite on AMR (WHO/WOAH/FAO). Application of Regulation (EU) 2019/6 on veterinary medicinal products in all member states.
- 2023: *European Commission recommendations*[9] on stepping up actions to combat antimicrobial resistance in the EU in a One Health approach; Reform of the EU *legislation on medicinal products*[10]; Consideration of issue of AMR in negotiations on international Pandemic Agreement (WHO INB process);
- 2024: High-level Meeting on AMR at the UN General Assembly.

7 More information on the procedural requests can be found at *www.parlament.ch*.
8 *https://www.fao.org/fao-who-codexalimentarius/thematic-areas/antimicrobial-resistance/en/#c437070*
9 *https://health.ec.europa.eu/publications/commission-proposal-council-recommendation-stepping-eu-actions-combat-antimicrobial-resistance-one_en*
10 *https://ec.europa.eu/commission/presscorner/detail/de/ip_23_1843*

3 Priority action areas 2024–2027

The key priority action areas of the StAR One Health Action Plan are set out below. For each one, a brief description of the background is followed by the objectives, implementation activities, milestones and stakeholders. Chapter 4 sets out details on roles and responsibilities and on measuring progress, indicators and evaluation. Annexes 1 and 2 contain an overview of milestones and the composition of each task by stakeholder. Annex 4 features a detailed presentation of the status of implementation of StAR.

The six priority action areas of the One Health Action Plan supplement, define and prioritise the implementation of StAR for the years ahead (2024–27).

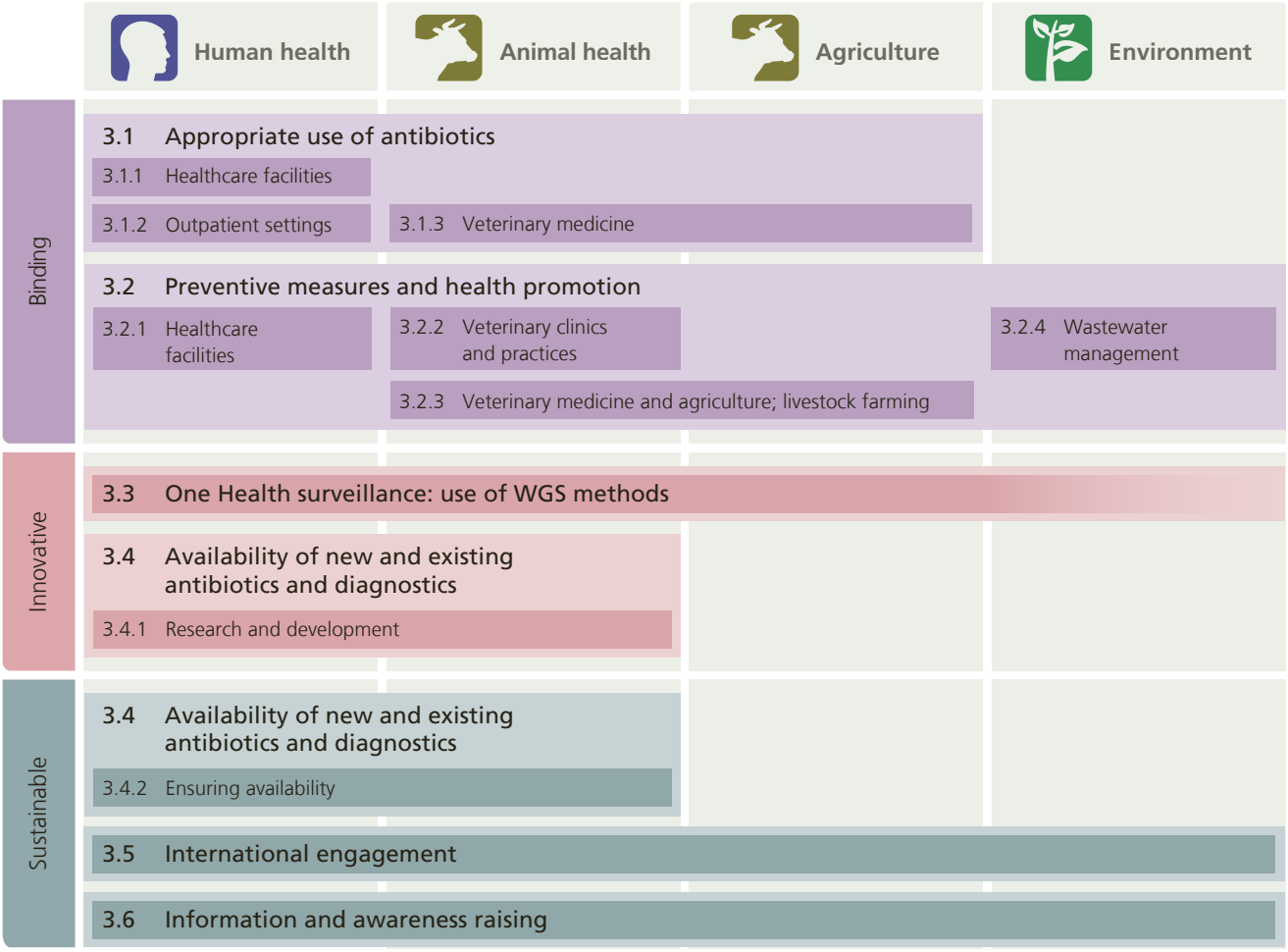

Figure 1: Priority action areas of the StAR One Health Action Plan at a glance

3.1 Appropriate use of antibiotics

3.1.1 IN HEALTHCARE FACILITIES

Background

The National Centre for Infection Prevention (Swissnoso) developed documents to support stewardship programmes (promoting the appropriate use of antibiotics in inpatient settings), and assisted hospitals in implementing them. Data from the Swiss Centre for Antibiotic Resistance (ANRESIS) and from the NOSO point prevalence study[11] on antibiotic consumption and use is available to hospitals.

11 NOSO stands for nosocomial infections

Various – mainly large – hospitals in Switzerland have introduced or scaled up antibiotic stewardship programmes (ASPs) in recent years. In 2017, a representative survey showed a great deal of variability in implementation of ASPs in Swiss hospitals, and shortcomings in typical activities, such as audits, feedback and measures to limit the use of reserve antibiotics.

The share of healthcare-associated infections (HAIs) in the burden of disease caused by resistant pathogens is high. There is therefore some room for improvement in terms of antibiotic use in inpatient settings compared with other countries. Measures in hospitals – including smaller and medium-sized facilities – are therefore a high priority.

There is less data on antibiotic resistance and use in nursing and care homes (NCHs). There are not yet any specific national resources on the appropriate use of antibiotics in these settings either. The COVID-19 pandemic showed that NCHs can be particularly affected by infectious diseases.

Objectives

Reduce consumption – in particular of watch and reserve antibiotics – in inpatient settings to the level of the best-performing European countries.

In view of the potential introduction of a mandatory requirement in the EpidA, the aspiration is that the majority of Swiss hospitals implement stewardship programmes. In addition, improve the data on care homes and review basic measures. This will increase appropriate use of antibiotics and reduce the use of watch and reserve antibiotics.

Activities

The following activities will be carried out to achieve the objectives:

- Data will be collected again on the current state of implementation of stewardship programmes in hospitals. On the basis of this status evaluation, further measures will be put in place.
- To support hospitals, clear guidance will be compiled in a handbook on setting up stewardship programmes and other tools and resources will be developed. Possible tools are antibiotic guidelines for hospitals, for example for surgical antibiotic prophylaxis and the optimised use of diagnostics (diagnostic stewardship). Other support options are continuing education modules and an in-depth monitoring and feedback system on antibiotic use (e.g. collection of data on indications) and resistance by ANRESIS. Increased use of digital tools such as clinical decision support tools (CDSS) will also be reviewed.
- Options for a national standardised implementation of ASP are being worked on, for example similar to the 'structural minimum requirements for the prevention and control of healthcare-associated infections in Swiss acute care hospitals'. This includes examining whether the nationwide roll-out of stewardship programmes and mandatory reporting of antibiotic use by hospitals would require an amendment to the legal framework. Corresponding legislative proposals will be put forward in the ongoing partial revision of the EpidA.
- The multidisciplinary stewardship teams that are established in hospitals will be closely linked to the existing infection prevention and control (IPC) teams. A tiered approach will take adequate account of the situation in small and medium-sized hospitals when it comes to implementation so that they can join forces and form networks. Work will be done to examine whether it would be helpful to provide support to cantonal authorities in the implementation of ASPs. This could take place by means of a national audit process, for example.
- The data situation on antibiotic resistance and resistance rates in nursing and care homes will be improved. Potential measures to promote appropriate use in care homes (e.g. guidelines) will be examined. The various organisational structures of NCHs in the cantons must be considered in this process. This work will be closely aligned with the National Strategy for the Monitoring, Prevention and Control of Healthcare-Associated Infections (NOSO Strategy).

THE FOLLOWING ARE THE TARGET MILESTONES:

Milestones

2024: The national implementation monitoring for ASP (including indicators) is established; an initial survey is conducted.
2025: A study is available on increasing the dissemination and binding nature of ASP in a nationally standardized process.
2026: The complete handbook for ASP, including implementation toolkit, is available.
2027: The legislative requirements regarding the nationwide roll-out of stewardship programmes and the mandatory reporting of antibiotic use are identified and corresponding proposed amendments are put forward in the EpidA revision process.

Stakeholders

EAD	IMPLEMENTATION PARTNERS
Swissnoso, federal government	Hospitals, professional societies, doctors, pharmacist, associations

3.1.2 IN OUTPATIENT SETTINGS

Background

The total consumption of antibiotics in outpatient settings in Switzerland is already low by international comparison. Nonetheless, various resources have been developed in recent years to further promote the proper and appropriate use of antibiotics in outpatient settings. They include, for example, the national guidelines on the appropriate use of antibiotics that are available on the platforms *ssi.guidelines.ch* and *guide.anresis.ch* (linked to the latest resistance data). Also, Information materials for doctors and patients were developed and decision-making tools on antibiotic prescribing were compiled for clinicians and for training in quality circles. Not all doctors are aware of the existing resources, however. Besides, there are specific problem areas and regions with disproportionately high antibiotic use. This is why the Action Plan focuses on raising awareness of the tools and resources and making targeted improvements in problem areas and regions with high antibiotic use.

Objectives

Consolidate Switzerland's internationally leading position in the appropriate use of antibiotics in outpatient settings. Reduce regional disparities.

Set up a stewardship network of stakeholders from the science community and clinicians which will formulate recommendations for interventions and inform the medical community about potential for improvement in medical practices on the basis of improved data on antibiotic use. Provide up-to-date and user-friendly resources (e.g. guidelines) and improve general conditions (e.g. individual dispensing) to support general practitioners and paediatricians in particular.

Activities

The following activities will be carried out to achieve the objectives:

- The introduction of nationwide monitoring of antibiotic consumption on the basis of accounting data will be reviewed, including benchmarking (e.g. by means of peer review in quality circles). Any amendments to the legal frameworks will be taken into account, and corresponding legislative proposals will be put forward in the current partial revision of the EpidA. In addition, the collection of data on antibiotic use (e.g. through the Sentinella notification system) will be expanded to allow detailed analysis of prescribing patterns and targeting of measures. It is important that consumption can be reported back to prescribers in a timely and granular manner, i.e. on a regional basis, broken down according to individual medical specialist group and indication.
- A stewardship network with representatives of the medical profession and the science community will be established for outpatient settings. This network will play a part in the

strategic management of measures in outpatient settings and ensure that communication aimed at general practitioners and paediatricians is targeted and coordinated.

- The recommendations of the stewardship network will help to improve the user friendliness, awareness and use of guidelines, information materials and decision-making aids. To ensure better coordination of resources with users and to ensure the resources are disseminated in a targeted way, cooperation with the key stakeholders (FMH, professional societies, physicians' networks, cantonal medical societies) is key. Communication with medical professionals and with patients will be systematically enhanced. Integration of antibiotic guidelines in the clinical software (CDSS) will be reviewed with the relevant stakeholders and the next steps defined.
- The level of knowledge of doctors and pharmacists is crucial to the appropriate use of antibiotics. Undergraduate, postgraduate and continuing education and training for doctors and pharmacists will therefore be bolstered in this area. To do this, various methods will be reviewed (e.g. mandatory postgraduate training and continuing education, adaptation of the under-graduate, postgraduate and continuing education programmes for doctors and pharmacists, incentivisation and creation of offerings for voluntary further training) and, where appropriate and possible, implemented.
- An amendment of the legal framework will be reviewed for the introduction of requirements on antibiotic use, including a notification requirement for certain substances. Corresponding legislative proposals will be put forward in the current partial revision of the EpidA. Such requirements are seen as a last resort if the appropriate use of antibiotics cannot be guaranteed any other way. They would also be limited to certain substances (e.g. market launch of a new substance to combat multi-resistant pathogens, reserve antibiotics).
- Necessary modifications to the legal and implementation frameworks for the potential introduction of individual dispensing of antibiotics throughout Switzerland will be examined as part of the Federal Council mandate.[12] For this, a cost-benefit analysis will be conducted.
- Where there is evidence that rapid diagnostic tests can reduce the use of antibiotics, the Swiss Society for Infectious Diseases (SGINF) will examine the inclusion of such tests in its guidelines during the update process. If diagnostic laboratory analyses prove effective, appropriate and cost effective as defined in the Health Insurance Act (HIA), it is the task of the professional societies and the manufacturer to seek inclusion in the List of Analyses by submitting applications to the Federal Commission for Analyses, Aids and Devices. This is so that they can be reimbursed by the compulsory health insurance.

Milestones

THE FOLLOWING ARE THE TARGET MILESTONES:

2024: The stewardship network is established.
2025: The Federal Council makes decision on individual dispensing of antibiotics. National quality indicators on antibiotic prescribing in outpatient settings and corresponding targets are developed.
2026: According to the recommendations of the stewardship network, tools and resources are systematically developed further and publicised.
2027: The legislative requirements regarding the mandatory postgraduate training and continuing education on antibiotic use are identified and corresponding proposed amendments are put forward in the EpidA r-vision process.

Stakeholders

LEAD	IMPLEMENTATION PARTNERS
Professional societies, federal government	Cantons, university general practice departments, physicians' networks, cantonal medical societies, doctors, pharmacists, associations

12 *https://www.admin.ch/gov/de/start/dokumentation/medienmitteilungen.msg-id-91071.html*

3.1.3 IN VETERINARY MEDICINE

Various tools are available to promote the appropriate use of antibiotics in veterinary medicine. Treatment guidelines exist for the most important bacterial infections and species. Besides the antibiotic sales data, detailed data on antibiotic use is also available in the Information system on antibiotics in veterinary medicine (IS ABV), and a benchmarking system is in development. This benchmarking system is intended to enable farmers to compare the intensity of antibiotic treatment on their own farm with that of other farms in the same use category. On this basis, livestock farmers with a high antibiotic treatment intensity can go about introducing improvements in their farm at an early stage. Similarly, a benchmark for veterinary practices should be implemented in future, too.

Veterinary medicine has notched up successes in the promotion of appropriate antibiotic use. For example, antibiotic sales volumes have been reduced by over 50% in the last ten years, and consumption of critical antibiotics has fallen by more than two thirds since 2016.

The data from the IS ABV shows high antibiotic consumption in dairy cattle and fattening veal in particular. Approaches need to be developed for these live-stock categories that allow antibiotic use to be reduced without compromising animal health and welfare.

Objectives

Be among the five best-performing countries in Europe in terms of the sale of critical anti biotics. Improve the appropriate use of antibiotics and reduce the consumption of critical antibiotics, without compromising animal health or welfare.

The aspiration is to successfully implement stewardship programmes in university veterinary clinics. Promote greater use of existing instruments in veterinary practices and clinics, leading to less use of critical antibiotics and further improvements in the appropriate use of antibiotics. Publicise benchmarks on antibiotic consumption and encourage veterinarians and farmers to use them as a feedback tool. Put in place relevant measures to deliver improvements.

Activities

The following activities will be carried out to achieve the objectives:

- Treatment guidelines, information materials and decision-making aids will be updated, made more user-friendly, and publicised.
- New approaches to educate and raise awareness will be evaluated and rolled out (e.g. working groups, educational games, podcasts)
- Ways of making the various instruments more binding will be reviewed – for example via a new legal framework (minimum standards).
- Steering instruments such as benchmarks for veterinarians and livestock owners will be created (small animals and livestock). These tools will allow targeted measures to be put in place over time. The aim is for the feedback to have educational value and for livestock owners and veterinarians to make improvements independently.

Milestones

THE FOLLOWING ARE THE TARGET MILESTONES:

2024: A benchmark for pet animal practices and some livestock categories is es-tablished. Treatment guidelines are up-to-date for all species. Instruments to improve information and awareness are reviewed.

2025: A reliable benchmark for the most important livestock categories is es-tab-lished. Processes to identify causes and plans of action are devel-oped for heavy antibiotic users. In collaboration with the Vetsuisse faculties, processes and instruments for stewardship programmes are developed in university veterinary hospitals. Instruments to improve information and awareness are implemented.

2026: Heavy users put in place measures to improve the situation. Steward-ship programmes in university veterinary hospitals are implemented. Recommen-dations on antibiotic stewardship for non-university veterinary hospitals are developed.

2027: For heavy users, action is taken by cantonal veterinary officers to improve the situation. Recommendations on antibiotic stewardship for non-university veterinary hospitals are communicated.

Stakeholders

LEAD	IMPLEMENTATION PARTNERS
Federal government, professional societies	Veterinarians, animal health authorities, universities (of applied sciences), associations, specialists

3.2 Preventive measures and health promotion

3.2.1 IN HEALTHCARE FACILITIES

Background

Swissnoso published guidelines on infection prevention and control for multi-drug resistant organisms (MDRO) in non-outbreak settings and on outbreak control. It also developed an operating concept for an outbreak investigation centre (OIC) to detect, investigate and manage healthcare-associated out-breaks in acute care hospitals and rehabilitation clinics.

IPC interventions are mainly coordinated through the National NOSO Strategy and the National Vaccination Strategy (NSI). A large portion of the disease burden caused by resistant pathogens can be attributed to HAIs, an estimated two thirds of which to bloodstream infections (BSI).

Surveillance data indicate that the import of MDROs by travellers is more significant than most domestic transmission routes. Targeted screening, particularly of returning travellers, could break this chain of transmission. A major outbreak of Vancomycin-resistant Enterococci (VRE) highlighted shortcomings in the control of outbreaks involving MDRO.

For nursing and care homes there is little data on antibiotic resistance and use and there are no specific national resources for infection prevention and control. The COVID-19 pandemic showed that NCH settings can be particularly affected by infectious diseases.

Objectives

Reduce the incidence of healthcare-associated infections involving resistant pathogens.

With regard to the potential introduction of a mandatory requirement in the EpidA, ensure that the majority of hospitals implement an MDRO screening programme for at-risk groups in accordance with national guidelines. Improve the data on antimicrobial resistance in nursing and care home settings; implement basic IPC measures.

Activities

The following activities will be carried out to achieve the objectives:

- The Swissnoso guidelines on prevention, control and management of MDRO outbreaks will be implemented as widely as possible. The guidelines will be regularly updated, hospital compliance will be checked, and the results will be communicated to healthcare facilities. This work will be implemented as part of the NOSO Strategy.
- In order for hospitals to carry out nationwide screening of at-risk groups, work will be done to check whether the legal framework needs to be amended. Corresponding legislative proposals will be put forward in the current revision of the EpidA. When patients are transferred, hospitals will have to inform the recipient healthcare facility about their MDRO colonisation status. This could also be regulated in legislation or alternatively via a directive.
- As part of the NOSO Strategy, many other measures to reduce HAIs caused by MDROs and non-resistant organisms will be carried out. Ensuring that all hospitals comply with already established structural minimum prevention and control requirements will be particularly important. The multidisciplinary Outbreak Investigation Centre (OIC), which is scheduled to be operational by 2025, will be of significance in tackling MDROs. The OIC will assist hospitals, cantonal authorities and the FOPH with rapid investigation and control of HAI outbreaks, including those caused by MDROs. The development of tools for the automated early detection of outbreaks will be examined. Where appropriate, they will be integrated into surveillance and monitoring.
- Coordination and cooperation between the StAR and NOSO strategies will be strengthened using suitable formats. There is also important crossover with the National Sepsis Action Plan, whose work will be closely aligned with StAR. Greater use of vaccinations will be promoted by the NVS in particular. As well as directly reducing bacterial infections, such as pneumococci, vaccinations against viral infections also have an indirect impact on antibiotic use. This is because antibiotics are often used in patients with viral infections to treat secondary infections or in cases where diagnostic differentiation is difficult.
- In NCH settings, monitoring of HAIs and antibiotic use will be strengthened. As part of the NOSO Strategy, an action plan for NCHs will be developed with IPC measures. Possible examples would be guidelines/directives and education and training measures. The appropriate use of antibiotics will also be taken into account.

Milestones

THE FOLLOWING ARE THE TARGET MILESTONES:

2024: Compliance with MDRO screening guidelines is reviewed and an updating process is established.
2025: The Swissnoso OIC is established.
2026: The data on antimicrobial resistance in nursing and care home settings is improved; basic IPC measures are implemented.
2027: The legislative requirements are identified regarding the nationwide screening of high-risk groups and the declaration of MDRO colonisation status when patients are transferred, and corresponding proposed amendments are put forward in the EpidA revision process.

Stakeholders

LEAD	IMPLEMENTATION PARTNERS
Federal government, cantons, Swissnoso	Professional societies, doctors, healthcare facilities, associations (e.g. H+ Swiss hospitals, CURAVIVA)

3.2.2 IN VETERINARY MEDICINE: CLINICS AND PRACTICES

Background

IPC strategies are essential for the protection of patients, animal owners, veterinary staff and the public. Particularly with regard to the rising incidence of resistant bacteria in animals and humans, good IPC measures are important to minimise the emergence and spread of these pathogens in veterinary facilities. As many pathogens, including resistant bacteria, can

be transmitted between small animals and humans, IPC measures not only help protect patients, but also staff and animal owners.

The clinic for small animal medicine at the Vetsuisse faculty Zurich compiled and published a detailed handbook on infection prevention and control in small animal clinics in collaboration with various experts. A number of clinics have put in place voluntary measures, but there is no overview of the degree of awareness and use of the handbook.

Objectives

Reduce incidence of infections involving resistant pathogens in veterinary clinics and practices.

The aspiration is that small animal clinics successfully implement infection prevention programmes. Switzerland's university veterinary clinics act as role models that are available to provide advice. Develop and implement minimum standards for infection prevention for small animal practices, and adapt programmes for livestock practices and clinics.

Activities

The following activities will be carried out to achieve the objectives:

- Awareness of the handbook on infection prevention and control for small animal clinics will be promoted.
- The handbook will be adapted for livestock clinics and practices, and activities will be carried out to raise awareness of the issue.
- Minimum standards will be developed for small animal practices.
- Work will be done looking at how measures can be made more binding, for example via new legal foundations (minimum standards, e.g. responsible person/hygiene group).
- Hygiene rules will be communicated and staff (veterinarians and veterinary assistants) will be educated on the rules.

Milestones

THE FOLLOWING ARE THE TARGET MILESTONES:

2024: Use of the handbook on infection prevention is encouraged through targeted awareness raising.

2025: Adapted programmes are developed for livestock practices and clinics. Infection prevention measures are developed and established in small animal clinics and an adapted version for small animal practices.

2026: Livestock practices and clinics are educated about adapted pro-grammes. Infection prevention measures are established in clinics and practices. A legal review of the introduction of mandatory measures is carried out and implementation is discussed with stakeholders.

2027: The impact of the planned activities is evaluated.

Stakeholders

LEAD	IMPLEMENTATION PARTNERS
Federal government	Vetsuisse faculty, Swiss Veterinary Society, Swiss Association for Small Animal Medicine, cantonal veterinary officers

3.2.3 IN AGRICULTURE AND VETERINARY SECTOR: ANIMAL HUSBANDRY

Background

Various research findings, recommendations, websites and documents are available on 'good agricultural practice' to promote preventive measures to improve animal health. These include extensive documents on improving biosecurity, vaccination guidelines and other materials. A calf health service was also set up and initiatives to develop herd health have been promoted.

Improve animal health across the board in Switzerland. Encourage veterinarians to support preventive measures to maintain and improve animal health. Educate livestock owners about the available tools and recommendations and encourage them to use/follow them.

Objectives

The following activities will be carried out to achieve the objectives:

Activities

- Good agricultural practice in relation to animal husbandry will be established and the existing tools will be used in day-to-day farming operations.
- The scope, user friendliness and awareness of the guidelines, information materials and decision-making tools will be increased.
- Research findings regarding prevention will be included in recommendations.
- Problem areas (livestock categories with high antibiotic consumption) will be identified and tackled in a targeted way.
- Measures will be made more binding (e.g. by recommending and integrating minimum standards).

THE FOLLOWING ARE THE TARGET MILESTONES:

Milestones

2024: Through targeted awareness campaigns, the use of herd medicine is promoted among livestock farmers. A targeted communication concept on promoting animal health in problem areas is drawn up.

2025: An overview of potential mandatory measures as minimum standards is developed. More preventive measures are implemented, particularly in problem areas.

2026: A legal review of the introduction of mandatory measures is carried out and implementation is discussed with stakeholders. Preventive measures are designed in such a way that the majority of livestock owners make use of them. Improvements become evident in animal health. Minimum standards are recommended.

2027: The cantonal veterinary officers put in place corrective measures for heavy users of antibiotics with shortcomings in prevention.

Stakeholders

LEAD	IMPLEMENTATION PARTNERS
Federal government	Associations, animal health authorities, educational institutions, universities (of applied sciences), agricultural colleges, professional societies

3.2.4 IN WASTEWATER MANAGEMENT

Background

Wastewater from households, healthcare facilities and industrial and commercial operations end up in the sewage system and is purified in wastewater treatment plants (WTPs). Wastewater therefore contains antibiotic-resistant faecal organisms and other pathogens, as well as a broad range of chemicals. WTPs are very effective at eliminating antibiotic-resistant pathogens (99%). The removal of chemicals (so-called micropollutants, including antibiotics) will be specifically improved in the next few years through the upgrading of selected WTPs with the addition of an extra purification stage. However, during periods of heavy rainfall, the sewage system becomes overloaded, leading to some 4% of Switzerland's wastewater being released untreated into water bodies every year. This is the primary way that antibiotic-resistant pathogens and various chemicals that are effectively eliminated in WTPs end up in water bodies. It is therefore important to minimise direct releases of untreated wastewater into water bodies.

Objectives

The aspiration is to minimise the levels of antibiotic-resistant organisms and chemicals in water bodies from direct releases of untreated wastewater. Ensure that the relevant stakeholders (e.g. healthcare workers, cantonal water authorities, communes, WTP associations) are aware of the issue and follow the relevant recommendations and best practice in wastewater management.

Activities

The following activities will be carried out to achieve the objectives:

- On the basis of the available baseline reports, guidance documents and guidelines will be drawn up to spread the core messages of minimising direct releases of untreated wastewater. The focus will be on wastewater from healthcare facilities.
- Measures to curb releases of antibiotic-resistant pathogens and chemicals into water bodies will be reviewed and implemented. For example,
  - a guidance document by the Swiss Water Association (VSA) and an intercantonal factsheet 'Wastewater management for healthcare facilities' will be developed. The guidance will cover operation, discharge into the sewers, and overall operation of the sewage system, and will recommend measures based on state-of-the-art technologies.
  - Information events and briefings will be organised for relevant stakeholders, such as health workers, cantonal water management authorities, communes and WTP associations.
  - The topics of antibiotic-resistant pathogens and direct releases will be incorporated in the training of staff at sewage works, at specialist events and in other future recommendations and guidelines issues by professional associations.

Milestones

THE FOLLOWING ARE THE TARGET MILESTONES:

2024: Existing information is compiled and core messages developed.
2025: The VSA guidance and intercantonal factsheet on wastewater management for healthcare facilities are developed.
2026: Information events with representatives from healthcare sector, cantonal water management authorities, communes and WTP associations take place.
2027: Curbing direct releases of antibiotic-resistant pathogens and chemicals is incorporated in basic and further training run by the VSA.

Stakeholders

LEAD	IMPLEMENTATION PARTNERS
Federal government, cantons	Communes, Swiss Water Association VSA, WTP associations

3.3 One-Health surveillance: use of whole genome sequencing methods

Background

The surveillance of antibiotic resistance and disease burden has been developed and scaled up on an ongoing basis – for example through the establishment of a reference laboratory, notification requirements in human medicine and the monitoring of animal pathogens in veterinary medicine. However, the systematic use of whole genome sequencing- (WGS) methods[13] is not yet established across the sectors in the existing resistance monitoring program. WGS is necessary to improve the epidemiological assessment of resistance and pathogens with regard to their emergence, spread, diversity and evolution. This allows tar-

13 In the text below, the term whole genome sequencing (WGS) refers to all complementary technologies for high throughout typing in molecular biology, such as next-generation and third-generation sequencing.

geted, efficient and timely outbreak and resistance control measures and allows such measures to be refined.

Objectives

Conduct and systematically analyse whole genome sequencing and coordinate across sectors for the purpose of epidemiological surveillance, with a focus on human and animal health.

Further develop the existing Swiss Pathogen Surveillance Platform (SPSP) and utilise it for multisectoral data storage and analysis. The platform will allow the obtained surveillance data to be jointly analysed and – subject to data protection laws – made accessible to relevant decision-makers and the research community. This in turn will allow further systemic analyses and research to be conducted to identify transmission routes and how relevant they are in the human-animal-environment system (fulfils the demands from Motion Graf 19.3861).

Activities

To achieve the objective, a shared national concept on systematic WGS sampling will be drawn up and implemented by (reference) laboratories. The concept will define for which pathogens and types of resistance WGS surveillance is useful, and which samples are analysed. The following points will be examined:

- A central and shared data and analysis platform such as the SPSP is essential for the interpretation and development of resistance control measures. Relevant methods and analysis reports will be further developed and supported. Existing legal frameworks will be identified that allow the multisectoral analysis and use of WGS data in conjunction with associated metadata from samples and results from other surveillance systems (e.g. IS ABV, ANRESIS). The necessary legal foundations for multisectoral analysis and use of data from the fields of human health, animal health, foodstuffs and the environment, and the long-term operation and financing of the shared platform are put forward as part of the partial revision of the EpidA. Supporting the development of the data and analysis platform will serve as preparation for the envisaged platform.
- Targets for the use of WGS will be defined: 1) for which types of resistance and pathogens; 2) at which resolution level (local/national/international, One Health context etc.) and 3) for what purpose (outbreak investigation, outbreak control, strategic monitoring and surveillance). Determining the sample collection requirements (who collects which samples from where in the individual subsections, e.g. also review of wastewater monitoring, inclusion of antibiotic resistance in the National Soil Monitoring Network), and methodological and bioinformatic analysis requirements.
- Preparing the division of tasks regarding the analysis and interpretation of WGS data between the federal government, the various stakeholders (Center for Zoonoses, Animal Bacterial Diseases and Antimicrobial Resistance (ZOBA), National reference laboratory for the early detection and surveillance of new forms of antibiotic resistance (NARA), ANRESIS, Swissnoso, the planned WGS data platform, and others). Other interested stakeholders will be involved on a voluntary basis. The timely availability of data and analysis will be a top priority. The infrastructure, the competencies needed for the analysis, and the future-oriented technological and methodological development will be located in an appropriate place and guaranteed.
- It is important to ensure that the WGS surveillance complies with international standards and that data can be exchanged with international programmes (European Antimicrobial Resistance Genes Surveillance (EUR-Gen-Net), European Food Safety Auhority (EFSA)).
- The other existing instruments for resistance monitoring will be selectively scaled up. For example, an expansion of the notification requirement to other pathogens in human and animal medicine will be regularly reviewed and analysis of the epidemiological trends and disease burden will be refined.

Milestones

THE FOLLOWING ARE THE TARGET MILESTONES:

2024: A comprehensive overview of the requirements for the overall WGS concept is available. This involves an examination of the existing legal framework regarding multisectoral possibilities for analysing WGS data on AMR. Funding for the development and sustainable use of the analysis and data platform is secured.

2025: Cooperation between reference laboratories and data platform operators gets under way. The WGS overall concept is developed.

2026: Initial experience with implementation of the WGS concept is compiled and optimisation potential identified. Expansion of the concept to environmental samples is reviewed (wastewater monitoring).

2027: Processes and concepts are optimised and developed and a cost/benefit analysis is carried out. The legislative requirements with regard to the analysis and use of AMR data from human health, animal health, foodstuffs and the environment and the long-term operation and financing of the shared platform are identified and relevant pro-posed amendments are put forward in the EpidA revision process.

Stakeholders

LEAD	IMPLEMENTATION PARTNERS
Federal government, (reference) laboratories, data and analysis platform	Canons, veterinarians, doctors, healthcare facilities, pharmacies, ANRESIS, universities (of applied sciences) (EAWAG) and Swiss Soil Monitoring Network (NABO)

3.4 Availability of new and existing antibiotics and diagnostics

3.4.1 RESEARCH AND DEVELOPMENT

Background

Globally, there are still not enough antibiotics in the pipeline to combat pathogens on WHO's priority list. To support the development of new antibiotics and diagnostics, the federal government backs international initiatives (e.g. the Global Antibiotic Research & Development Partnership (GARDP), the Global Alliance for Diagnostics (FIND), Swiss participation in the EU Framework Programmes for Research and Innovation, and research programmes in Switzerland (NRP 72, NCCR, AntiResisit; push funding). Switzerland already invests tens of millions every year in research and development in the field of antibiotics, although this is mainly in basic research and early-stage development of new antibiotics. NRP 72 specifically recommends further promotion of clinical development through push funding and new pull incentives. The creation of pull incentives is also recommended by international organisations. For Switzerland, the Antibiotics Round Table association published a white paper with pull incentive options.

Switzerland plays an important part in antibiotic research. International product development partnerships for antibiotics (GARDP) and diagnostics (FIND) are based in Switzerland. There are also numerous innovative small and medium-sized enterprises that receive some of their funding from international organisations, such as the Combating Antibiotic-Resistant Bacteria Biopharmaceutical Accelerator (CARB-X). Swiss R&D players play a key role in the AMR research projects funded by Horizon 2020, under which approx. EUR 690 million were mobilised to support research and development on AMR as part of a broader research portfolio on infectious diseases. The support for research and innovation in the field of AMR

is being continued in the Horizon Europe programme. Switzerland is participating in the One Health AMR partnership under Horizon Europe.

Objectives

Ensure new antibiotics and diagnostic and preventive tools to combat priority pathogens are placed on the market and available in Switzerland.

The aspiration is to play an active role in the research and development of new antibiotics and of diagnostic and preventive tools, and work towards making a contribution to international push and pull incentives that is commensurate with Switzerland's economic stature. Promote research and development into veterinary medicinal products that are unavailable based on existing active substances using a One Health approach.

Activities

The following activities will be carried out to achieve the objectives:

- Through push funding, Switzerland will make an appropriate contribution to the international funding of research and development of new antibiotics. To this end, international initiatives (e.g. GARDP, CARB-X, One Health AMR partnership) will be supported alongside the existing national programmes and projects (e.g. NCCR, AntiResist).
- To improve the economic incentives for developing new antibiotics, a pilot test of Swiss pull incentives will be reviewed, based among other things on the outcomes of a preliminary project. As acting alone is not effective given the size of the Swiss market, Switzerland will actively champion an internationally-coordinated solution in international forums.
- The current partial revision of the EpidA is an opportunity to lay any missing legal foundations for the targeted support of push and pull initiatives. The Swiss contributions to push and pull incentives will be guided by international targets and take account of the fact that Switzerland – as the location of product development partnerships and numerous companies operating in the development of innovative antimicrobial substances – benefits greatly from these contributions.
- The incentives will particularly promote therapeutics to combat resistant pathogens on WHO's priority list, but also diagnostic and preventive tools (e.g. vaccines) that support appropriate antibiotic use. The funding criteria will take account of the therapeutic areas that bring the greatest benefit to public health. In addition, the recipients of such funding will ensure that the developed products are used prudently (stewardship), that they are manufactured according to international environmental standards, and that where possible, global access to the developed products can be guaranteed.
- New diagnostics could play a key role in the coming years, so diagnostics development will also be factored in to financing decisions. The question of whether there is sufficient funding available for validation studies and for the appropriate use of diagnostic tests will be examined. Potential obstacles will be identified and where necessary, adjustments will be initiated. The potential remuneration will be structured so that doctors, laboratories and hospitals use diagnostic tests appropriately and as a result step up monitoring and stewardship programmes.
- The work on research and development of new antibiotics and diagnostic and preventive tools will be coordinated within the framework of platforms that already exist or may be set up where necessary with representatives from administration and the science community, and other relevant stake-holders.
- A study will assess the possibility of using medicinal products containing active substances that are established in human medicine in dosage strengths and administration routes that are suitable for veterinary medicine. To promote the development of potential medicinal products so that they can be authorised as swiftly as possible, Swissmedic will offer scientific and regulatory advice.

Milestones

THE FOLLOWING ARE THE TARGET MILESTONES:

2024: A suitable pull incentive model is defined for Switzerland.
2025: The possibilities for financing international push initiatives and the next steps on pull incentives are defined in a suitable platform with the relevant stakeholders.
2026: The legislative requirements regarding the promotion of R&D in the field of new antibiotics are identified and corresponding proposed amendments are put forward in the EpidA revision process.
2027: If the assessment is favourable, a Swiss pull incentive is piloted.

Stakeholders

LEAD	IMPLEMENTATION PARTNERS
Federal government	Industry, associations, Swissmedic, (reference) laboratories, universities (of applied sciences), product development partnerships

3.4.2 ENSURING AVAILABILITY

Background

In recent years, there has been a growing number of supply shortages affecting medicines that are already authorised for use in Switzerland. This is due in part to global supply disruption and was exacerbated by the COVID-19 pandemic. Antibiotics were one of the particularly affected active ingredient classes. This resulted in an acute shortage of antibiotics in the spring of 2023, for example.

In human medicine, manufacturers of various newly developed antibiotics do not always apply for authorisation in Switzerland. In addition, authorisation applications and market entry are delayed in Switzerland compared with other countries. There are also isolated cases in Switzerland of already authorised antibiotics being withdrawn from the market by the authorisation holder. The 2022 supply report[14] lists 20 priority measures to improve the medicines supply situation, which are currently being examined in depth.

In veterinary medicine, the new authorisation of veterinary medicinal products with known older active substances is not always of commercial interest, and even some older authorised veterinary medicinal products are sometimes with-drawn from the market. Measures to reduce antibiotic use in veterinary medicine has in some cases led to the withdrawal of product authorisations. A number of measures have already been put in place to improve security of supply, such as simplified reclassification and efficient import by veterinarians. Regarding the authorisation of medicinal products, there are already heavily simplified authorisation procedures in place, where Swissmedic bases its assessment on an authorisation decision by a foreign authority or many years of use in another country.

Objectives

Improve the availability of existing antibiotics for humans and animals in Switzerland.

To this end, implement the priority measures from the supply report concerning the expansion of the notification requirement and the digitalisation of the notification process and monitoring in human medicine. Implement in line with the Federal Council's decision (which has yet to be made). Launch implementation of other measures. In veterinary medicine, evaluate and where applicable implement measures in collaboration with Swissmedic, the

14 Federal Office of Public Health (2022): Disruptions of Supplies of Medicinal Products for Human Use in Switzerland: situational analysis and improvements to be considered, Bern.

FONES and stake-holders. Share information between human and veterinary medicine and seek collaboration on common issues.

Activities

The following activities will be carried out to achieve the objectives:

Human medicine:

- For the implementation of the measures from the 2022 supply report, specific proposals will be drawn up for all classes of medicinal products in a separate report. In terms of the monitoring and analysis of supply shortages, under the Federal Council decree of 5 April 2023,[15] preliminary enquiries into digitalisation of the reporting process will be made and the requirement to report supply disruption will be expanded.[16] The time frame for the potential implementation of these priority measures will be decided by the Federal Council decision in summer 2024.
- Regarding the supply of antibiotics of particular relevance, the following implementation proposals, which affect all classes of active substances, are under discussion:
  - From the sub-project 'market access for essential medicines' facilitating import of authorised medicines (out-of-stock applications) and non-authorised medicines, and greater use of the simplified authorisation procedure by industry if medicines are already authorised in other countries.
  - From the sub-project 'incentives for manufacturers of essential medicines' checking during reimbursement whether supply criteria are met.
  - From the sub-project 'public procurement/production of essential medicine by the federal government' procurement within the framework of capacity agreements.
- In addition to these proposed measures from the supply report, a separate process will look at why manufacturers of various newly-developed antibiotics are sometimes launched in Switzerland with a significant delay or not at all. Another point to be clarified in this context is which monetary and non-monetary incentives could be used to speed up authorisation applications.
- As part of the revision of the Health Insurance Act (cost containment package 2), a differentiated assessment of healthcare services will be envisaged on the basis of the criteria of effectiveness, appropriateness and economic efficiency, in accordance with Article 32 HIA. For cheap antibiotics, for example, this could mean that after a legislative basis such as this has entered into force, the periodic review of economic efficiency and/or a price cut could be waived.

Veterinary medicine:

- Various measures to improve availability will be evaluated in veterinary medicine.
- Under the auspices of the FONES, the following will be assessed:
  - Providing information on supply shortages to identify supply gaps; defining a notification requirement with stakeholders and developing the legal framework;
  - Reviewing the idea of extending compulsory stocks to include other antibiotics and additional medicinal products; raising awareness of alternatives abroad.
- In the preliminary project on the security of veterinary medicinal product supply by the FSVO and Swissmedic, a wide range of measures will be examined in detail and if applicable put forward for implementation. The preliminary project includes the following activities:
  - Analysing the most important supply gaps in veterinary medicinal products (VMPs);
  - Determining the key causes of problematic VMP supply situations;
  - Outlining potential solutions and reviewing workability and where applicable additional optimisation options;
  - Implementing potential quick wins from the analysis in a timely manner.

15 Federal Council decree of 5 April 2023 on supply shortages involving medicinal products for human use in Switzerland: Implementation proposals on the sub-project monitoring and analysis of supply disruption.

16 Federal Council decree of 31 January 2024 on the choice of system for the monitoring platform. *https://www.admin.ch/gov/de/start/dokumentation/medienmitteilungen.msg-id-99898.html*

One-Health synergies:

- Examining the potential of One Health measures. This could involve, for example, a re-classification of veterinary antibiotics for use in human medicine or joint stockkeeping, for example of active pharmaceutical ingredients (APIs).
- Another conceivable option would be targeted communication measures promoting the prudent use of antibiotics, particularly during shortages.

Milestones

THE FOLLOWING ARE THE TARGET MILESTONES:

2024: In veterinary medicine, the supply situation with regard to veterinary medicinal products is analysed as part of the preliminary project by the FSVO and Swissmedic, and potential measures are reviewed. Any quick wins are implemented.

2025: The FOPH and the FONES submit a report to the Federal Council with proposed measures to improve security of supply. In veterinary medicine, concepts are drawn up on the measures assessed as feasible and useful.

2026: The Federal Council launches implementation of the approved proposals.

2027: A pull incentive to improve security of supply for existing antibiotics is piloted if the assessment is favourable.

Stakeholders

LEAD	IMPLEMENTATION PARTNERS
Federal government	Cantons, industry, Swissmedic, (reference) laboratories, doctors and pharmacists

3.5 International engagement

Background

To accelerate global political momentum, leadership and action in the area of AMR, the Global Leaders Group on AMR was established in 2020 following the recommendation of the Interagency Coordination Group (IACG) on Antimicrobial Resistance. Switzerland follows the work of the Global Leaders Group on AMR closely. In addition, the UNEP joined the Tripartite (WHO/WOAH/FAO) in 2022, expanding the alliance to include environmental programmes (now called Quadripartite). Switzerland is an active participant at global ministerial conferences on AMR and supports the targets of the Muscat Manifesto on tackling AMR. It is also involved as an observer in the One Health Network on AMR, set up by the EU Commission, and is active in other relevant bodies (Global Health Security Agenda (GHSA), G20, OECD).

Swiss actors from AMR research and innovation are involved in the EU research and innovation programmes in this area. Switzerland is still involved in a number of other initiatives, including the GARDP and the Global AMR R&D Hub to promote new antibiotics, which was set up by the G20. The Swiss surveillance data on resistance and antibiotic consumption is regularly shared with international surveillance systems (WHO, Global Antimicrobial Resistance and Use Surveillance System (GLASS), EFSA and World Organisation for Animal Health (WOAH).

Objectives

Campaign internationally for the sustainable and appropriate use of antibiotics. Ensure the Swiss Action Plan reflects the relevant international guidelines, targets and recommendations of the four international agencies (WHO, Food and Agriculture Organization (FAO), WOAH, UNEP).

Play an active part in the development of international agreements and programmes on AMR, participate in key multilateral initiatives, and engage directly with neighbouring countries. Guarantee long-term financial contributions to national and international efforts to develop new antibiotics and to curb the antibiotic resistance issue globally. Support and help shape initiatives to tackle AMR globally to ensure that Switzerland is a committed actor on the global stage in this area.

Activities

The following activities will be carried out to achieve the objectives:

- Switzerland will participate internationally in the further elaboration of international goals on the appropriate use of antibiotics (2024 UN High-Level Meeting on AMR and Global Ministerial Conference on AMR) and will advocate appropriate consideration of the AMR issue in the new international pandemic agreement (a process of WHO's Intergovernmental Negotiating Body (INB). It will foster dialogue and share knowledge and experience with its neighbouring countries.
- On the basis of models and international deliberations that it has adopted from other countries, Switzerland will examine and support – if possible – the development of push and pull incentives for R&D and to ensure the availability of new antibiotics. It will advocate internationally-coordinated solutions.
- Switzerland will continue to voluntarily align with EU regulations on veterinary medicinal products (Regulation EU 2019/6). One of the main objectives of the Regulation is to mitigate of the risk of AMR, particularly through the appropriate use of antimicrobials. The Regulation prohibits the use of antimicrobials for performance enhancement and the use of certain active substances that are reserved for treating infections in humans as veterinary medicinal products. It also states that the same requirements apply to the import of animals from third countries (non-EU) and to the import of meat from those animals.
- Switzerland will share its AMR surveillance data in the area of human health with WHO's Global Antimicrobial Resistance and Use Surveillance System (GLASS). In veterinary medicine, the AMR data will be shared with the EFSA and the antibiotic consumption data with the WOAH.
- As part of its development cooperation work, Switzerland will support low- and middle-income countries in implementation of measures to prevent and reduce AMR. Through its participation in the SECURE programme of the Global Antibiotic Research and Development Partnership (GARDP), it will campaign for equitable access to antibiotics. In addition, through a Core Voluntary Contribution (CVC), the Swiss Agency for Development and Cooperation (SDC) will support the Special Programme on tackling antimicrobial resistance of WHO, UNICEF, the World Bank, and the UN Development Programme (UNDP).

Milestones

THE FOLLOWING ARE THE TARGET MILESTONES:

2024: Switzerland participates in the second High-Level Meeting on AMR and the fourth Global AMR Ministerial Conference in Saudi Arabia. It examines various international activities that are worthy of support and endorsement.
2025: A decision is made on the direction of travel for specific projects. Implementation and/or support of specific projects is initiated.
2026: Support of specific projects is continued.
2027: Support of specific projects is continued.

Stakeholders

LEAD	IMPLEMENTATION AND COOPERATION PARTNERS
Federal government	Specialty medical societies, reference laborato-ries, international organisations (e.g. WOAH, WHO, FAO, EFSA, EU Commission)

3.6 Information and awareness raising

Background

During the COVID-19 pandemic, the issue of antibiotic resistance was pushed into the background. Public awareness of the problem is therefore lower than for other health topics. There are also regional and sociocultural differences (e.g. according to language region and level of education). Also, the tools and resources that have been developed as part of StAR (guidelines, information materials and decision-making tools) are often not known about in professional circles and are not yet sufficiently used.

Communication on StAR generally draws a distinction between information for professionals and information for the general public. Both strands are backed up by active media activities and are intended to cross-fertilise. StAR uses a model that sets out how different target audiences can be reached and adequately informed and educated through communication and outreach efforts. Several target groups were identified: professionals, general public, stakeholders and policymakers. The model is based on the idea that mobilising professionals and stakeholders as multipliers is effective.

As part of StAR, information materials and resources for various target groups promoting the prudent use of antibiotics and preventive measures were developed and publicised. In a broad-based awareness campaign over several years ("use wisely take precisely", 2018–21), the federal government provided information on the importance of antibiotics to human and animal health, explained antibiotic resistance, and raised awareness of the issue in the target groups. As a result of the COVID-19 pandemic, the awareness campaign was suspended and most public outreach work had to be stopped in 2020–21. The communication activities were resumed on a smaller scale in 2022–23.

Objectives

Provide effective information for professionals so that they are adequately informed about the issue of antibiotic resistance and can respond appropriately to the expectations of the public. Raise awareness and encourage active use of the resources and tools developed as part of StAR among professionals. Run coordinated and targeted public awareness measures to ensure that certain target groups are educated about the issue of antibiotic resistance and the prudent use of antibiotics. Involve professionals and stakeholders as mediators and multipliers in communication measures.

Take account of regional and sociocultural differences in both communication for professionals and public awareness campaigns. Reach other population groups, professionals and stakeholders through accompanying media activities.

Close overall communication gaps and implement new communication approaches. Step up activities to support the proper use of antibiotics, implement preventive measures and close gaps in knowledge in a targeted way.

Activities

The following activities will be carried out to achieve the objectives:

- With external support, direct information delivery aimed at professionals will be intensified and stakeholder management will be expanded. Regional and sociocultural differences will be taken into account and the identified target groups will be addressed both through media and via various stake-holders.
- For public awareness measures, selected activities will be developed addressing the degree to which individual target groups are affected and their awareness of the problem. A large-scale public awareness campaign is not currently possible due to stretched federal budgets. The public awareness and outreach measures include providing general information on AMR, highlighting specific actions, closing knowledge gaps, and communicating and promoting preventive measures. Regional and sociocultural differences will be taken into

account and the identified target groups will be addressed using appropriate messaging and channels via the media and medical professionals.
- Active media activities will accompany and support implementation of the Action Plan, the communication for professionals and the public awareness campaigns.

THE FOLLOWING ARE THE TARGET MILESTONES:

Milestones

2024: External support for communication activities aimed at professionals and the public is gained through a tender for a creative and communication agency. The agency has been tasked with the StAR integrated communication concept.

2025: The StAR communication concept is drawn up and the first communication measures are implemented. The need for revision of StAR resources and tools is reviewed.

2026: Individual communication measures are scaled up, StAR resources and tools are developed further, and awareness and use of these resources and tools increases.

2027: For communication with professionals and targeted public awareness measures, new and sustainable communication approaches are developed and institutionalised.

Stakeholders

LEAD	IMPLEMENTATION AND COOPERATION PARTNERS
Federal government	Cantons, healthcare facilities, consumer associations, professional societies, patient associations, relevant agricultural and sector associations, media

4 Aspects of implementation

4.1 Roles and responsibilities

For the majority of the priority action areas, responsibility for implementation of the StAR One Health Action Plan lies with the four participating federal bodies: FOPH, FSVO, FOAG and FOEN. These offices share responsibility for implementation depending on priority areas with other stakeholders or support them. An overview of the tasks and responsibilities of the stakeholders in the individual priority action areas can be found in Annex 2.

Strategic steering

The project committee is the strategic steering body for implementation of the StAR Action Plan. It comprises the heads of the four participating federal offices, the intercantonal conferences involved (Swiss Conference of the cantonal ministers of public health, agriculture, and the heads of Switzerland's environment agencies), as well as the Federation of Swiss Cantonal Veterinary Officers. The project committee will be regularly updated on the status of implementation. Within its area of competence and in consideration of developments (see chapter 4.3) and implementation experience, it will decide any adjustments of priorities and approach.

Coordination of overall project

The StAR project team is responsible for coordinating the multisectoral implementation of the StAR Action Plan, while the FOPH is responsible for overall coordination. The project team comprises representatives of the four federal offices involved. It meets regularly and coordinates overarching activities and contact with implementation partners, for example at joint stakeholder events.

Operational implementation

Responsibility for operational implementation of the measures lies with the four federal offices in which the StAR sub-projects are located (human health, animal health, agriculture, the environment).

Implementation partners

In many cases, the four participating federal offices work with implementation partners that are also responsible for implementing aspects of the strategy (see Annex 2). They are invited to gear their priority setting to this Action Plan. They are also free to carry out supporting activities with a view to the overarching objectives.

Key implementation partners include ANRESIS, NARA and Swissnoso. The participation of doctors, veterinarians and laboratories is also of central importance to implementation of the StAR Action Plan. They will be involved in implementation of the strategy through their medical, veterinary and pharmaceutical professional bodies, the Swiss Medical Association (FMH), and cantonal medical associations and physician networks. Other stakeholders are industry (pharmaceutical associations), the science community (universities (of applied sciences) and university hospitals) and product development partnerships.

For the agriculture and food sector, associations of livestock farmers and agricultural associations, individual farms, and the wholesale and retail sector are key implementation partners, while in the environmental sector, e.g. wastewater treatment plants play an important role.

Cantons

The cantons have a crucial part to play, particularly in the priority action areas of prevention, appropriate use of antibiotics and monitoring and surveillance. They are responsible for ensuring that the recommendations and guidelines developed at national level are implemented. As part of the StAR One Health Action Plan, the cantons should therefore be more heavily involved in implementation, particularly in the area of human health. To ensure that they are able to participate actively in the project, they are represented in the project committee.

Implementation of the StAR Strategy and StAR Action Plan is scientifically accompanied. In human medicine, for example, the StAR-M Core Team, made up of experts from the fields of epidemiology, infectiology, microbiology and public health, meets several times a year.

4.2 Resources and financing

The comprehensive and coordination-intensive implementation of the measures set out in the One Health Action Plan will require an increase in financial and human resources. The additional needs at federal level will be borne by the four federal offices involved.

From 2028, the funding will be secured by means of legal amendments in the prevention and control of antimicrobial resistance that will be introduced as part of the partial revision of the Epidemics Act.

It is conceivable that there will be certain additional costs at cantonal level, for example for implementation of the stewardship programmes. At the time of publication, it is not yet possible quantify these costs. However, a regulatory impact assessment (RIA), which will be conducted in 2024 in conjunction with the partial revision of the Epidemics Act, will provide insights and highlight any additional costs.

4.3 Measuring and evaluating progress

4.3.1 IMPACT

The diagram below provides an overview of the impact model that guides this Action Plan. The StAR Strategy on Antibiotic Resistance and its overarching objective – to ensure antibiotics remain effective to preserve human and animal health in the long term – form the overarching conceptual framework. The formative evaluation, which was completed in 2023, and the SARR[17] which is published every two years, provide important input for the Action Plan. The same goes for the findings from the National Research Programme on antimicrobial resistance[18] and various domestic political initiatives from the last few years (see chapter 2). The impact model also takes account of international developments and action plans.

The activities carried out by the implementing stakeholders will generate concrete outputs – for example up-to-date guidelines on the appropriate use of antibiotics and programmes and resources on infection prevention and control. The most important anticipated outputs of the Action Plan are set out in Figure 2.

17 Federal Office of Public Health and Federal Food Safety and Veterinary Office (2022): Swiss Antibiotic Resistance Report, Bern. Accessible at: *https://www.star.admin.ch/star/en/home/sarr/sarr.html*.

18 Swiss National Science Foundation (2023): Antimicrobial resistance. National Research Programme NRP 72 Accessible at: *https://www.nfp72.ch*

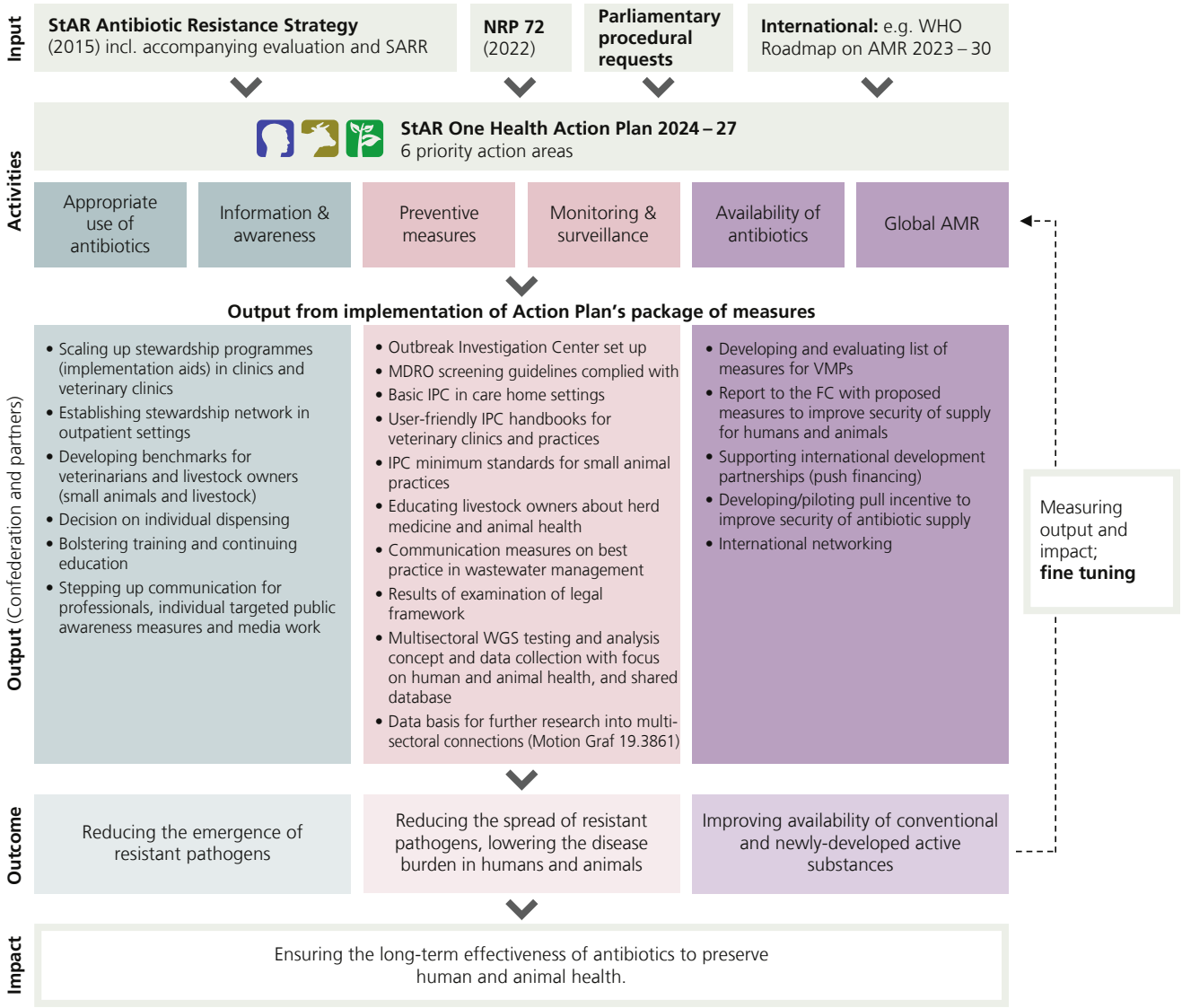

Figure 2: Impact model of the StAR One Health Action Plan

The Action Plan aims to achieve the following three key outcomes: Reduce the emergence of resistant pathogens, reduce their spread and therefore lower the burden of disease in humans and animals, and improve availability of conventional and new antibiotics. As in the StAR, the long-term and overarching objective is to ensure that antibiotics remain effective to preserve human and animal health in the long term.

These outcomes are aligned with those of StAR and the target outcomes in the draft 'Roadmap on Antimicrobial Resistance for the WHO European Region 2023–2030',[19] which was submitted to WHO for endorsement in 2023.

4.3.2 MEASURING PROGRESS AND INDICATORS

For each of the six priority action areas, a set of indicators and associated targets has been defined so that progress can be measured in detail. Important sources of information for impact measurement are also the SARR (see Annex 4, action area 1), the report on the sale

19 Regional Committee for Europe, 73rd session. (2023). Seventy-third Regional Committee for Europe: Astana, 24–26 October 2023: roadmap on antimicrobial resistance for the WHO European Region 2023–2030. World Health Organization. Regional Office for Europe. https://iris.who.int/handle/10665/372503

of antibiotics in veterinary medicine, and the antibiotic resistance monitoring in livestock in Switzerland (ARCH-Vet).

Defining quantified goals is seen by international organisations as a key part of national action plans on antibiotic resistance. The national targets should motivate and guide all stakeholders and highlight where there is room for improvement. Achievement of the targets should therefore always be considered in the context of external factors, such as the evolution of resistance rates internationally and efforts by other countries.

To measure progress and impact, the StAR project team will prepare selected indicators from this indicator set and information from the SARR on a regular basis The StAR project committee will then refine implementation of the Action Plan based on this. Various indicators are collected and analysed by external partners. The frequency of these analyses will be taken into account in impact measurement.

4.3.3 EVALUATION

As described in chapter 2, implementation of StAR was subject to a formative evaluation between 2017 and 2023. The insights from this have fed into this One Health Action Plan. Once implementation of the Action Plan is complete, the situation will be assessed again in a full evaluation.

4.4 Project completion and follow-up

Up until now, the work on developing and implementing the StAR Strategy was organised in the form of an interdepartmental and interagency project, comprising the autonomous sub-projects of human health, animal health, agriculture and the environment. This project organisation will also shape implementation of the Action Plan. In addition, the project aims to ensure that all the conditions are created in the four participating offices and at the interfaces to other stake-holders (e.g. cantons) to allow the work to be pursued in the long term beyond the end of the project. The following will be the determining elements here:

- Securing the necessary staff and financial resources and incorporating them into the core services of the offices and stakeholders involved.
- Setting up bodies for organisation, coordination and steering, both within the Federal Administration and for collaboration with the cantons and other external stakeholders.
- Incorporation of the activities in the relevant legal frameworks, reports and programmes.

With regard to the last point, reference is made among other things to the ongoing partial revision of the Epidemics Act[20] By including specific provisions, the recommended measures will be made more binding, thereby supporting long-term target achievement. Measures on AMR are a focus area in the proposed amendments to the partial revision of the EpidA. The report *Zukünftige Ausrichtung der Agrarpolitik*[21] on the future of Switzerland's agricultural policy is also of vital importance in this regard. It shows how food security can be achieved through sustainability from production to consumption.

20 Further information on the partial revision of the EpidA can be found (in German, French and Italian) on the website of the Federal Office of Public Health: *https://www.bag.admin.ch/bag/de/home/strategie-und-politik/politische-auftraege-und-aktionsplaene/revision-epidemiengesetz.html* At the time of going to press, the Act is expected to enter into force in 2027/2028.

21 Further information (in German, French and Italian° can be found on the website of the Federal Office for Agriculture: *https://www.blw.admin.ch/blw/de/home/politik/agrarpolitik/postulat.html*

In terms of future organisation formats, different approaches will be discussed and potential synergies examined (e.g. a One Health subsidiary body). Before completion of the project, the project organisation will start to be transferred so that StAR activities can be continued as core tasks of the federal offices. This will ensure that the new structures for strategic coordination and implementation are established in time.

Annexes

Annex 1: Overview of milestones

Priority action area	2024	2025	2026	2027
3.1.1 In healthcare facilities	Nat. implementation monitoring for antibiotic stewardship programmes	Study on increasing dissemination and making more binding	Handbook incl. implementation toolkit for ASP	Proposed amendments in EpidA revision process
3.1.2 In outpatient settings	Stewardship network is established	Decision on individual dispensing; quality indicators for antibiotic prescribing	Resources further developed in a targeted way according to recommendations	Proposed amendments in EpidA revision process
3.1.3 In veterinary medicine	Benchmark for pet animal practices and some livestock categories	Stewardship programmes in university veterinary clinics	Recommendations on ASPs for non-university veterinary clinics	Measures for heavy users by cantonal veterinary officers
3.2.1 IPC in healthcare facilities	Process for updating MDRO screening guidelines	Swissnoso Outbreak Investigation Center	Data on resistance in NCHs is improved	Regulatory requirements identified for screening of high-risk groups
3.2.2 IPC in veterinary medicine: clinics and practices	Awareness raising as per handbook on infection prevention	Programmes adapted	Infection prevention established	Evaluation of impact
3.2.3 In agriculture and veterinary sector: animal husbandry	Promote use of herd medicine, communication concept	Step up implementation of preventive measures in problem areas	Widespread use of resources and recommendation on minimum standards	Addressing shortcomings in prevention with heavy users
3.2.4 In wastewater management	Preparing information, developing core messages	Developing VSA guidance	Information events with health workers and WTP associations	Basic and further training for WTP staff by VSA
3.3 One-Health surveillance	Blueprint for overall concept on whole genome sequencing WGS	Overall WGS concept developed	WGS concept implemented	Optimisation and development
3.4.1 Research and development	Defining a suitable pull incentive model	Financing international push initiatives and reviewing pull incentives	Reviewing legislative requirements on promotion of R&D in AM	Pull incentive piloted
3.4.2 Ensuring availability	List of measures to be implemented drawn up and evaluated	Report on improving security of supply	Implementing proposals approved by Federal Council	Pull incentive piloted
3.5 International engagement	2nd high level meeting on AMR & 4th Global AMR Ministerial Conference	Decision on direction of travel for specific projects	Continuing to support specific projects	Continuing to support specific projects
3.6 Information and awareness raising	Contract on StAR communication concept is awarded	Communication concept developed, first communication measures	Scaling up individual communication measures	Exploring new communication approaches

Annex 2: Overview of leads and implementation partners

The tables below provide an overview of the leads and implementation partners. The first table is structured according to priority action areas, and the second according to stakeholders.

PRIORITY ACTION AREA	LEAD	IMPLEMENTATION PARTNER
3.1.1 Appropriate use of antibiotics in healthcare facilities	Swissnoso, federal government	Cantons, hospitals, professional societies, doctors, pharmacies, associations
3.1.2 Appropriate use of antibiotics in outpatient settings	Professional societies, federal government	Cantons, university general practice departments, physicians' networks, cantonal medical societies, doctors, associations
3.1.3 Appropriate use of antibiotics in veterinary medicine	Federal government	Veterinarians, animal health services, universities (of applied sciences), associations, specialists
3.2.1 Preventive measures and health promotion in healthcare facilities	Federal government, cantons, Swissnoso	Professional societies, doctors, healthcare facilities, associations (e.g. H+ Swiss hospitals, CURAVIVA)
3.2.2 Preventive measures and health promotion in veterinary medicine: Clinics and practices	Federal government	Vetsuisse faculty, Swiss Veterinary Society, Swiss Association for Small Animal Medicine, cantonal veterinary officers
3.2.3 Preventive measures and health promotion in veterinary medicine and agriculture: Livestock farming	Federal government	Associations, animal health services, educational institutions, universities (of applied sciences), agricultural colleges, professional societies
3.2.4 Preventive measures and health promotion in wastewater management:	Federal government, cantons	Communes, Swiss Water Association VSA, WTP associations
3.3 One Health surveillance: Use of WGS methods	Federal government, (reference) laboratories, SPSP data and analysis platform	Canons, communes, veterinarians and doctors, healthcare facilities, pharmacies, ANRESIS, universities (of applied sciences) (EAWAG), Swiss Soil Monitoring Network (NABO)
3.4.1 Availability of new and existing antibiotics and diagnostic methods: Research and development	Federal government	Industry, associations, Swissmedic, (reference) laboratories, universities (of applied sciences), product development partnerships
3.4.2 Availability of new and existing antibiotics and diagnostic methods: Ensuring availability	Private sector, supported by the federal government	Cantons, industry, Swissmedic, (reference) laboratories, veterinarians, GST, doctors and pharmacies
3.5 International engagement	Federal government	Specialty medical societies, reference laboratories, international organisations (e.g. WOAH, WHO, FAO, EFSA, EU Commission)
3.6 Information and awareness raising	Federal government	Cantons, healthcare facilities, pharmacies, consumer associations, professional societies, relevant agricultural and sector associations, media

STAKEHOLDERS	LEAD	IMPLEMENTATION PARTNERS
ANRESIS		3.3
Pharmacies		3.1.1, 3.1.2, 3.3, 3.4.2
Physician networks		3.1.2
Doctors		3.1.1, 3.1.2, 3.2.1, 3.3, 3.4.2
Educational institutions		3.2.3
Federal government	3.1.3, 3.2.1, 3.2.2, 3.2.4, 3.3, 3.4.1, 3.5, 3.6	3.1.1, 3.1.2, 3.4.2
SPSP data and analysis platform	3.3	
Professional societies	3.1.2, 3.1.3	3.1.1, 3.2.1, 3.5, 3.6
Universities (of applied sciences)		3.1.3, 3.2.3, 3.3
Communes		3.2.4
Healthcare facilities		3.2.1, 3.3, 3.6
Industry		3.4.1, 3.4.2
International organisations		3.5
Cantonal medical associations		3.1.2
Cantons	3.2.1, 3.2.4	3.1.2, 3.4.2, 3.6
Media		3.6
Swiss Soil Monitoring Network NABO		3.3
Product development partnerships		3.4.2
(Reference) laboratories	3.3	3.4.1, 3.4.2, 3.5
Specialists		3.1.3
Hospitals		3.1.1
Swissmedic		3.4.1, 3.4.2
Swissnoso	3.1.1, 3.2.1	
Veterinarians		3.1.3, 3.3, 3.4.2
Animal health authorities		3.1.3, 3.2.3
University general practice departments		3.1.2
Associations		3.1.1, 3.1.2, 3.1.3, 3.2.1, 3.2.3, 3.2.4, 3.4.1, 3.6
Public sector	3.4.2	

Annex 3: Indicators for measuring impact

The table below provides an overview of the targets and indicators defined for each priority action area (see chapter 3).

PRIORITY ACTION AREA	INDICATORS (OUTCOME LEVEL)
3.1.1, 3.1.2 Appropriate use of antibiotics in human medicine (total consumption)	**I) Total consumption in DDD/1,000 inhabitants/day** Baseline: 10.6 (2019); Target: 4% reduction by 2027 **II) Percentage of access antibiotics in total consumption** Baseline (2022): 66%; target (2027): 69%
3.1.1 Appropriate use of antibiotics in healthcare facilities	STRUCTURAL INDICATORS: **I) Percentage of Swiss acute care hospitals participating in surveillance of antibiotic consumption by ANRESIS** Baseline (2022): 56% (58/104); target (2027): 80% **II) Average antibiotic stewardship score of Swiss acute care hospitals** A composite indicator (stewardship score) will be developed as part of the Action Plan. A baseline survey is being conducted in 2024 and a national target and minimum targets will then be defined for hospitals. PRESCRIBING INDICATORS: **I) Consumption (DDD/1,000 inhabitants/day) of Watch/Reserve** antibiotics Watch baseline (2019): 0.74; Target: 8% reduction by 2027 Reserve baseline (2019): 0.016; Target: no increase **II) Antibiotic use in nursing and care homes (NCH)** Possible ways of monitoring antibiotic use in NCH are currently being reviewed
3.1.2 Appropriate use of antibiotics in outpatient settings	**I) Total consumption in DDD/1,000 inhabitants/day** Baseline (2019): Ø national 9.0, variation in language regions: 7.7 (German-speaking Switzerland) to 12.3 (French-speaking Switzerland); Target (2027): <11.5 in all language regions, regional disparities to be reduced **II) Percentage of inappropriate prescriptions** Quality indicators (e.g. similar to ESAC quality indicators) will be developed and national targets defined through a stewardship network.
3.1.3 Appropriate use of antibiotics in veterinary medicine	**I) Consumption of critical antibiotics** Continued decline across all sectors, without compromising animal health and welfare
3.2.1 Infection prevention and control (IPC) in hospitals and care homes	STRUCTURAL INDICATORS: **I) Percentage of hospitals conducting admission screenings in accordance with recommendations for multi-resistant pathogens from Swissnoso** Baseline (2023): VRE 62%; CPE: 56%; target (2027): 90% both INCIDENCE INDICATORS: **II) II) Incidence (cases/100,000 population) of bloodstream infections involving various MDROs:** i) Methicillin-resistant *S. aureus* (MRSA) Baseline: 1.2/100,000 (Ø 2017–2021); target: 3% reduction (Ø 2024–2027) ii) 3rd generation cephalosporin-resistant *E. coli* Baseline: 5.6/100,000 (Ø 2017–2021); target: 5% reduction (Ø 2024–2027) iii) Carbapenem-resistant *K. pneumonia* (CRKP) Baseline: 0.07/100,000 (Ø 2017–2021); target: 2 % reduction (Ø 2024–2027)

PRIORITY ACTION AREA	INDICATORS (OUTCOME LEVEL)
3.2.2 IPC in veterinary medicine: clinics and practices	**I)** The majority of clinics and practices put in place minimum standards.
3.2.3 Prevention and health	**II)** Appropriate antibiotic use without a change to animal health
3.2.4 Wastewater management	**I)** Curb antibiotic resistance in the water cycle. Reduce direct releases of contaminated wastewater into waterways.
3.3 Systematic use of WGS methods for multisectoral resistance monitoring	**I)** Due to better monitoring and surveillance, resistance trends will be detected earlier so that appropriate action can be taken. **II)** Data facilitate new scientific studies, correlations between the transfer of resistance can be identified, and corresponding countermeasures can be put in place.
3.4.1 Research and development into new antibiotics and diagnostic and preventive tools	**I)** **Number of newly developed antibiotics, authorised and available in Switzerland** Baseline 2010–20: 7, including 3 innovative ones; target: Increase
3.4.2 Availability of antibiotics	**I)** **Number of supply disruptions involving antibiotics per year** Baseline (Ø 2021–22): 52.5; target (2027): decrease It should be noted that modification of the notification system will lead to an increase in notifications and could therefore distort the meaning of this indicator. **II)** **Percentage of antibiotics that are placed on the market in Switzerland within 3 years of first being licensed abroad** Baseline 2 of 18 (2011–2020); target: increase (2024–2027)
3.5 AMR internationally	**I)** Specific national targets will be defined as part of the Muscat Ministerial Manifesto and other future international commitments. **II)** Inclusion of AMR in WHO's future international pandemic instrument (INB)
3.6 Information and awareness raising	**I)** Greater awareness and use of StAR materials and resources by medical professionals.

Annex 4: Status of implementation of StAR

The status of implementation and the target achievement of StAR since its launch is outlined below on the basis of a few highlights. A more detailed summary can be found in the final report of the formative evaluation.

FIELD OF ACTIVITY 1: MONITORING

Goal

A cross-sector monitoring system employing standardised methods will be developed for humans, animals, agriculture and the environment. This will provide information on the distribution and use of antibiotics and on the development and spread of resistance. Additional data will be recorded where specific problem areas are identified. This will form the basis for targeted intervention and monitoring of outcomes.

In terms of monitoring, several centres and institutions have been established to collect and analyse data on antibiotic resistance and antibiotic consumption in human and veterinary medicine, and to publish it on various channels.

The data basis for monitoring has been continually developed. In human medicine, additional data on resistance and on antibiotic consumption is now collected compared with 2016: ANRESIS has been expanded, the monitoring of antibiotic prescribing has been incorporated in the FOPH's Sentinella notification system, and NARA was set up in 2017.

The FSVO developed the IS ABV, which, since 2019 has collected data throughout most of Switzerland every time an antibiotic treatment is administered and therefore allows nuanced analyses to be conducted. The ZOBA has been investigating animal pathogens in an annual antibiotic resistance monitoring programme since 2019. As part of NRP 72 on AMR, SPSP data and analysis platforms were developed to allow genomic data to be compared and analysed. The platform is not yet used for routine AMR surveillance but already proved effective in COVID-19 monitoring.

The data from monitoring and surveillance on resistance and antibiotic consumption is jointly published every two years in the SARR by the FOPH and the FSVO. The report also includes a separate chapter on One Health analyses and reports. Data on water samples has also been published since 2018. In addition, the data from *anresis.ch* is published interactively and for veterinary medicine in various reports (Archvet, IS ABV report).

FIELD OF ACTIVITY 2: PREVENTION

Goal

The need for antibiotics will be reduced to the essential minimum by implementing targeted preventive measures and effective alternatives.

Status of implementation

Numerous prevention measures that were put in place as part of StAR have shown encouraging results. In human medicine, various instruments exist, such as guidelines and modules for infection prevention and control in hospitals. This work was mainly implemented within the framework of the NOSO Strategy. Among other things, structural minimum requirements have been established in hospitals to prevent and control healthcare-associated infections. Since 2017, the National Vaccination Strategy (NVS) has also promoted the prevention of viral and bacterial infections through vaccination.[22] In addition, the National Sepsis Action Plan was launched in 2022.

22 Implementation of the NVS Action Plan was suspended in early 2020 and resumed in the summer of 2022.

Various resources and guidance documents on infection prevention and control were also developed for veterinary medicine. For example, since 2020, the online tool *VaccineScout* has been available to help veterinarians use vaccination responsibly. Besides the newly-developed vaccination guidelines for pigs (2019), it also includes the vaccination guidelines for dogs and cats. In 2020, the handbook on infection prevention and control for veterinary practices and clinics was published under the direction of the Vetsuisse faculty Zurich.

In agriculture, various research projects have been launched to improve animal health. The *Outdoor veal calf* project was a particular success. Using the new, alternative husbandry concept, antibiotic consumption in fattening veal was reduced by 80%. Other research projects, such as 'Healthy hooves – a firm foundation for the future', the 'KGD water troughs' pilot project and 'ReLait – reducing antibiotics in Fribourg's dairies' highlighted other approaches to improve animal health.

In livestock farming, a calf health service was set up to complement the existing pig health authority. Since October 2021, the operational activity of the calf health service has been integrated in Cattle health Switzerland (RGS). The Plus health programme for pigs recorded the antibiotic consumption of all farmers and showed their individual consumption in relation to the benchmark. Thanks to the industry solution with financial incentives in the initial phase, extensive improvements were made to animal health.

FIELD OF ACTIVITY 3: APPROPRIATE USE OF ANTIBIOTICS

Goal

Rules on the appropriate use of antibiotics will be defined in accordance with the current state of understanding. These will be binding and implemented consistently.

Status of implementation

As part of StAR, various *resources were developed* to promote the appropriate use of antibiotics in human medicine. They include the national guidelines on the appropriate use of antibiotics that are available on the platforms *ssi.guidelines.ch* and *guide.anresis.ch* (linked to the latest resistance data). For outpatient settings, information materials were developed for *doctors* and *patients* and *decision-making tools on antibiotic prescribing* were developed and publicised for clinicians and for training in quality circles. For inpatient settings, Swissnoso developed *supporting documents for antibiotic stewardship programmes* and assisted hospitals in implementing such programmes. Hospitals can access data on antibiotic consumption and use in ANRESIS and from the *NOSO point prevalence survey*.

In animal health and agriculture, antibiotic treatment guidelines were developed for the most important animal species (*cattle, pigs, small ruminants, new world camelids*, *dogs and cats* and exotic pet animals) and made available to medical professionals as an online tool (*www.antibioticscout.ch*). The Swiss Veterinary Society also published guidelines on the prudent use of veterinary medicinal products. Since 2016, the stockpiling of prophylactic and critical antibiotics is no longer permitted.

On the basis of the IS ABV data, comparative analyses are being conducted. Farmers and veterinarians can view their own use in comparison with the Swiss benchmark. The legal basis to create a benchmark for veterinarians and farmers was established in 2022.

FIELD OF ACTIVITY 4: RESISTANCE CONTROL

Goal

The transmission and spread of resistant organisms will be minimised in order to reduce antibiotic resistance.

Status of implementation

In human medicine, Swissnoso published guidelines on *prevention and control of MDROs in non-outbreak settings* and on *outbreak control* and integrated them in the structural minimum requirements for the prevention and control of healthcare-associated infections.

Swissnoso also put together an operating concept for an *Outbreak Investigation Center* to detect, investigate and manage healthcare-associated outbreaks in acute care hospitals and rehabilitation clinics.

In veterinary medicine, several information brochures were published on MDROs and transmission between animals and humans.

In animal health and agriculture, a study and various research projects were conducted on antibiotic resistance in foodstuffs, Giving rise to a number of initiatives, including a campaign on kitchen hygiene (*www.sichergeniessen.ch*) and a factsheet on the disposal of milk containing antibiotics in dairies.

In terms of biosecurity, a set of guidelines was developed for the first time, including a website with guidance and e-learning content and a self-assessment tool for livestock farmers on biosecurity (*Healthy livestock – Guidelines on biosecurity (gesunde-nutztiere.ch)*),. The legal framework was also established to require livestock owners to guarantee biosecurity on their farms.

In the environmental sphere, the expansion programme to eliminate antibiotics from wastewater made good progress and is due to be completed by 2040. It will allow up to approx. 99% of antibiotic-resistant organisms to be removed in the central wastewater treatment plants. Additional purification stages cannot eliminate any additional antibiotic-resistant micro-organisms. An analysis of the problem therefore revealed that it makes more sense to tackle the problem of direct releases of contaminated wastewater (e.g. from hospitals) into waterways during heavy rainfall.

FIELD OF ACTIVITY 5: RESEARCH AND DEVELOPMENT

Goal

Interdisciplinary research and development work on the emergence, transmission, spread and control of resistant bacteria will be intensified. This research will also provide the basis for the targeted development of antimicrobial substances and cost-effective diagnostic products.

Status of implementation

The NRP 72 ran from 2015 to 2022. Through various research projects and taking a cross-cutting One Health approach, it aimed to identify new solutions to curb the spread of antibiotic-resistant pathogens, to use antibiotics more responsibly, and to develop new technologies for better treatment of infections caused by antibiotic-resistant organisms. The findings and recommendations from NRP 72 have been available since December 2022 (*www.nfp72.ch*).

Since 2020, the Swiss National Science Foundation has been supporting the National Centre of Competence in Research AntiResist (NCCR) (*www.nccr-antiresist.ch*), which carries out basic research to find new ways of tackling antibiotic-resistant bacteria.

Internationally, the product development partnerships *GARDP* and *FIND* received financial backing from the FOPH and SDC. In addition, the *Global AMR R&D Hub* in Berlin was supported through a secondment.

Finally, in terms of research and production facilities, the Containment Ordinance (ContainO) underwent a partial revision. It now contains clear regulations on the disposal of antibiotic-resistant bacteria from microbiological activities. The Ordinance entered into force on 1 January 2020.

FIELD OF ACTIVITY 6: COOPERATION

Goal

Cooperation among the various stakeholders at political, scientific and economic levels will be encouraged and coordinated beyond the boundaries of individual disciplines both nationally and internationally as part of the One Health approach.

Status of implementation

The interdisciplinary StAR project team and the StAR project committee make sure the One Health approach is followed in the implementation of StAR. In principle, care is taken to involve stakeholders as extensively as possible in implementation of the various measures, and work is done in collaboration with experts and professional societies in specific areas (e.g. StAR-M Symposium, Livestock health Switzerland (NTGS), specialist water associations). In June 2023, the proposed priority areas for the One Health Action Plan were discussed and coordinated at a multisectoral stake-holder workshop.

Alongside the international community, Switzerland endorses the 2015 WHO Global Action Plan on Antimicrobial Resistance and the political declaration of the 2016 UN High-Level Meeting on AMR. International dialogue on antibiotic resistance at international events and in specific expert committees is also crucial to StAR. The UNEP joining the Tripartite (WHO/WOAH/FAO) has expanded the international alliance to include environmental programmes (now called Quadripartite). Switzerland has observer status in the One Health Network on AMR, established by the EU Commission. The Swiss resistance and antibiotic consumption surveillance data is regularly shared with international surveillance and monitoring systems (WHO, GLASS, EFSA and WOAH).

FIELD OF ACTIVITY 7: INFORMATION AND EDUCATION

Goal

Knowledge of antibiotic resistance will be improved among experts and the general public so that more responsible decisions are taken and resistance levels fall.

Status of implementation

The StAR communication activities are aimed at various target groups (professionals, patients, general public). Reporting on StAR took the form of an annual report until 2019, and since 2020 is published several times a year as an electronic newsletter.

As part of StAR, a large-scale, multi-year information campaign was launched in 2018. Through the campaign, which ran from 2018 to 2021, the federal government educated people about the value of antibiotics to human and animal health and raised awareness of the issue of antibiotic resistance (*www.richtig-ist-wichtig.ch*). Most public outreach work had to be stopped between 2020 and 2022 due to the COVID-19 pandemic.

In human medicine, various specific communication channels, information products and training modules were developed for individual target groups in different areas: For outpatient settings, information materials were developed for *doctors* and *patients* and *decision-making tools on antibiotic prescribing* were developed and publicised for clinicians and for training in quality circles.

One of the priorities of StAR in the area of agriculture and veterinary medicine was previously the development of different information materials and treatment guidelines.[23] In addition, all veterinarians who stockpile antibiotics have to attend a mandatory training course. The course teaches them about the appropriate use of antibiotics and about how antibiotic resistance emerges and spreads. This measure was supplemented by a specific StAR newsletter for veterinarians and numerous presentations at events.

23 For example for the treatment of the most common diseases affecting dogs, cats, exotic pet animals, pigs, cattle, and small ruminants, vaccination guidelines for pigs, a handbook on infection prevention s for small animal practices and a biosecurity tool for livestock owners (*www.gesunde-nutztiere.ch*)

FIELD OF ACTIVITY 8: GENERAL CONDITIONS

Goal

General conditions and incentives, whether political, legal or financial in nature, will be created so that effective antibiotics are available and are used in a prudent, sensible manner.

Status of implementation

In human medicine, a number of studies and pilot projects on incentive schemes for antibiotic use have been conducted and some have already been completed. For example, one feasibility study showed that *individual dispensing of antibiotics* is feasible and is accepted by the majority of patients.

In terms of alternative antibiotic incentive schemes for Switzerland (pull incentives), a pilot project by the association the Swiss Round Table on Antibiotics is being supported. The Swiss Institute of Intellectual Property (IPI) compiled a report looking at economic incentives to promote the development of new antibiotics, examining areas such as the protection of intellectual property (e.g. patents) and appropriate pricing models.

In veterinary medicine, the Veterinary Medicinal Products Ordinance was revised twice. Since 2016, restrictions can be placed on the stockpiling of veterinary medicinal products. Implementation of this regulation was accompanied by guidance and training sessions. Another revision in 2021 optimised the general conditions to improve the availability of medicinal products. The development of the IS ABV provided baseline information for research and for possible future amendments to the regulations on antibiotic use in veterinary medicine.

In agriculture, various resource and research projects (e.g. Smart Animal Health) have generated scientific and practical data and evidence. The directive on the development of agricultural policy after 2022 (AP22+) envisaged the creation of policies and strategic principles to better promote animal health. The suspension of AP22+ means that no concrete adjustments to the general conditions and incentives have yet been implemented in the area of AMR.

Annex 5: Glossary

Antibiotic/antibiotics	Antibiotics are naturally occurring or artificially produced substances that can kill bacteria (bactericidal effect) or inhibit their growth (bacteriostatic effect). Antibiotics are used in human and veterinary medicine to treat bacterial diseases. They are not effective in viral diseases.
Antibiotic resistance	The phrase 'antibiotic resistance' summarises the properties of bacteria which allow them to weaken or completely neutralise the effect of antibiotics.
Antimicrobial resistance	Antimicrobial resistance (AMR) is the ability of microorganisms to persist or grow in the presence of drugs designed to inhibit or kill them.
Bacteria	Bacteria are microscopically small single-cell organisms that exist everywhere in the air, water and soil. Bacteria also play a major role in the human body. For example, the human intestines are host to many bacteria which make up the group of intestinal flora which aid digestion. The skin of healthy people is colonised by harmless bacteria which make up the skin flora. Other bacteria are used for example in making yoghurt or cheese. However, bacteria can also cause disease.
Cephalosporin(s)	Cephalosporins are a substance class of antibiotics used to treat bacterial infections. They are divided into generations according to their spectrum of action. The third and fourth generations are regarded as particularly important because they are the only effective antibiotics for some bacterial infectious diseases. Bacteria that produce ESBLs (see below) have become resistant to these newer generations.
Consignment warehouse	A consignment warehouse is a warehouse that is set up by the supplier in order to ensure fast delivery to the customer for urgently-required parts. Ownership of the goods remains with the consignor (supplier) until they are claimed.
Critical antibiotics	The World Health Organization (WHO) and the World Organization for Animal Health (WOAH) assess substance classes of antibiotics for their efficacy in treating bacterial infections in humans and animals. As part of this strategy, antibiotics from the most relevant substance classes are designated as critical antibiotics, equivalent to the WHO class of 'critically important antibiotics of highest priority'.
Extended-spectrum beta-lactamases (ESBL)	Beta-lactamases are enzymes formed by bacteria that are able to confer resistance to certain antibiotics (beta-lactam antibiotics) and so render them ineffective. ESBLs have a broader spectrum, i.e. unlike normal beta-lactamases, they can also confer resistance to more modern beta-lactam antibiotics. This means that bacteria which produce ESBLs are resistant to many antibiotics. Carbapenems remain effective against ESBL-producing bacteria.
Immune system	The immune system is the biological defence system of an organism that prevents pathogens or substances from outside the body damaging the organism. It is also able to destroy cells within the body that have become defective, such as cancer cells.
Infectiology	The science of researching and treating infectious diseases.
Infection	The term 'infection' refers to the process by which pathogens enter, remain and then reproduce in the body.
Methicillin-resistant Staphylococcus aureus/ MRSA	MRSA is the term used to refer to a variation of the Staphylococcus aureus bacterium which is resistant to beta-lactam antibiotics and other classes of antibiotics. MRSA strains are further classified into groups according to where they are most frequently found, i.e. 'hospital-associated', 'community-associated' and 'livestock-associated.
Microorganisms	Microorganisms are microscopic creatures which can usually not be seen by the naked eye. They include some fungi, single-cell parasites, bacteria and viruses.
Monitoring	Monitoring is a continuous process of recording, administering, analysing, summarising and reporting data on the status, for instance the resistance situation, in a population over a given time. The purpose is to identify changes in the situation in order, for example, to check the effect of measures.
Multi-resistance	Bacteria are defined as multi-resistant if they are resistant to various antibiotics from different substance classes.
One Health principle/ approach	The One Health principle is an integrative approach in which national and international cooperation among various disciplines is intended to achieve the best possible effect on human and animal health and the environment.

Outbreak	An outbreak is the term used to refer to clusters of infections in a particular place or at a particular time. Combined with the issue of resistance, out-breaks of multi-resistant bacteria are particularly problematic in hospitals, care facilities or farms.
Pathogenic organisms (pathogens)	Pathogen is a term used to describe an organism (or germ) that causes disease.
Penicillin	Penicillin is the oldest antibiotic in clinical use. It has a relatively narrow spectrum of action, and many bacteria are naturally resistant to penicillin. However, it can still be used successfully to treat various diseases. A number of derivatives have been developed from this active ingredient. They all belong to the penicillin class.
Prevalence	The frequency of a disease or symptom in a population at a given time.
Prevention	Preventing or minimising future disorders, impairments or damage in order to prevent problems. The aim of disease prevention is to apply targeted measures in order to prevent the occurrence of disease.
Prophylactic use of medicinal products	Medicinal products are used as prophylaxis in order to prevent the development of a potential disease before clinical symptoms are present. This preventive use takes place at times when experience shows that there is a higher than usual risk of infection.
Pull incentive	Indirect financing of drug research and development by the public sector by means of market incentives, e.g. market entry premiums and regularly recurring payments. These payments would only be made for successfully-developed antibiotics that meet certain criteria (for example effectiveness against multi-drug resistant organisms).
Push incentive	Direct financing for drug research and development projects by the public sector, for example at universities or in companies.
Reserve antibiotic(s)	Reserve antibiotics are special antibiotics that should only be used to treat infections caused by resistant pathogens.
Secondary infection	A secondary infection, also known as 'superinfection', is an infection in which a second pathogen, different from the first pathogen, attacks an organism which already has an infection ('primary infection') caused by another pathogen. For example, a viral infection of the respiratory tract can make it easier for bacterial pathogens to colonise mucous membranes which are already damaged.
Sentinella notification system	The Sentinella notification system is a human health co-project between GPs and the Federal Office of Public Health. It involves 150 to 200 general practitioners, internal medicine specialists and paediatricians with a practice focusing on general medicine. It collects epidemiological data and monitors communicable and other acute conditions, and carries out research in general medicine. The Sentinella notification system also looks into issues relating to the use of antibiotics, whether they are being used appropriately, and the development of resistance.
Stakeholder	A stakeholder is defined as an individual or group with a justified interest in the course or outcome of a process or project.
Substance class	Antibiotics are placed in certain classes according to their mechanisms of action and chemical structure.
Surveillance	Surveillance is a three-stage process, the first of which consists of identifying and recording diseases (monitoring). In the second stage the data obtained is assessed. After this, consideration is given to what measures need to be taken to contain or prevent a medical problem such as an infectious disease.
Vaccination	A vaccination is a preventive measure against infectious diseases. Administration of dead or weakened pathogens or parts of pathogens mimics a natural infection. This triggers the body's immune system to produce defensive substances that subsequently protect the person who has received the vaccination against the disease in question for a certain time.
Zoonotic disease/zoonosis	Zoonoses are infectious diseases that can be transmitted between humans and animals.

Annex 6: List of abbreviations

Agroscope	Swiss Confederation's centre of excellence for research into agriculture and the food sector.
AMR	Antimicrobial resistance
ANRESIS	Swiss Centre for Antibiotic Resistance
AP22+	Dispatch on the development of agricultural policy from 2022
API	Active pharmaceutical ingredients
ARCH-Vet	Report on the sale of antibiotics in veterinary medicine and antibiotic resistance monitoring in livestock in Switzerland
ASP	Antibiotic stewardship programmes
BSI	Bloodstream infections
CARB-X	Combating Antibiotic-Resistant Bacteria Biopharmaceutical Accelerator
CDSS	Clinical decision support tools
ContainO	Containment Ordinance
COVID-19	CO for corona, VI for virus, D for disease and 19 for the year it was first detected (2019).
CRKP	Carbapenem-resistant K. pneumonia
CURAVIVA	Swiss national industry association for providers of services to the elderly
CVC	Core voluntary contribution
DDD	Defined daily dose
E. coli	Escherichia coli
EAE	Effectiveness, appropriateness and economic efficiency
EAWAG	Swiss Federal Institute of Aquatic Science and Technology
EFSA	European Food Safety Authority
EpidA	Epidemics Act
ESAC	European Surveillance of Antimicrobial Consumption
ESBL	Extended spectrum β-lactamase
EU	European Union
EURGenNet	European Antimicrobial Resistance Genes Surveillance
FAO	Food and Agriculture Organization (US)
FC	Federal Council
FDHA	Federal Department of Home Affairs
FIND	The Global Alliance for Diagnostics
FMH	Swiss Medical Association
FOAG	Federal Office for Agriculture
FOEN	Federal Office for the Environment
FONES	Federal Office for National Economic Supply
FOPH	Federal Office of Public Health
FSVO	Federal Food Safety and Veterinary Office
G20	Group of 20
GARDP	Global Antibiotic Research and Development Partnership
GHSA	Global Health Security Agenda
GLASS	Global Antimicrobial Resistance and Use Surveillance System
GST	Swiss Veterinary Society
H+	National umbrella organisation of public and private Swiss hospitals, clinics and care establishments
HAI	Healthcare-associated infections
HIA	Health Insurance Act
HIV	Human Immunodeficiency Virus
IACG	Interagency Coordination Group
IHR	International Health Regulations

INB	Intergovernmental Negotiating Body
IPC	Infection prevention and control
IPI	Swiss Institute of Intellectual Property
IS ABV	Information system on antibiotics in veterinary medicine
KGD	Swiss calf health service
MDRO	Multidrug-resistant organism
Mo.	Motion
MRSA	Methicillin-resistant Staphylococcus aureus
NABO	Swiss Soil Monitoring Network
NARA	National reference laboratory for the early detection and surveillance of new forms of antibiotic resistance
NCCR AntiResist	National Centre of Competence in Research for Antibiotics Research
NCH	Nursing and care homes
NOSO	Nosocomial infections
NRP	National Research Programme
NTGS	Livestock health Switzerland
NVS	National Vaccination Strategy
OECD	Organisation for Economic Cooperation and Development
OIC	Outbreak Investigation Center
R&D	Research and development
ReLait	Antibiotics reduction in Fribourg dairies
RGS	Calf health Switzerland in Cattle health Switzerland
RIA	Regulatory impact assessment
SARR	Swiss Antibiotic Resistance Report
SDC	Swiss Agency for Development and Cooperation
SGINF	Swiss Society for Infectious Diseases
SPSP	Swiss Pathogen Surveillance Platform
StAR	Swiss Antibiotic Resistance Strategy
SVK-ASMPA	Swiss Association for Small Animal Medicine
Swissmedic	Swiss Agency for Therapeutic Products
Swissnoso	National Centre for Infection Prevention
UN HLM	UN high-level meeting
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNICEF	United Nations Children's Fund
US	United States
Vetsuisse faculty	Affiliation of the veterinary faculties in Bern and Zurich
VMP	Veterinary medicinal product
VRE	Vancomycin-resistant Enterococci
VSA	Swiss Water Association
WB	World Bank
WGS	Whole genome sequencing
WHO	World Health Organization
WOAH	World Organisation for Animal Health
WOAH	World Organisation for Animal Health
WTP	Wastewater treatment plant(s)
ZOBA	Center for Zoonoses, Animal Bacterial Diseases and Antimicrobial Resistance

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