INTERMINISTERIAL ROADMAP FOR
CONTROLLING ANTIMICROBIAL RESISTANCE

13 OVERARCHING INTERMINISTERIAL MEASURES
40 ACTIONS

17 November 2016
The problems arising from the development of resistance to antibiotics in France, and more generally worldwide, are multiple and complex. They are characterised by:

- increasing resistance rates amongst bacteria that are pathogenic to humans and animals;
- rarefaction of the therapeutic arsenal, related to the industry disinvesting from research and development of new products;
- overuse of antibiotics;
- limited access or recourse to diagnostic tests that enable treatments to be better targeted;
- insufficient adoption of preventive measures, either for controlling bacterial transmission or through vaccination, which help avoid or reduce the use of antibiotics.

The diffusion of bacteria and/or resistance genes is a threat of which there is currently little or poor awareness amongst the public and professionals. Resistance has an impact on all human and veterinary medical activities, as well as on the environment, which justifies an intersectoral and interministerial approach based on the “One Health” concept as advocated by the World Health Organisation (WHO) and the World Organisation for animal health (OIE). The objective is to control the expansion of resistance to antibiotics and to maintain the immense benefits that antibiotics have brought to medicine. Applied to national public policies, this approach is necessarily conducted in close co-operation with the many international bodies that endorsed controlling the antimicrobial resistance (AMR) as public-health priority (the European Union, the G7, the G20, the WHO, FAO and the OIE).

With that in mind, the main measures proposed to the CIS (Comité Interministériel pour la Santé – Interministerial Committee on Health) for adoption involve:

- setting up a long-lasting intersectoral communication programme on AMR, aimed at bringing about a long-term modification in the way that antibiotics are perceived by all target audiences concerned;
- encouraging prescribers to prescribe antibiotics more appropriately, and linking that encouragement to making tools available, including appropriate diagnostic tests for human and animal health;
- co-ordinating research and provide support for a national intersectoral research plan, including measuring and analysing the impact of bacterial resistance in the environment;
- securing a strategic domain dedicated to innovation in antibiotic therapy and alternatives, within the thematic consortium, common to the Aviesan and AllEnvi research Alliances, in order to foster research and development of innovative new products;
- setting up an ad-hoc “technical committee” on antibiotic resistance, tasked with assessing and supporting the development of new technologies and products that may contribute to controlling resistance to antibiotics;
• strengthening the organisation of monitoring and use of data (on consumption and resistance), as well as producing indicators for monitoring that are common to the various sectors concerned;

• reinforcing the coordination of current plans from a “One health” perspective, in line with international actions.
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<tr>
<td>AFVAC</td>
<td>Association Française des Vétérinaires pour Animaux de Compagnie (French Association of Domestic-Animal Veterinary Surgeons)</td>
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<td>AGEPS</td>
<td>Agence Générale des Equipements et Produits de Santé (Assistance publique-hôpitaux de Paris) (General Agency for Healthcare Facilities and Products (Public Assistance – Paris Hospitals))</td>
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<td>Agence Nationale du Développement Professionnel Continu (National Agency for Continuous Professional Development)</td>
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<td>ANSP</td>
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<td>Alliance pour la Recherche et l’Innovation des Industries de Santé (Health Industry Alliance for Research and Innovation)</td>
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<td>Agence Régionale de Santé (Regional Health Agency)</td>
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<td>Agence des Systèmes d’Information Partagés de Santé (Shared Health Information Systems Agency)</td>
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<td>Alliance nationale pour les sciences de la vie et de la santé (National Alliance for Life and Health Sciences)</td>
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<td>Banque Publique d’Investissement (Public Investment Bank)</td>
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<td>Comité Interministériel pour la Santé (Interministerial Committee on Health)</td>
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<td>CNAMTS</td>
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<td>Organisation professionnelle unitaire de la Coopération agricole (Unitary Professional Organisation for Agricultural Co-operation)</td>
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<td>CPIAS</td>
<td>Centres d’appui et de Prévention des Infections Associées aux Soins (Support and Prevention Centres for Healthcare-Related Infections)</td>
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<td>Comité Permanent Restreint (Standing Health Committee)</td>
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<td>Comité Technique de l’Antibiorésistance (Technical Committee on Resistance to Antibiotics)</td>
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<td>European Medicines Agency</td>
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<td>ETPT</td>
<td>Equivalent Temps Plein Travaillé (Full-Time Equivalent Worked)</td>
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<td>FAO</td>
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<td>Groupement d’interets scientifiques (Scientific Interest Grouping)</td>
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<td>INRA</td>
<td>Institut National de la Recherche Agronomique (National Institute for Agronomic Research)</td>
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<td>Institut National de la Santé et de la Recherche Médicale (National Institute for Health and Medical Research)</td>
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<td>IRD</td>
<td>Institut de Recherche pour le Développement (Research Institute for Development)</td>
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<td>Les Entreprises du Médicament (Businesses in the Drugs Industry)</td>
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<td>MTEFD</td>
<td>Ministère du Travail, de l’Emploi, de la Formation professionnelle et du...</td>
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<tr>
<td>OECD</td>
<td>Organisation for Economic Co-operation and Development</td>
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<td>OIE</td>
<td>World Organisation for Animal Health</td>
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<td>WHO</td>
<td>World Health Organisation</td>
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<td>ONDAM</td>
<td>Objectif National de Dépenses de l’Assurance Maladie (National Health Insurance Expenditure Objective)</td>
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<td>PIA</td>
<td>Programme d’Investissements d’Avenir (Future Investments Programme)</td>
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<td>PLFSS</td>
<td>Projet de Loi de Financement de la Sécurité Sociale (Social Security Financing Bill)</td>
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<td>Public-Private Partnership</td>
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<td>RIHN</td>
<td>Référentiel des actes Innovants Hors Nomenclature (Reference Framework of Innovative Acts (except Nomenclature))</td>
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<td>Rémunération sur Objectifs de Santé Publique (Pay for Performance related to Public Health Objectives)</td>
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<td>RREVA</td>
<td>Réseau Régional de Vigilance et d’Appui (Regional Vigilance and Support Network)</td>
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<td>Secrétariat Général des Affaires Européennes (Secretariat General of European Affairs)</td>
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<td>Syndicat de l’Industrie du Diagnostic In-Vitro (In-Vitro Diagnosis Industry Union)</td>
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<td>SIG</td>
<td>Service d’Information du Gouvernement (Government Information Service)</td>
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<td>TROD</td>
<td>Test Rapide d’Orientation Diagnostique (Rapid Diagnostic Test)</td>
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Over the past fifteen years, France faced an overall increase in bacterial resistance to antimicrobial agents. Over that period, new resistance mechanisms have emerged and have spread amongst pathogenic bacteria, making currently-available treatments ineffective. This phenomenon affects most countries (with just a few, rare exceptions), and it recognises no borders. It is explained by over-exposure of bacteria to antimicrobial agents, which is directly linked to the over-use and the persistent misuse of antibiotics. The growth in the prevalence of resistance goes together with a reduction in the available therapeutic options. Some old antibiotic molecules are no longer produced or are no longer available, due to their low or non-existent profitability. At the same time, industrial investments in research and development relating to new active treatments on new forms of resistance or tools that enable them to be anticipated and prevented have become less common over the last thirty years, due to an inefficient economic model for those products.

The combination of those factors has led to growing therapeutic difficulties and even dead ends, especially for the most vulnerable sick people. Each year in France, 12,500 deaths are linked to an antibiotic-resistant bacterial infection. On a global scale, antimicrobial resistance is currently estimated to account for 700,000 deaths per year.

Antimicrobial Resistance is a universal problem that calls for co-ordinated action between the various sectors and actors concerned: healthcare systems, animal sector, the environment, research, the school organization, occupational health, etc. Controlling the AMR issue can only be done by adopting a global approach to the phenomenon, both nationally and internationally. There is a need to put in place intersectoral measures that open up healthcare approaches and that go beyond borders. Those measures must involve monitoring the phenomenon, controlling and preventing resistance, and developing new products that enable better diagnosis and treatment of bacterial infections. The “One Health” concept, implemented by the tripartite collaboration (OMS, OIE and FAO) and adopted by the WHO global action plan\(^1\), FAO action plan and by the Strategy on Fighting AMR of the OIE\(^2\) fully sums up the approach that must be implemented to counteract antimicrobial resistance.

This growing health threat is now perceived by international bodies as one of the main health priorities. In May 2015, after having drawn up a worrying context analysis of the issue at a global level\(^3\), the WHO issued a global action plan recommending that all member states should have drawn up a national intersectoral plan to control resistance by 2017. In the USA, President Barack Obama asked the President’s Council on Sciences and Technologies (PCAST) to make proposals in order to control the health threat linked to resistance to antibiotics, and to overturn the negative trend in research and innovation relating to antibacterial agents. The report presented by PCAST to the US President makes 8 recommendations, and adds to prior advances resulting from the setting

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up in 2010 of the Biomedical Advanced Research and Development Authority (BARDA), followed by the Generating Antibiotic Incentives Now Act (GAIN Act) in 2013.

In the United Kingdom, Prime Minister David Cameron tasked Lord Jim O’Neill, an economist and the Commercial Secretary to HM Treasury, with making recommendations on controlling resistance to antibiotics. Since December 2014, the group has issued several thematic publications, and its final report was issued in May 2016. In particular, it includes alarming estimates of the human and economic consequences of worldwide resistance to antibiotics, citing of 10 million deaths per year by 2050 if appropriate measures are not taken. Therefore, resistance to antibiotics may become the leading cause of death in the world, ahead of cancers (8.2 million deaths), diabetes (1.5 million deaths), diarrhoea (1.4 million deaths), and road-traffic accidents (1.2 million deaths). The report provides several proposals in order to stimulate research and development of new antimicrobial agents. The objective of the latter is to ensure a return on investment for the industry by decoupling revenues from sales volumes of new products.

AMR was one of the issues raised in the declaration at the G7 summit of June 2015, and at the Ministries of Health summit in Berlin in October 2015. It was one of the priorities during the Netherlands’ presidency of the European Union, which, on 17 June 2016, led the European Council to pass a resolution to strengthen the fight against AMR. Like the WHO plan, the latter invites member states to set up national intersectoral plans by mid-2017. The resolution also includes quantified objectives. In addition, it puts in place an intersectoral European network, the “One Health Network”, for exchanges and co-ordination on human and animal health policies applied in member states. It also encourages discussions with industry in order to maintain access to existing antibiotics. It calls for the increased use of preventive vaccination in animals, as well as developing and accessing diagnostic tools. Finally, the resolution strengthens research, in particular via the European programme called the Joint Programming Initiative on Antimicrobial Resistance (JPI-AMR). On May 25th & 26th, 2016, G7 country members committed to joint efforts in order to strengthen their One-Health multisectoral national action plans. On September 5th, 2016, G20 countries issued a resolution strongly supporting WHO, FAO and OIE actions in the field of AMR. Finally, on September 21st, 2016, the United Nations General Assembly adopted an ambitious high-level declaration to combat AMR, and called the General Secretary to appoint an inter-agency coordinating body, in conjunction with FAO and OIE to coordinate tripartite actions against AMR.

In France, in spite of the initial success of antibiotic plans implemented since 2001, the level of antibiotic consumption in human health remains excessively high compared with the European average. However, the Ecoantibio plan allowed a reduction of about 20% in the use of antibiotics in veterinary medicine between 2012 and 2015, thus lowering consumption to the European average; nonetheless, it is important to maintain that effort over time.

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4 Biomedical Advanced Research and Development Authority. http://www.phe.gov/about/BARDA/Pages/default.aspx
6 https://www.bundesregierung.de/Content/EN/_Anlagen/G7/2015-06-08-g7-abschluss-eng_en.pdf?_blob=publicationFile&v=3
Despite its high-ranking among priority health risks at the global level, AMR remains a danger that is under-estimated by the general public and by professionals themselves (physicians, healthcare professionals, veterinary surgeons, stockbreeders, agronomists, ecologists, evolutionists, hydrologists, etc.). The phenomenon remains poorly visible, whereas the traditional “all-mighty” image of antibiotics remains dominant. As a consequence, antimicrobial agents are not adequately viewed as a common, fragile and threatened good, which must be preserved.

For those reasons, the French Prime Minister, Mr. Manuel Valls, has decided to focus the first meeting of the Comité Interministériel pour la Santé (CIS – Interministerial Committee on Health) on controlling resistance to antibiotics, thus making of the topic a health priority for the government, by re-stating the challenges and objectives in terms of reducing the consumption of antibiotics and fatalities associated with antibiotic-resistant infections.
OVERVIEW OF THE INTERMINISTERIAL ROADMAP FOR CONTROLLING ANTIMICROBIAL RESISTANCE

THE INTERMINISTERIAL COMMITTEE ON HEALTH

In January 2015, the French Minister of Health Marisol Touraine tasked Dr. J. Carlet with putting together a special working group on AMR, in order to make innovative, concrete proposals which could be swiftly put into action. The conclusions and recommendations of that multidisciplinary, 120-member group were presented in September 2015. For the first time in France, the report included an estimate made by the Agence Nationale de Santé Publique (National Agency for Public Health) of the human cost of AMR. The latter was quantified at 150,000 cases per year of infections due to multiresistant bacteria, linked to 12,500 annual deaths.

The group’s recommendations included four actions that were deemed priorities, serving four main objectives:

1) encourage and develop research into antimicrobial resistance;
2) strengthen monitoring through indicators shared between activity sectors;
3) improve the use of antibiotics;
4) increase general public awareness to the risk of antibiotic resistance and to the proper use of antibiotics.

The four actions deemed priorities for attaining those objectives consisted of:

- setting up an interministerial committee tasked with co-ordinating actions to fight resistance to antibiotics, steered by an interministerial delegate;
- drawing up a 5-year national interdisciplinary research plan on antimicrobial resistance;
- supporting research and development relating to innovative products against resistance to antibiotics, in particular by setting up a particular status;
- acknowledging the significance of the problem by granting a “great national cause” label to the fight against resistance to antibiotics.

In that context, the Minister of Health suggested to the Prime Minister that the Comité Interministériel pour la Santé (CIS - Interministerial Committee on Health) should hold a meeting, for which preparation work would be co-ordinated by a ministerial delegate. The mission of that board is to define a roadmap of cross-sectoral actions aimed at controlling AMR, based on the recommendations of the Carlet – Le Coz report. On 11th December 2015, the suggestion was accepted under the terms of a letter from the Prime Minister. Thus, resistance to antibiotics was the first topic to be dealt with by the CIS. This report summarises the results of the work done by the Comité Permanent Restreint (CPR – Steering Committee for Health), meeting under the ægis of the Director General for Health and the interministerial delegate, to prepare for the CIS meeting and to make suggestions to it concerning the implementation of concrete actions.

THE STEERING COMMITTEE FOR HEALTH

The CIS’s Comité Permanent Restreint (CPR – Steering Committee) on controlling resistance to antibiotics brought together all the directors (or their representatives) of central administrations concerned by that theme, as well as some health agencies (ANMV, Anses, ANSM, ANSP, and the HAS). Other institutions (CNAMTS, ANR, research institutes and Alliances) were invited to take part in the CPR’s working groups.

Five plenary meetings were held between January and July 2016 and an interministerial roadmap was developed. That roadmap was structured around five cross-cutting pillars dealt with within the CPR or within interministerial working subgroups:

1. Public and professionals’ awareness
2. proper use and resources for good practice
3. new indicators and monitoring
4. solutions for innovation and research
5. intersectoral governance in the international context.

A progress Réunion Interministérielle (RIM – Interministerial Meeting) was held on July 1st, and enabled the presentation of an initial version of this document as well as the refinement of some suggestions. The measures that follow are organised according to the actions proposed by each subgroup, and were validated at the CPR meeting held on 13 July 2016.

The appendices to the document bring together:

• a summary table that recapitulates all the measures and actions proposed;
• the list of contributors to the interministerial roadmap on antimicrobial resistance.

The French version includes in addition descriptive notes for each action (context, technical description, pilot institutions and other participants concerned, budgetary impact, provisional timetable for implementation, and indicators).

The detailed notes can be found at:

In human health, in spite of many awareness-raising programmes carried out mainly by the CNAMTS and communication actions rolled out in the various ministerial plans, antibiotic consumption remains much too high in France and well above the European average. AMR is a phenomenon misunderstood by the general public, and the perception of antibiotics remains all too often in line with old representations of omnipotent and readily available drugs.

In animal health, the favorable results observed following the implementation of the first Ecoantibo plan improved France’s ranking in Europe. After the Netherlands, France is the second European country to have most reduced its antibiotic consumption in veterinary medicine over the last few years, thus allowing it to return below the European average in terms of antibiotics animal exposure. That downward trend, and, more generally, the careful and reasoned use of antibiotics, must be maintained and continued through active and ongoing mobilisation of all actors. Furthermore, the Loi d’Avenir pour l’agriculture, l’alimentation et la Forêt (Law for the future of agriculture, food and forest) passed in 2014, has strengthened the risk management framework for antibiotic use with binding measures. For example, these measures should enable to restrict critical antibiotics use, monitor antibiotic consumption or create economic rules for market moralization.

We are just beginning to explore the role that the environment plays in the process, by encouraging the dissemination and, potentially, the selection of resistant bacteria, in particular when it is contaminated by residue of antibiotics used in humans or animals, by biocides, or by other pollutants. The effluents reused for agricultural purposes may play a part in the environmental dispersal of resistance to antibiotics. In some countries (outside Europe), antibiotics are also used to protect plants. Thus, resistance to antibiotics can spread quickly over very large areas. Adressing the problem of antimicrobial resistance within the “One Health” approach must account for the indirect role and potential impact on human health of the environment and its contamination.

Consequently, resistance to antibiotics is a major, multisector, worldwide challenge that requires all actors to be mobilised. Those actors must be sensitized to the specific characteristics of antibiotics, and they must be alerted to the individual and collective risks of resistance to antibiotics as well as to prevention measures from a “One Health” perspective. For an effective communication campaign, all these components must be included.

CHALLENGES

- Raising awareness of collective responsibility among the general population and professionals, in order to induce a long-lasting modification in how antibiotics are perceived and used, so that antibiotics are perceived as a common good to be preserved and used prudently, from a sustainable development perspective.
- Encouraging access to information, increase the general public and professionals knowledge, and highlight the commitment of all relevant stakeholders (public authorities, professionals and users) in the control of antibiotic resistance.

**MEASURES ADOPTED**

**MEASURE 1 – Launch the first national intersectoral programme to raise awareness on prevention of antimicrobial resistance**

**Action no. 1:** Implement the first major intersectoral communication campaign, as part of a pluriannual communication programme focusing on AMR, its determinants, and its consequences.

Developed under a common banner, the campaign must be tailored to target various audiences (professionals working in human and animal healthcare, stockbreeders and owners of domestic animals, populations at specific risk, environmental professionals, etc.), and will put into perspective the role that vaccinations and hygiene measures play in preventing infections, as well as the risks associated with antibiotics release into the environment.

**MEASURE 2 – Improve access to information, and public commitment to controlling antimicrobial resistance**

**Action no. 2:** Reinforce health education for populations, especially young people and animal owners, through educational modules (“e-bug” programmes in a school setting, training in secondary schools and in colleges) and the media (“Entertainment Education”).

**Action no. 3:** Set up a single interministerial portal (or a section on social-sante.gouv.fr website) that provides information to the public and to professionals, raising their awareness of antibiotic resistance, as well as enabling everyone to get involved in controlling resistance to antibiotics.
A significant proportion of human antibiotic consumption can be attributed to treatments prescribed for viral infections, or to treatments that are unnecessarily prolonged. Over-prescribing antibiotics and the excessive exposure of human and animal populations play a direct role in the emergence of resistance, and incur unnecessary costs in human medicine for the healthcare system. Preventive measures that allow limiting antibiotic exposure, especially preventive vaccination, remain insufficiently widespread and adopted.

**CHALLENGE**

- Reduce the population exposure to antibiotics by lowering consumption down to the European average in human medicine, providing appropriate tools to improve the relevance and quality of prescribing by all healthcare professionals concerned (human and animal health), and by encouraging preventive measures.

**MEASURES ADOPTED**

**MEASURE 3 – Provide support to proper prescribing by healthcare professionals in both the human and animal sector**

**Action no. 4:** Upgrade the importance of antimicrobial resistance in the healthcare professional’s initial training, especially for pharmacists, midwives, nurses, and dentists. Set up and prioritise the monitoring of continuous training programmes dedicated to the proper use of antibiotics in human health. In animal health, strengthen continuous training and education programs for veterinary surgeons and stockbreeding professionals by developing e-learning training modules.

**Action no. 5:** Roll out regional structures providing support for the fight against antimicrobial resistance, to serve healthcare professionals in the community, in hospitals, and in nursing homes institutions in each region, by relying on regional reference networks in relation to resistance against antibiotics as well as vigilance and support structures, especially those devoted to healthcare-associated infection (CPIASs). In animal health, widen the network of regional reference veterinarians, and secure its funding.
Action no. 6: Ensure the dissemination, promotion, and availability to all prescribers of tools contributing to the proper use of antibiotics:

- practice guidelines for dealing with common pathologies;
- updated recommendations on the relevance and duration of treatment;
- ruling against prescribing antibiotics in the absence of indications;
- recommendations sheets and guides to best practice for veterinary surgeons and stockbreeders.

Action no. 7: Encourage the use of rapid diagnostic tests that contribute to controlling antibiotic resistance in the community and in hospitals. In the veterinary setting, develop and provide access to diagnostic kits as well as rapid tests to determine bacterial susceptibility to antibiotics.

MEASURE 4 – Incentivize healthcare professionals to prescribe appropriately by reinforcing the regulatory framework

Action no. 8: In human medicine, use regulatory provisions to limit prescription duration to a maximum of 7 days for common infections.

Action no. 9: In human medicine, put in place dedicated prescription forms for antibiotic prescriptions, by linking them to the use of TRODs (Tests Rapides d’Orientation Diagnostique – Rapid Diagnostic Tests) for rhinopharyngeal infections, in prescribing-assistance software or thanks to online services developed by CNAMTS.

Action no. 10: Limit the list of tested antibiotics provided to prescribers for antibiotic susceptibility tests performed on urinary pathogens, in order to restrict the prescription of the so-called “critically important antibiotics” in human health.

Action no. 11: Follow the progress of the objective set in the medical convention on limiting the prescribing rate for so-called “critically important” antibiotics, linked to remuneration based on public-health objectives, and work with “outliers” (overprescribers) to reduce unjustified prescriptions. In veterinary medicine, ensure the proper application of the April 2016 decree and ruling, which govern or prohibit the prescription and delivery of “critically important” antibiotics.
**MEASURE 5 – Encourage the proper use of antibiotics**

**Action no. 12:** In human medicine, adapt the packaging of oral and injectable presentations to minimum recommended treatment durations. When appropriate, extend the dispensing experiment to the antibiotics unit. In veterinary medicine, favour the development by manufacturers of tailored packaging, and propose a regulatory framework that favours antibiotics being issued in small doses.

**Action no. 13:** On antibiotic packaging, insert a warning message for patients or stockbreeders.

**MEASURE 6 – Promote adoption by healthcare professionals and public of effective preventive measures to improve human and animal health**

**Action no. 14:** In veterinary medicine, promote biosecurity measures in stockbreeding by strengthening and developing programmes to improve stockbreeding conditions.

**Action no. 15:** In human medicine, use monitoring by the interministerial intersectoral plan coordination body (cf. action no. 36) to ensure compliance with recommendations and the achievement of objectives set out in pilar 2 of the *Programme de Prévention des Infections Associées aux Soins* (PROPIAS – Healthcare-Related Infection Prevention Programme), especially concerning the promotion of standard hygiene precautions, means for rapid diagnostic of resistances, and objectives for the proper use of antibiotics and vaccination for patients and residents.

**Action no. 16:** Promote preventive vaccination against infections in humans and animals, in particular through the communication campaign (cf. action no. 1) and the current national consultation.
France is one of the world leaders in innovation relating to controlling resistance to antibiotics, thanks to the excellence of its research and the dynamism of businesses established in the country. Controlling antimicrobial resistance must involve developing knowledge of how resistance to antimicrobial agents emerges and is transmitted, as well as developing new therapeutic and diagnostic solutions or alternative solutions to antibiotics. Those objectives require:

- Structuring research networks and observatories to strengthen research efforts;
- Encouraging better interaction between scientific, human, and social disciplines, and ensuring co-ordination of research efforts between the human-health, animal-health, and environmental sectors, steered by a transdisciplinary strategic council;
- Supporting and accelerating the transfer of research from the academic world to the industrial world by setting up a pro-active policy on public-private partnership and project support;
- Adapting new economic model applied to the development of new practices and products that enable resistance to antibiotics to be controlled.

**CHALLENGE**

- Encourage access to and the availability of innovative products and new tools contributing to the control of antimicrobial resistance, by strengthening the structuring and co-ordination of research, as well as by encouraging academic / industry exchanges and by promoting products that contribute to controlling resistance to antibiotics.

**MEASURES ADOPTED**

**MEASURE 7 – Structure and co-ordinate research, development, and innovation efforts into AMR and its consequences**

**Action no. 17:** Install a strategic steering committee for research on antimicrobial resistance.

**Action no. 18:** Set up a common intersectoral, interactive web portal indentifying public and private actors as well as networks, laboratories, and research projects relating to AMR.

**Action no. 19:** Strengthen and connect research and monitoring networks as well as observatories.
Action no. 20: Strengthen research and innovation efforts. At national level, co-ordinate the scientific research program on antimicrobial resistance and related financing, while ensuring that the national effort is integrated with actions taken at European level (especially the JPI AMR), and by supporting research focused on public-health priorities.

MEASURE 8 – Foster convergence between support for scientific research and innovation by strengthening public-private partnerships

Action no. 21: Support and speed up transfers from the academic world to the industrial world in the field of antimicrobial resistance.

Action no. 22: On a joint basis between academics and industrialists, set up regular exchange programmes by organising “academic / industry” meetings in the field of human and animal health, as well as the fields of agriculture, nutrition, and the environmental health.

MEASURE 9 – Promote and preserve products that contribute to controlling resistance to antibiotics

Action no. 23: Install a Comité Technique de l’Antibiorésistance (Technical Committee on Antimicrobial Resistance) in charge of giving opinions on the relevance of products to be used in human or veterinary medicine, and contributing to controlling resistance to antibiotics.

Action no. 24: Maintain the effectiveness of the therapeutic arsenal by adopting incentive measures that allow existing antibiotics to be retained in the market.

Action no. 25: Provide innovative products and technologies contributing to the control of antimicrobial resistance with a set of regulatory and financial incentive mechanisms.

Action no. 26: Improve the use of in vitro diagnostic (IVD) tools contributing to control antimicrobial resistance, thanks to a better use of those technologies.
France has an extensive monitoring system that covers resistance to antibiotics as well as antibiotic consumption in human and veterinary medicine. However, the large number of actors in human medicine and the redundant nature of some of their assigned tasks impair the effectiveness and efficiency of the monitoring system, especially for resistance to antibiotics. For that reason, the national policy for monitoring antibiotic resistance and consumption must be consolidated through a better structure and organisation. Moreover, current monitoring lacks cross-sectoral indicators and data on resistance in the environment (soils, plants, and water), and new tools are needed in terms of methodology and indicators shared between the various sectors.

**CHALLENGE**

- Boost the effectiveness of monitoring resistance to antibiotics and the consumption of antibiotics, and improve the date dissemination.

**MEASURES ADOPTED**

**MEASURE 10 – Clarify the national policy on monitoring antibiotic resistance and consumption, and improve the availability of its results.**

**Action no. 27:** Use a “One Health” approach to provide annual communication to the public and to professionals on consumption and resistance data by prioritising common indicators.

**Action no. 28:** Making clearer and operating the monitoring mapping of antibiotic resistance and the consumption of antibiotics in human health. Use vigilance and support networks to generate point-of-care indicators of consumption and resistance for healthcare professionals.
MEASURE 11 – Develop new indicators and monitoring tools through better use of databases

**Action no. 29:** Normalise and open up laboratory data on antibiotic resistance.

**Action no. 30:** At the national and European level, develop new global and specific indicators aimed at measuring antibiotic resistance and exposure to antibiotics on a common basis for humans, animals, and the environment.

**Action no. 31:** Study the cost of bacterial resistance to antibiotics in human and veterinary medicine in order to develop relevant economic indicators.

**Action no. 32:** Organise a Hackathon dedicated to operating databases on antibiotic consumption in human medicine.
There are currently several ministerial plans and programmes aimed at controlling resistance to antibiotics. Co-ordination between the human antibiotic plan, the EcoAntibio plan in veterinary medicine, and the Environnement-Santé (Environment-Health) plan (measure 12b) must be strengthened and formalised to enable better consistency and effectiveness, according to the recommendations of the WHO’s global plan, the OIE’s Strategy in the Fight against Resistance to Antibiotics, and the European plan. By end 2016, the human antibiotic plan and the EcoAntibio plan came together to an end, which represented a unique opportunity to set up a co-ordinated “One Health” plan on controlling resistance to antibiotics, adapted to the challenges that are specific to human and animal health as well as to the environment.

The high-level priority ascribed to antimicrobial resistance and the many ongoing initiatives at the European and international levels (G7 and G20, WHO, OIE, FAO, OECD, UN, etc.) require a strong vigilance over consistency between actions taken nationally and internationally, as well as over the clarity and consistency of French positions defended during many discussions with our European and international partners.

**CHALLENGES**

- Ensure that the national policy on controlling resistance to antibiotics is consistent with international actions taken from the “One Health” perspective, by strengthening intersectorality.
- Guarantee consistency and support of the concerted positions taken by France at the international level.

**MEASURES ADOPTED**

**MEASURE 12 – Strengthen interministerial co-ordination on controlling antimicrobial resistance**

**Action no. 33:** Summarise the situational analyses of the various plans in order to define common themes to the various sectors, with the objective of gathering them into an overall, co-ordinated action plan to tackle AMR.

**Action no. 34:** Develop this co-ordinated programme to tackle AMR in actions. These actions will be adapted to the challenges specific to each sector (human health, animal health, and the environment), grouped according to their own sectoral identity and monitored by each ministerial department concerned.
Action no. 35: Set up a high-level ministerial body for intersectoral co-ordination relating to controlling antibiotic resistance and to monitoring actions taken by each ministerial department concerned, by ensuring that they are consistent with European and international actions.

**MEASURE 13 – Co-ordinate national actions with European and international programmes, in order to strengthen France’s lead role in controlling antibiotic resistance**

Action no. 36: Keep an updated, shared agenda of European and international events relating to controlling AMR, in order to strengthen France’s place in the most important initiatives. Summarise essential interministerial positions on controlling AMR, and place them at European and international level.

Action no. 37: At European level, make a proposal to set up a special framework dedicated to developing products that contribute to controlling AMR.

Action no. 38: At international level and with the help of the European Union, promote the adoption of measures for checking that antibiotics are used properly, in particular banning the use antibacterial agents as growth promoters in stockbreeding.

Action no. 39: At European level, promote the development of co-ordinated monitoring of the main pathogens observed in veterinary medicine.

Action no. 40: In collaboration with the WHO and the OIE, develop a network for monitoring the emergence and spread of resistance to antibiotics (in humans, animals, and the environment) in low-income countries, by relying on existing networks.
• Summary table
• Contributors to the roadmap
<table>
<thead>
<tr>
<th>Theme</th>
<th>Measures</th>
<th>Actions</th>
<th>Strategic steering</th>
<th>Operational steering</th>
<th>Budget elements</th>
<th>Implementation</th>
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</thead>
<tbody>
<tr>
<td>Awareness raising and communication</td>
<td>1. Launch the first national intersectoral programme to raise awareness on prevention of antimicrobial resistance</td>
<td>1. Implement the first major intersectoral communication campaign, as part of a multiannual communication programme focusing on resistance to antibiotics, its determinants, and its consequences</td>
<td>SIG DICOM of MASS</td>
<td>Directorates in charge of communication in the ministries concerned ANSP / Anses CNAMTS</td>
<td>10-15 million euros One full-time ETP (full-time equivalent)</td>
<td>4th quarter 2017</td>
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<td>2. Implement the first major intersectoral communication campaign, as part of a multiannual communication programme focusing on resistance to antibiotics, its determinants, and its consequences</td>
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<td>3. Set up a single interministerial portal (or an internet area at social-sante.gouv.fr) that provides information to the public and to professionals and that raises their awareness in relation to resistance to antibiotics, as well as enabling everyone to get involved in controlling resistance to antibiotics.</td>
<td>SIG DICOM of MASS</td>
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<td>4. Upgrade the importance of antimicrobial resistance in the healthcare professional’s initial training, especially for pharmacists, midwives, nurses, and dentists. Set up and prioritise the monitoring of continuous training programmes dedicated to the proper use of antibiotics in human health. In animal health, strengthen continuous training and education programs for veterinary surgeons and stockbreeding professionals by developing e-learning training modules.</td>
<td>MAAF MASS MENESR</td>
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<td>5. Roll out regional structures providing support for the fight against resistance to antibiotics, to serve healthcare professionals in the community, in hospitals, and in medical-social establishments in each region, by relying on regional reference networks in relation to resistance to antibiotics as well as vigilance and support structures, especially CPIAs. In animal health, widen the network of regional references in veterinary medicine, and guarantee its funding.</td>
<td>MAAF MASS</td>
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<tr>
<td>Education and proper use</td>
<td>3. Provide support to proper prescribing by healthcare professionals in both the human and animal sector</td>
<td>4. Incentivize healthcare professionals to prescribe appropriately by reinforcing the regulatory framework</td>
<td>MASS ANSM / Anses ANMV HAS CNAMTS ASIP Santé and Software publishers AVEF / AFVAC / SNGTV</td>
<td>MASS ANSM HAS ASIP Santé</td>
<td>Budget revenue 4th quarter 2016</td>
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<td>7. Encourage the use of rapid diagnosis tests that contribute to controlling AMR in the community and in hospitals. In a veterinary setting, develop and provide access to diagnostic kits as well as rapid tests to determine bacterial susceptibility to antibiotics.</td>
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<td>8. In human medicine, use regulatory provisions to limit prescription duration to a maximum of 7 days for common infections.</td>
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<td>9. In human medicine, put in place a dedicated prescription that covers antibiotic prescriptions, by linking them to the use of TRDs for rhinopharyngeal infections, in prescribing-assistance software or thanks to ronline services developed by CNAMTS.</td>
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<td>10. Limit the list of tested antibiotics provided to prescribers for antibiotic susceptibility tests performed on urinary pathogens, in order to restrict the prescription of the so-called “critically important antibiotics” in human health.</td>
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<tr>
<td>Research and Innovation</td>
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<td><strong>5. Encourage the proper use of antibiotics</strong></td>
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<tr>
<td>11. Follow the progress of the objective set in the medical convention on limiting the prescribing rate for so-called “critically important” antibiotics, linked to remuneration based on public-health objectives, and work with “outliers” (overprescribers) to reduce unjustified prescriptions. In veterinary medicine, ensure the proper application of the April 2016 decree and ruling, which govern or prohibit the prescription and delivery of “critically important” antibiotics.</td>
<td>MAAF</td>
<td>CNAMTS</td>
<td>ARS</td>
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<td>Additional expenditure if additional point in remuneration of public health objectives (ROSP) (except for redistribution)</td>
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<td>4th quarter 2016</td>
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<tr>
<td>12. In human medicine, adapt the packaging of oral and injectable presentations to minimum recommended treatment durations. When appropriate, extend the dispensing experiment to the antibiotics unit. In veterinary medicine, favour the development by manufacturers of tailored packaging, and propose a regulatory framework that favours antibiotics being issued in small doses.</td>
<td>MASS</td>
<td>ANSM / Anses-ANMV</td>
<td>SIMV</td>
<td>Budget revenue</td>
<td>2017</td>
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<tr>
<td>13. On antibiotic packaging, insert a warning message for patients or stockbreeders.</td>
<td>MASS</td>
<td>MAAF</td>
<td>EMA / European Commission MEEM</td>
<td>ANSM / Anses-ANMV</td>
<td>Pharmaceutical and veterinary industry</td>
<td>No budget incidence</td>
</tr>
<tr>
<td>14. In veterinary medicine, promote biosecurity measures in stockbreeding by strengthening and developing programmes to improve stockbreeding conditions.</td>
<td>MAAF</td>
<td>GDS France / Coop France / SNGTV / FSVF</td>
<td>Expenditure as part of financing for vaccination or for improving stockbreeding conditions</td>
<td></td>
<td>In hand</td>
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<tr>
<td>15. In human medicine, use monitoring by the interministerial intersectoral plan (cf. action no. 36) to ensure compliance with recommendations and the achievement of objectives set out in pillar 2 of the Programme de Prévention des Infections Associées aux Soins (PROPIAS)</td>
<td>MAAF</td>
<td>HAS</td>
<td>ANSP</td>
<td>No financial incidence</td>
<td>In hand</td>
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<tr>
<td>16. Promote preventive vaccination against infections, in particular through the communication campaign (cf. action no. 1) and the current national consultation.</td>
<td>MAFS</td>
<td>MAAF</td>
<td>HAS</td>
<td>SIMV</td>
<td>FNGDS / Coop de France / SNGTV</td>
<td>Financing plan for medico-economic studies and vaccination promotion Communication campaign plan for promoting veterinary vaccination</td>
</tr>
<tr>
<td>17. Install a strategic steering committee for research into AMR.</td>
<td>MENESR</td>
<td>MAAF</td>
<td>MEEM</td>
<td>MASS</td>
<td>MDef</td>
<td>MEF</td>
</tr>
<tr>
<td>18. Set up a common intersectoral, interactive portal identifying public and private actors as well as networks, laboratories, and research projects relating to AMR.</td>
<td>MENESR</td>
<td>MAAF</td>
<td>MEEM</td>
<td>MASS</td>
<td>MDef</td>
<td>MEF</td>
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<tr>
<td><strong>7. Structure and co-ordinate research, development, and innovation efforts into AMR and its consequences</strong></td>
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<tr>
<td>19. Strengthen and connect research and monitoring networks as well as observatories.</td>
<td>Research directorates in the ministries concerned</td>
<td>Aviesan / AllEnvi / Athena ANR / Anses / ANSM / Other health and environmental safety agencies concerned CIRAD Existing research networks and observatories concerned Structures and actions put in place at European level: JPI-ANR, JA-AMR-ICAL, WHO Global Action Plan, ECDC, and ECRAID (European Clinical Research Alliance on Infectious Diseases, pending validation)</td>
<td>To be determined by the alliances</td>
<td></td>
<td>From 2017 onwards</td>
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<tr>
<td>20. Strengthen research and innovation efforts. At national level, coordinate the scientific research program on antimicrobial resistance and related financing, while ensuring that the national effort is integrated with actions taken at European level (especially the JPI AMR), and by supporting research focused on public-health priorities.</td>
<td>MENESR MAAF MEEM MASS MDef MEF</td>
<td>Aviesan / AllEnvi / Athena ANR / Anses / ANSP / BPI / Other financing agencies under ministerial oversight CEA / CNRS / INRA / INRIA / IRD / INSERM / Institut Pasteur / CHRU / CPU / etc.</td>
<td>To be determined by the alliances</td>
<td>From the end of 2016</td>
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<tr>
<td>8. Foster convergence of activities supporting research and innovation by strengthening public-private partnerships</td>
<td>21. Support and speed up transfers from the academic world to the industrial world in the field of resistance to antibiotics</td>
<td>Strategic steering committee</td>
<td>Ministries concerned Agencies Scientific experts Competitiveness clusters Businesses and federations</td>
<td>Start-up funds to be budgeted (PIAS)</td>
<td>DVS launch: 4th quarter 2016</td>
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<tr>
<td>22. On a joint basis between academics and industrialists, set up regular exchange programmes by organising “academic / business meetings” in the field of human and animal health, as well as the fields of agriculture, nutrition, and the environment.</td>
<td>MEF</td>
<td>Wide perimeter covering researchers and business inside and outside the healthcare sector</td>
<td>PPP industry / alliances</td>
<td>Already in place, but to be extended to the agrifood and environmental sectors</td>
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<tr>
<td>23. Set up a Technical Committee on Resistance to Antibiotics (CTA) in charge of giving advices on the relevance of products to be used in human or veterinary medicine, and contributing to controlling resistance to antibiotics.</td>
<td>MASS</td>
<td>MEF / MAAF / MENESR ANSM, Anses, HAS</td>
<td>Setting up a new committee will lead to additional expenditure for the host body</td>
<td>2nd quarter 2017</td>
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<tr>
<td>24. Maintain the effectiveness of the therapeutic arsenal by adopting incentive measures that allow existing antibiotics to be retained in the market.</td>
<td>MASS</td>
<td>MAAF / MEF ANSM / Anses-ANMV CTA HAS CEPS</td>
<td>Possible additional expenditure in the event of reassessing the prices of some technologies</td>
<td>2nd quarter 2017</td>
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<tr>
<td>25. Provide innovative products and technologies contributing to the control of AMR with a set of regulatory and financial incentive mechanisms.</td>
<td>MASS</td>
<td>MAAF / MEF ANSM / Anses-ANMV CTA HAS CEPS</td>
<td>Price of innovative technologies</td>
<td>2nd quarter 2017</td>
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<tr>
<td>26. Improve the use of in vitro diagnostic (IVD) tools in controlling resistance to antibiotics, thanks to better use of those technologies.</td>
<td>MASS</td>
<td>MEF CTA HAS CNAMTS Drugs and diagnosis industries</td>
<td>ONDAM List above RIHN</td>
<td>2nd quarter 2017</td>
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<tr>
<td>10. Clarify the national policy on monitoring of antibiotic resistance and consumption, and improve the availability of its results</td>
<td>27. Use a “One Health” approach to provide annual communication to the public and professionals on consumption and resistance data by prioritising common indicators.</td>
<td>MASS MAAF ANSP ANSM Anses CNAIMS</td>
<td>Cost of producing infographics (with ANSP bearing the cost)</td>
<td>4th quarter 2016</td>
<td></td>
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<tr>
<td>11. Develop new indicators and monitoring tools through better use of databases</td>
<td>28. Making clearer and operating the mapping of monitoring of antibiotic resistance and the consumption of antibiotics in human health. Use vigilance and support networks to generate proximity indicators on consumption and resistance data for human-healthcare professionals.</td>
<td>MASS ANSP Anses ARS CPIAS ANSM / CNAIMS</td>
<td>Budget revenue</td>
<td>2nd quarter 2016</td>
<td></td>
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<tr>
<td>29. Normalise and open up laboratory data on antibiotic resistance</td>
<td>MASS ASP Santé ANSP ARS / CPIAS Professional unions of microbiologists Software publishers</td>
<td>No financial incidence</td>
<td></td>
<td>1st quarter 2017</td>
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<tr>
<td>30. At national and European level, develop new global and specific indicators aimed at measuring antibiotic resistance and exposure to antibiotics on a common basis in humans, animals, and the environment.</td>
<td>MASS MAAF ECDC / EMA / EFSA / WHO CNAIMS ANSP Anses</td>
<td>Setting up and facilitating a national group of experts (financed by the agencies responsible)</td>
<td></td>
<td>4th quarter 2016</td>
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<tr>
<td>12. Strengthen interministerial co-ordination on controlling antibiotic resistance</td>
<td>31. Study the cost of bacterial resistance to antibiotics in human and veterinary medicine in order to develop relevant economic indicators.</td>
<td>MENES</td>
<td>MASS / MAFF CNAMTS ANR ANSP Anses AVIESAN / AllEnvi Inra / CNRS</td>
<td>Research budget</td>
<td>1st quarter 2017</td>
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<tr>
<td>32. Organise a Hackathon dedicated to operating databases on antibiotic consumption in human medicine</td>
<td>MASS</td>
<td>Mission Etalab ANSP ANSM CNAMTS</td>
<td>4,000 euros</td>
<td>4th quarter 2016</td>
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<tr>
<td>33. Summarise the situational analysis of the various plans in order to define common themes to the various sectors, with the objective of gathering them into an overall, co-ordinated action plan to tackle antibiotic resistance.</td>
<td>MASS MAAF MEEM</td>
<td>Ministries concerned [research, industry, economy, defence, etc.] IGAS / CGAAER ANSM / Anses-ANMV HAS ANSP / Anses</td>
<td>Some themes and measures that cut across the various sectors will need a dedicated budget [research, innovation, and communication] that has already been presented in preceding measures</td>
<td>4th quarter 2016</td>
<td></td>
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<tr>
<td>34. Develop the co-ordinated programme for controlling antibiotic resistance into actions. Theses actions will be adapted to specific challenges of each sector (human health, animal health, and the environment), grouped according to their own sectoral identity and monitored by each ministerial department concerned.</td>
<td>Governance body MEEM / MASS / MAAF / Ministries and administrations concerned Plan stakeholders</td>
<td>Each plan must be covered by a dedicated budget and human resources</td>
<td>2nd quarter 2017</td>
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<td>35. Set up a high-level interministerial body for intersectoral coordination relating to controlling antibiotic resistance and to monitoring actions taken by each ministerial department concerned, by ensuring that they are consistent with European and international actions.</td>
<td>Interministerial delegate on resistance to antibiotics MASS / MAAF / MEEM / MAEDI / Ministries and administrations concerned Stakeholders</td>
<td>This body and its budget will be contained in the overall plan on controlling resistance to antibiotics</td>
<td>2nd quarter 2017</td>
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<td>36. Keep an updated, shared agenda of European and international events relating to controlling antibiotic resistance, in order to strengthen France's place in the most important initiatives. Summarise essential interministerial positions on controlling antibiotic resistance.</td>
<td>SGAE MAEDI</td>
<td>MAAF / MASS / MEEM ANSM / Anses-ANMV</td>
<td>No financial incidence</td>
<td>4th quarter 2016</td>
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<td>37. At the European level, make a proposal to set up a special framework dedicated to developing products that contribute to controlling AMR.</td>
<td>MASS MAEDI</td>
<td>SGAE</td>
<td>The proposal can commit France to take part, with other European partners, in a European fund to finance innovation in the field of controlling resistance to antibiotics</td>
<td>4th quarter 2016</td>
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<td>38. At the international level and with the help of the European Union, promote the adoption of measures for checking that antibiotics are used properly, in particular prohibition to use antibacterial agents as growth promoters in stockbreeding.</td>
<td>SGAE MAEDI</td>
<td>MAAF / MASS / MEEM ANSM / Anses-ANMV Anses</td>
<td>No financial incidence</td>
<td>1st quarter 2017</td>
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<td>39. At the European level, promote the development of co-ordinated monitoring of the main pathogens observed in veterinary medicine.</td>
<td>MAEDI MAAF MASS</td>
<td>ANSP Anses</td>
<td>Actions to promote the French arrangement [Réasapath network]</td>
<td>4th quarter 2017</td>
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<td>40. In collaboration with the WHO and the OIE, develop a network for monitoring the emergence and spread of resistance to antibiotics in humans, animals, and the environment in low-income countries, by relying on existing networks.</td>
<td>MEEM MAAF MAEDI</td>
<td>WHO, FAO, OIE European partners Anses IRD / Fondation Rodolphe Mérieux/ Institut Pasteur React-ing</td>
<td>500,000 euros</td>
<td>2nd quarter 2017</td>
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The interministerial roadmap was prepared and validated by the interministerial Steering Committee for Health (CPR) gathering representatives of the central administration directorates. The CPR convened for 5 sessions, under the chairmanship of the Director General for Health.

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Les mesures présentées dans la feuille de route interministérielle ont été préparées par quatre groupes thématiques composés des représentants d’administration centrale et des agences, ainsi que d’experts scientifiques.

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