

How Contexts and Desired Impacts Shape Interventions towards Improved Antimicrobial Use in Animal Production

Comment les contextes et les impacts souhaités façonnent les interventions vers une meilleure utilisation des antimicrobiens dans la production animale

Wie Kontext und gewünschte Auswirkungen Interventionen zur Verbesserung des Einsatzes antimikrobieller Mittel in der Tierproduktion formen

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Introduction

The aim of the ROADMAP project was to foster transitions towards prudent antimicrobial use (AMU) in animal production. This was to be achieved by implementing Living Labs (LLs), which are user-centred, open innovation ecosystems based on a systematic user co-creation approach integrating research and innovation processes in real life communities and settings (Garcia Robles *et al.*, 2015). A general presentation of all ROADMAP LLs is provided in the article by Oehen *et al.* published in the current Special Issue. It describes the interventions (sets of actions around the common objective of prudent AMU) that were designed in each LL.

In five countries of the ROADMAP project, the LL process was guided by an *ex-ante* impact assessment (EAIA) method that aims to improve interventions by designing them in a strategic and participatory manner and laying out the mechanisms through which impacts will be generated (Blundo Canto *et al.*, 2018). This EAIA method is recent and has never been used to design solutions to inadequate AMU (Guenin *et al.*, 2023). Returns of experience on how this method is

applied and what type of results it produces are therefore valuable to inform future solution-seeking projects in the agricultural sector. The objective of our study was to analyse and compare interventions created in the five ROADMAP LLs using EAIA to guide the process. The first part of this article explains how EAIA was used to design interventions towards improved AMU. The second part describes the characteristics of the interventions resulting from the LL process. The third part identifies factors that shaped the design of these interventions. Finally, the concluding section outlines the main strengths and weaknesses of the approach used in the study.

The use of *ex-ante* impact assessment to design interventions towards improved antimicrobial use

EAIA was used in five of the ROADMAP LLs: those aimed at improving AMU in pig and veal production in Belgium, pig and cattle production in Denmark, poultry and pig production in France, poultry and pig production in Italy, and poultry production in Vietnam.

The EAIA method used was adapted from ImpresS, a participatory intervention-building approach developed by Blundo Canto *et al.* (2018) based on the construction of an impact pathway



Invited stakeholders with many different backgrounds listening and taking part in discussions on AMU in the Danish pig sector © Mette Vaarst.

underpinned by a theory of change. The impact pathway describes the causal links between resources mobilised by the intervention (inputs), the intervention's products (outputs), the changes in practices, behaviour and interactions for the actors associated with the use of these outputs (outcomes) and the impacts to which these outcomes contribute in the long term (Guenin *et al.*, 2023).

EAIA was conducted between October 2020 and June 2022 by the LL coordinators and included five steps: 1) establishing an initial assessment by gathering information on the legislative framework, the current state of AMU in the targeted animal production sector, and the different past and ongoing programmes aimed at optimising AMU; 2) identifying all stakeholders linked to AMU, building a stakeholder map, and inviting key stakeholders to participate in a LL aimed at prudent AMU in their specific context; 3) asking LL participants to build a commonly agreed desired vision for the future and identifying positive impacts to contribute to 4) identifying problems preventing the desired impacts from happening, and designing actor-centred strategies to address these problems; and 5) summarising the

theory of change through a narrative and an impact pathway diagram (example in Figure 1).

“ Utiliser une évaluation d'impact ex ante au sein des Laboratoires vivants pour concevoir des interventions en faveur d'une utilisation des antimicrobiens plus prudente prend du temps et nécessite de l'expertise en matière d'organisation et de facilitation. ”

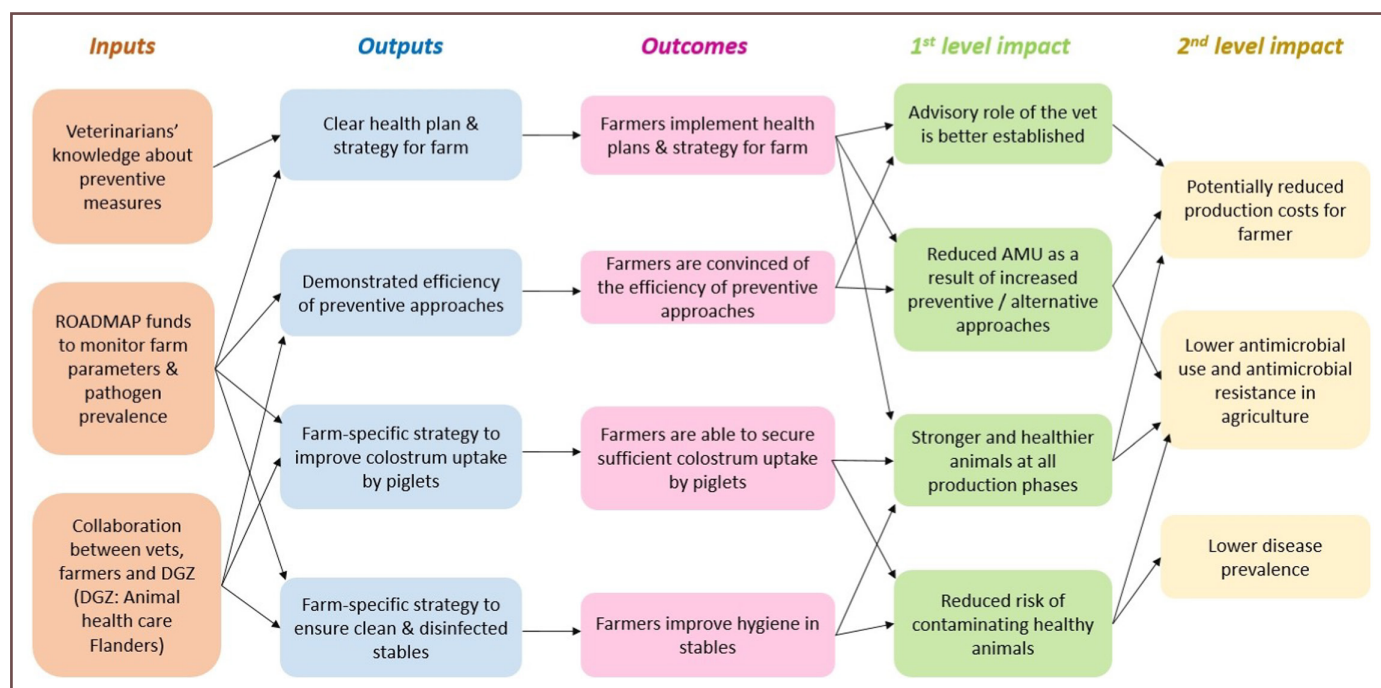
Once narratives and impact pathways for AMU interventions were built in each of the five countries, they were compared using an evaluation framework designed by experts in the ImpresS method. This framework assessed the similarities and differences regarding the country

context of the interventions, how the EAIA process was implemented, the type of interventions designed, the animal production stakeholders that were targeted, the factors that influenced the intervention design, and the acceptability, plausibility and sustainability of the designed interventions. Five workshops were organised between December 2022 and March 2023 with the LL coordinators of all five countries to characterise the different interventions and identify factors that shaped their design. These results are presented in the two parts hereafter.

AMU interventions decided in the five LLs and their characteristics

Types of intervention. In Belgium, the main intervention selected by participants in the pig LL was centred on an action lab to demonstrate the advantage of preventive and hygienic methods and to better establish the advisory role of veterinarians in the pig sector. In Denmark, participants discussed the link between AMU in farm animals and antimicrobial resistance (AMR) in humans in a context of a relatively low animal AMU and progressing towards opening up the

Figure 1: Impact pathway for improved antimicrobial use in pig production in Belgium



Source: Participants of the ROADMAP LL in Belgium.

debate on the actual obstacles to further improve AMU. In the French LL, participants decided to build combined indicators about the health of animals, their welfare, the use of antibiotics and bacterial resistance to antibiotics that convey the information in the clearest possible way. LL activities in Italy focused on updating the guidelines on the use of antibiotics in pig farms elaborated by the public health services of the Emilia-Romagna region and adopting them as national guidelines and on the evaluation, through the FAO Progressive Management Pathway for AMR, of the poultry industry's national plan to reduce AMU. In Vietnam, LL participants worked towards establishing training and awareness-raising programmes for actors in animal production and veterinary drug delivery, as well as consumers.

LL coordinators concluded from their analysis of the different types of interventions designed in the five countries that some interventions seem indispensable for improved AMU: information and education of all stakeholders and an AMU monitoring system. These interventions are necessary but not sufficient and need to be complemented by other interventions adapted to the specific context and production sector concerned. The government is likely to have a significant role to play through a variety of potential actions such as incentives/penalties, restrictions, regulations and research funding.

Targets of interventions. When analysing which actors were targeted by the different interventions, LL coordinators pointed out that farmers and veterinarians were the only actors systematically targeted in all countries. This happened in spite of ROADMAP's objective to build AMU changes in the whole value chain. In some countries, other types of stakeholders were also targeted for change such as consumers and veterinary drug sellers in Vietnam or actors of the farming industry, slaughter companies, supermarket

chains and politicians in Denmark. In the Danish LL, participants debated if and how supermarkets should actively engage in supporting antimicrobial (AM)-free labels. The supermarket representative argued that AMU in animal production was an issue at the societal level and therefore should not be dealt with at the consumer level. Other participants did not agree. Veterinary drug producers or livestock technical institutes were never targeted as actors involved in implementing transition pathways towards more prudent AMU, even though some of them participated in intervention design in several LLs.

“ Die Ex-ante-Folgenabschätzung im Rahmen von LLs, um Maßnahmen für einen umsichtigeren EAM zu entwerfen, ist zeitaufwändig und erfordert fachkundige Organisation und Moderationskompetenz. ”

The heterogeneity among farmers and veterinarians in terms of how much AM they use or prescribe was discussed in all countries. Nonetheless, the strategies designed to improve AMU were mainly generic rather than tailored to specific groups of farmers and veterinarians. It was only in Belgium that the idea to start with farmers who were high AM users was expressed. In Denmark, penalties for high use of AM (called the Yellow Card scheme) were already in place to target the farmers having the highest AMU. In this case, differences in how veterinarians frame themselves were expressed: some take much pride in being focused on productivity and not being 'afraid' of using AMs, and others frame themselves as 'the good

guys' who do not use a lot of AM. The attitude of the veterinarians was seen as a significant factor in relation to farmers' willingness and ability to change.

Acceptability, plausibility and sustainability. LL coordinators also assessed the acceptability, plausibility and sustainability of the interventions and their associated impact pathways designed by LL participants in all five countries. The acceptability was considered satisfactory in all countries due to the participatory nature of the interventions' design. In some cases, possible reluctance was identified from a set of specific actors: for example, pharmaceutical companies being more in favour of interventions where something tangible is sold, such as vaccines or vitamin supplements, rather than advisory services; or production organisations being reluctant to share their data. However, these were not considered major obstacles to acceptability.

The plausibility of the impact pathways was a bit more debated, in particular when it related to assumptions that were considered too optimistic. For example, several interventions relied on increasing the knowledge of farmers about the AMR issue, their level of AMU, and best practices in farm and health management. However, discussions between LL coordinators concluded that increasing the knowledge level of stakeholders was necessary but not sufficient in itself to change practices. Another debated assumption was the ability of veterinarians, a profession in which individualism is highly valued, to become team players and interact with other types of stakeholders. Finally, structural problems, such as a pig production sector very oriented towards export markets, lack of staff or the use of high prolificity sows with fewer teats than the number of piglets in a litter can easily impede the likelihood of changes. While such kinds of structural and systemic issues were mentioned when assessing problems, the proposed interventions rarely dealt with them.

Concerning sustainability, several interventions depended on securing additional funding. Market price for animal products was considered highly influential, both in terms of how profitable some interventions may turn out to be and in terms of how willing farmers may be to apply them. Liaising with other AMU improvement projects to ensure synergies was seen as a potential way to increase sustainability.

Factors influencing transition pathways towards improved AMU

LL coordinators identified a series of factors that influenced the types of intervention and the transition pathways that were designed in each country to improve AMU in specific animal production sectors.

Country-specific context

AMU levels. AMU levels varied significantly among the five countries studied at the beginning of the EAIA process. This influenced the desired impacts and the type of interventions that were designed to improve AMU.

First, while all countries had developed national action plans against AMR, the amount of yearly sold AM for food-producing animals differed vastly: 33.4 mg/PCU (population correction unit) in Denmark, 51.7 in France, 95.3 in Belgium and 173.5 in Italy (ESVAC, 2022). In Vietnam, such AM sales information is not available, but AMU is considered problematic, with large overuse, misuse and problems of product quality (Ha *et al.*, 2021). Depending on where each country was situated on this AMU scale, and on efforts already undertaken in the last decade to decrease AMU in livestock production, the perceived necessity to continue reduction efforts differed. For example, long discussions in the Danish LL on the relationship between AMU and AMR and the need to further reduce AMU were necessary.

AMU monitoring systems. Countries differed regarding whether they had national AMU monitoring systems at

the farm level. This was the case for three countries: Belgium, Denmark and Italy. Developing such AMU monitoring systems is a government priority both in France, where a database called Calypso will soon allow the country to comply with species-level AMU information obligations set by Article 57(3) of the EU Regulation 2019/6 on veterinary medicinal products, and in Vietnam as part of its new AMR National Action Plan (2021–2025).

The role of veterinarians in selling AMs. Another difference was whether veterinarians were allowed to sell AMs: it was not the case in Denmark and Italy where veterinarians are only allowed to prescribe AMs.

Decoupling AM prescription and sale was debated in the Belgian and French LLs but not considered an appropriate intervention. The link between decoupling prescription from sales and obtaining good AMU is indeed not established (Speksnijder *et al.*, 2015), as evidenced by the fact that France and Belgium, where veterinarians make a profit from selling AMs, have lower AM mg/PCU than Italy. Nevertheless, LLs in both Belgium and France developed interventions that aimed to contribute to new business models for veterinary practices, based less on selling drugs and more on providing advice.

Political momentum. Political momentum was also considered influential in terms of what type of

intervention could be achieved. AMU has traditionally been a priority in Danish policy but politicians have lately given more attention to climate and biodiversity issues comparatively, and no politicians accepted an invitation for a meeting on AMU in Danish animal farming arranged by the LLs. Similarly in Belgium, controversies around nitrogen regulation meant that the government was limiting its AMU-improvement ambitions to meeting the requirements of EU regulations. Furthermore, animal health authorities were quite preoccupied by more pressing subjects such as highly pathogenic avian influenza or African swine fever outbreaks.

Animal production. There were also contrasts in terms of the economic situation and orientation of the livestock production systems studied. For example, in Denmark, approximately 90 per cent of pig production is exported and maintaining low pork prices is a high priority to remain attractive on the international market. At the same time, AMU is low compared to competitors on the export market so further reduction will be more likely to cost money than save money. In this context of low AMU compared to other countries with similar industrialised pig production, the ban on medical zinc oxide in 2022 could increase the pressure on costs in an already fragile industry resulting in more pig farms going bankrupt.



Stakeholders of the ROADMAP French Living Lab building a holistic vision of problems preventing improved antimicrobial use in the poultry and pig sectors © Sophie Molia.

Consequently, the participants in the Danish LL felt there was not much space left for reducing AMU in pigs. This fear of losing competitiveness in pig export markets was also present in Belgium and France where 65 per cent and 25 per cent respectively of pig production is exported, and significant attention was paid to designing interventions that would contribute to improving farmers' income which could be possible by aiming for a lower AMU.

It was not clear whether the degree of integration of a production system was an advantage or an obstacle in the transition towards improved AMU. Some interventions, for example in pig production in Belgium, require farmers to have decision-making power on farm management which is not the case for those parts of integrated systems. In contrast, the progress achieved on AMU in the Italian poultry sector was in part attributed to pressure from big retailers on the integrator companies, which control the national market.

The breadth of desired impacts for AMU interventions.

Among desired impacts for AMU interventions identified by LL participants, some were quite similar between countries and related to health aspects (maintained or improved animal health, lower or improved AMU, lower AMR). These health-related desired impacts were understandable given the general objective of the ROADMAP project. However, other desired impacts were also expressed by LL participants in some countries, and this shaped the type of interventions designed. Those impacts mainly dealt with animal welfare (maintained or improved) and economics (reduced production costs, improved farm resilience, more competitive farm production). Interestingly, there was no mention of desired impacts aimed at the well-being of farmers or 'greener' agriculture. These latter impacts could have been expected, at least in Europe, given the current political attention on transitions in agriculture and the difficulties in renewing the

farming workforce many of whom are nearing retirement.

Animal welfare. Animal welfare is a growing citizen concern in many European countries. It was largely discussed in the French and Danish LLs but not much or at all during the pig LL meetings of Belgium and Italy and the poultry LL in Vietnam, nor included in their desired impacts. This may reflect how powerful and vocal welfare organisations are in some countries or the current AMU level (e.g. in Denmark some would argue the use of AM is as low as it can be if you still want to have good animal welfare). However, it must be emphasised that none of the LLs included representatives of welfare organisations. Reasons for not including these organisations ranged from deliberately avoiding them due to fear of conflicting interests between them and other LL members, to time limitations from their side.

“ Achieving system changes (such as changing the veterinarian business model) through LLs needs time for building trust between stakeholders and allowing for long negotiations. ”

New business models for veterinarians. Discussions were held in the LLs in Belgium and France about how to achieve a desired change of business model for veterinarians, with less money coming from AM sales and more coming from giving advice. This is of particular importance in France and Belgium where private veterinarians are conferred important sanitary tasks by the government to ensure public health and tackle animal health crises. Achieving economically resilient

business models independent of AM sales would therefore help to maintain the veterinary health territorial coverage, a task that public veterinarians cannot handle by themselves. However, there is a problem with competition for advice. Many other actors have filled the gap regarding farm advice. For example, feed companies provide advice for free, and veterinarians find it hard to get paid for advice. In Belgium, there is a lot of discussion about how advice should be regulated. These discussions were linked to the structure of the veterinary offer: there are too many veterinarians for the number of pigs and the business model for veterinarians is not clear. The price paid for the three compulsory visits per year is 30€ per visit and this is not high enough to encourage veterinarians to give advice. Veterinarians therefore mostly combine these visits with other visits when they are called in to deal with a problem. Since much of a veterinarian's income depends on AM sales, the trend observed over the last decade towards lower AMU means that the economic viability of numerous veterinary clinics specialising in food-producing animals has become fragile, with a risk of producing 'veterinary deserts'. A systemic change is needed, including a decision on who should pay for periodic visits and health checks. In Denmark, the income of veterinarians comes from giving advice and to a lesser extent acute treatments (the latter only in the cattle sector). Danish regulations ensure that all professional pig and cattle farmers have a Veterinary Advisory Service Contract with a private veterinarian of their own choice. These veterinarians perform regular herd visits and at these visits offer health advice and prescribe (but do not sell) all medicines used in the herds.

Informing consumers about AMU.

Improved information for consumers about AMU in animal farming was a desired impact that was discussed in Belgium, France, Denmark and Vietnam. In Belgium, it was considered that some information

was already provided by the government and in France and Denmark information directed at consumers was considered essential given the number and differences among AM-free labels and the frequent confusion induced by AM-free labels (consumers think that products without AM-free labels may contain antibiotic residues). In Denmark, there was a discussion about the responsibility of retailers and consumers versus policymakers for a societal problem like AMR. Because of the widespread misuse of AMs in Vietnam (e.g. use of the forbidden chloramphenicol, non-respect of withdrawal periods after AM treatments), improved safety of animal products for consumers was in this case considered a desired impact.

The Living Lab process. Living Labs have successfully been used to bring about changes in agriculture (Berberi *et al.*, 2023; Gardezi *et al.*, 2024). However, achieving

system changes (such as changing the veterinarian business model) through LLs needs time for building trust between stakeholders and allowing for long negotiations. Participatory methods used within research projects such as ROADMAP, with limited time and budget, therefore tend to produce interventions that are consensual, easy to implement and less likely to bring major change to systems. They preclude possibilities to test regulatory measures such as legislative changes or decoupling of AM prescription and sales. This may explain why all interventions in the five countries targeted farmers and veterinarians. They nevertheless can contribute to rethinking a system, by ripple effect or by putting the spotlight on some specific problems.

The choice of participants was analysed by LL coordinators as a key element of the LL process (Table 1). The interventions chosen depend on which categories of stakeholders

were invited to participate in the LLs, how representative and influential LL participants were in their home institution or among their peers, how motivated and concerned they felt about AMU, and how they were able to interact with other participants with potentially antagonistic interests. Furthermore, this latter point was influenced by the skills and the neutrality of the LL facilitator. The differences among LLs regarding the selection of participants and facilitators therefore significantly contributed to which types of interventions were designed.

Conclusion

Using *ex-ante* impact assessment within LLs to design interventions for more prudent AMU is time-consuming and requires expert organisation and facilitation skills to ensure a smooth and structured process. However, the benefits derived are multiple and powerful. First, EAIA provides a holistic vision of problems: the link between AMR

Table 1: Types of stakeholder and whether they had representatives or not at the LL of each country (a colour indicates presence of the stakeholders)

		Belgium	Denmark	France	Italy	Vietnam
Government	Ministry of Agriculture	1			1	
	Ministry of Health	2			1	
	Ministry of Environment					
Livestock producers	Farmers	3				
	Farmers unions				3	
	Production organisations					
	Interprofession/ branch organisations					
Health advice providers	Integrators					
	Veterinarians					
	Veterinarians Order					
	Veterinarians unions/organisations					
	Technical institutes					
Academics	Diagnostic laboratories				3	
	Farming advisors					
	Researchers					
Food providers	Agricultural / Veterinary teachers					
	Transformers	3			3	
Drug providers	Retailers					
	Pharmaceutical companies					
Feed and stock providers	Drug sellers					
	Feed companies	3			3	
Consumers	Breeding companies					
	Consumers associations					
Welfare	Welfare organisations					
Label	Label organisations (e.g. Parma ham)					
NGO with contract with government to analyse data		4				

Notes: ¹ Regional or provincial level; ² Agencies rather than the ministry; ³ Some actors could have a double or triple role (farmer and representative of a farmers' union or a production organisation, integrator and farming advisor, transformer and retailer, etc); ⁴ AMCRA (knowledge centre on antibiotic use and antibiotic resistance and antibiotic resistance in animals).

and other agricultural issues was reflected in the variety of impacts our stakeholders intended to contribute to, from improving animal health and welfare, to better informing consumers and to making farms and veterinary business models less dependent on antimicrobials and therefore more economically sustainable. Second, the implementation of EAIA makes it possible to evaluate the outcomes and expected impacts of the interventions. Finally, the participatory nature of LLs and EAIA allows the creation of context-tailored, comprehensive solutions, ensuring the commitment of stakeholders, and broadening perceptions and discussions on sensitive topics. The associated

drawback is that AMU interventions designed through such participatory processes have limited results in terms of system rethinking and are generally targeted at farmers and veterinarians. Long-lasting, 7 to 10 years, funding would be necessary to reap the benefits of the trust and co-creation built within the LLs and to really progress towards systemic prudent AMU.

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Summary


How Contexts and Desired Impacts Shape Interventions towards Improved Antimicrobial Use in Animal Production

 The objective of this study was to analyse and compare the interventions (sets of actions) towards improved antimicrobial use (AMU) in animal production. These were designed in Living Labs (LLs) organised in five countries of the ROADMAP project, with *ex ante* impact assessment (EAIA) to guide the process. LL participants designed very different types of interventions which targeted systematically farmers and veterinarians but less frequently other stakeholders, despite the ROADMAP ambition to involve the whole value chain in AMU transition scenarios. A variety of factors influenced which interventions were designed, such as the country's AMU levels, existence of AMU monitoring systems, the possibility for veterinarians to profit from antimicrobials sales, export-orientation of the animal production sector and political momentum. Other influential factors included the breadth of desired impacts that the LL participants wished to produce through the interventions they designed (limited to animal health aspects or encompassing other subjects such as animal welfare, consumer information or veterinary business models) and the LL process (choice of participants and facilitators). Overall, the approach succeeded in providing a holistic vision of the possible measures and the obstacles towards improved AMU and produced context-tailored interventions with high acceptability. However, they had limited results in terms of system rethinking.

Comment les contextes et les impacts souhaités façonnent les interventions vers une meilleure utilisation des antimicrobiens dans la production animale

 L'objectif de cette étude était d'analyser et de comparer les interventions (ensembles d'actions) visant à améliorer l'utilisation des antimicrobiens (UAM) dans l'élevage. Elles ont été formulées dans des Living Lab (LL) organisés dans cinq pays du projet ROADMAP, avec une évaluation d'impact *ex ante* (EIEA) pour guider le processus. Les participants ont conçu des interventions de types très différents qui avaient en commun de cibler systématiquement des éleveurs et des vétérinaires et moins souvent d'autres parties prenantes, malgré l'ambition de ROADMAP d'impliquer l'ensemble de la chaîne de valeur dans les scénarios de transition de l'UAM. Une série de facteurs influençait les interventions conçues, tels que les niveaux d'UAM du pays, l'existence de systèmes de surveillance de l'UAM, la possibilité pour les vétérinaires de tirer profit des ventes d'antimicrobiens, l'orientation vers l'exportation du secteur de la production animale et la motivation politique. Parmi les autres facteurs influents, citons la variété des impacts que les participants souhaitaient produire grâce aux interventions conçues (limités aux aspects de santé animale ou englobant d'autres sujets tels que le bien-être animal, l'information des consommateurs ou le modèle économique des cliniques vétérinaires) et le processus du LL (choix des participants et des facilitateurs). En conclusion, cette approche a permis de fournir une vision holistique des leviers et des obstacles à l'amélioration de l'UAM, et de formuler des interventions adaptées au contexte et bénéficiant d'une grande acceptabilité. Cependant, elle a eu des résultats limités en termes de remise en question du système.

Wie Kontext und gewünschte Auswirkungen Interventionen zur Verbesserung des Einsatzes antimikrobieller Mittel in der Tierproduktion formen

 Ziel dieser Studie war es, die Interventionen (Maßnahmenpakete) zur Verbesserung des Einsatzes antimikrobieller Mittel (EAM) in der Tierproduktion zu analysieren und zu vergleichen. Diese wurden in Living Labs (LLs) in fünf Ländern des ROADMAP-Projekts entwickelt, wobei eine Ex-ante-Folgenabschätzung (EAF) den Prozess leitete. Die Teilnehmer der LL entwarfen sehr unterschiedliche Arten von Maßnahmen, die sich systematisch an Landwirte und Tierärzte, aber weniger häufig an andere Interessengruppen richteten, obwohl ROADMAP das Ziel verfolgte, die gesamte Wertschöpfungskette in EAM-Umstellungsszenarien einzubeziehen. Eine Vielzahl von Faktoren beeinflusste die Gestaltung der Maßnahmen, wie z. B. die EAM-Werte des Landes, das Vorhandensein von EAM-Überwachungssystemen, die Möglichkeit für Tierärzte, vom Verkauf antimikrobieller Mittel zu profitieren, die Exportorientierung des Tierproduktionssektors und das politische Momentum. Andere einflussreiche Faktoren waren die Breite der gewünschten Auswirkungen, die die LL-Teilnehmer durch die von ihnen entworfenen Interventionen erzielen wollten (beschränkt auf Tiergesundheitsaspekte oder andere Themen wie Tierschutz, Verbraucherinformation oder tierärztliche Geschäftsmodelle umfassend) und der LL-Prozess (Auswahl der Teilnehmer und Moderatoren). Insgesamt gelang es mit diesem Ansatz, eine ganzheitliche Sicht auf die möglichen Maßnahmen und die Hindernisse für eine verbesserte EM zu vermitteln und kontextbezogene Interventionen mit hoher Akzeptanz zu entwickeln. Sie hatten jedoch nur begrenzte Ergebnisse in Bezug auf ein Umdenken im System.