

ROADMAP

Rethinking of antimicrobial decision-systems in the management of animal production

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Literature review on participatory approaches to AMU reduction in animal agriculture

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About the ROADMAP research project

The overall aim of ROADMAP is to **foster transitions towards prudent use of antimicrobials (AMs) in animal production in different contexts to manage antimicrobial resistance (AMR). Prudent antimicrobial use (AMU) will be achieved by enhancing antimicrobial decision-systems along the food and drug supply chains.** ROADMAP will focus on supporting animal health and welfare through prevention and health promotion actions.

AMR is recognized as a significant threat to global public health and food security. Overuse and improper use of AMs in many parts of the world contribute to the emergence and spread of AMR. Although human and animal health require AMs, it has been estimated that two thirds of the future AMU growth worldwide will be in animal production. Improving the management of AMU in farm animals is therefore a critical component of dealing with AMR and optimizing production in the livestock sector. Nevertheless, the variety of contexts of AMU in the livestock sector is a major challenge to managing AMR. **There is no “one-size-fits-all” solution to improve AMU and strategies must be contextually developed** (for instance, strategies used in the Danish pig industry are difficult to adapt and adopt in the French free-range poultry farming). Successful solutions must be combined and tailored to the production systems and the social and economic context in which they operate.

ROADMAP will meet three general objectives, in line with the EU AMR Action plan: i) **Rethink AM decision-systems and animal health management**; ii) **Develop options for encouraging prudent AMU in animal production**; iii) **Engage all actors in the food and drug supply chains in fostering a more prudent use of AMs.**

Project consortium

Part . N°	Participant organisation name (acronym)	Country
1	Institut National de Recherche pour l'Agriculture, l'Alimentation et l'Environnement (INRAE) **	France
2	Association de coordination technique agricole (ACTA) ***	France
3	Centre de coopération internationale en recherche agronomique pour le développement (CIRAD) **	France
4	University of Liverpool (ULIV) *	United Kingdom
5	Cardiff University (CU) *	United Kingdom
6	James Hutton Institute (HUT) **	United Kingdom
7	Alma Mater Studiorum - Università di Bologna (UNIBO) *	Italy
8	Aarhus Universitet (AU) *	Denmark
9	Eigen Vermogen van het Instituut voor Landbouw en Visserijonderzoek (EV-ILVO) **	Belgium
10	Research Institute of Organic Agriculture (FiBL) **	Switzerland
11	Stichting Wageningen Research (WR) *	Netherlands
12	Swedish University of Agricultural Sciences (SLU) *	Sweden
13	Southern Agriculture and Horticulture Organization (ZLTO) ***	Netherlands
14	European Forum of Farm Animal Breeders (EFFAB) ****	Netherlands
15	Fundacion Empresa Universidad Gallega (FEUGA) ****	Spain
16	Dierengezondheidszorg Vlaanderen (DGZ) ***	Belgium
17	INRAE Transfert (IT) ****	France

* *Universities/veterinary schools*

** *Research institutes specialized in both fundamental and applied agricultural and veterinary sciences*

*** *Public and private advisory services Organisations*

**** *Knowledge transfer and Innovation organisations*

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List of acronyms and abbreviations

Antimicrobials	AM
Antimicrobial reduction	AMR
Antimicrobial usage	AMU
Community-based participatory research	CBPR
Decision support system	DSS
Living Lab	LL
Participatory research	PR
Science and technology studies	STS
Theory of planned behavior	TPB

1 Summary

In Pillar 2 of the ROADMAP project, ROADMAP partners aim to “co-develop participatory approaches in terms of farmer groups (stable schools, focus groups and others) and adjust them to national and local contexts, and different animal species as a strong element of advisory models.” This aim can clearly only be fulfilled through participatory research methodologies, action re-search and multi-actor involvement. Furthermore, Living Labs constitute a vital and important part of the ROADMAP project and are built on participation with a negotiated and mutually agreed aim of reaching a common goal. In light of this aim, and to inspire partners and stakeholders to fulfill this aim, we hereby present a report on current literature as well as known practices regarding participatory research in and approaches to AMU reduction which involves stakeholders and actors, who play a direct or indirect role in AMU in animal farming. This report refers also to D3.1 about participatory research, and builds partly on the same understanding and discussion of the concept of participation, which is introduced in the first section of this report, where key conceptual aspects of participatory methods and research including critiques of participatory methods.

This report opens the exploration of looking at participatory methods to reducing AMU and bring down the risk for AMR through health promotion and alternative disease handling strategies in animals farming in Europe and beyond, with examples of farmer groups.

Furthermore, the report includes a section, which presents the responses of ROADMAP Case Study leaders to an informal survey on participatory methods and projects already being implemented in respective countries specifically toward AMU reduction. This survey is far from covering all relevant initiatives in all sectors, but it points to different approaches on farm levels as well as on more structural and institutional levels. It also points to the fact that initiatives such as Living Labs have not existed in any of the participating countries before, and even being a small survey. It also points to huge and interesting differences between countries.

In the conclusion, we point to some important aspects of participatory approaches to AMU reduction mostly on individual, farm and farmer group levels, and opens up the discussion on future perspectives, where it is important to identify ways in which changes on these levels can foster transitions on more structural and institutional levels.

2 Introduction: how do we understand ‘participatory approaches’?

In research focusing on the use of antimicrobials (AMU; ‘AntiMicrobial Use’) in animal agriculture, we need to acknowledge the many potential influences from many actors in the field as a whole. Although we may focus on the farmer and on-farm decisions regarding the actual use of antimicrobials, including how strategies at national as well as farm levels are spelled out in practice, but we know that the practical everyday decisions and AMU are influenced by many actors in the field.

This ROADMAP deliverable report build on the understanding and reflections on ‘participatory’ and ‘participation’, which we unfolded in D3.1 ‘Report on participatory approaches framework’. When we in this deliverable report focus on participatory approaches to AMU, we boil it down to what is used in animal agriculture, on farm levels, in this present report. This means that we focus on farm owners, managers, employees and farm-related actors as well as their range of different types of advisors including the veterinarian.

We concluded in the D3.1 report that the ROADMAP project builds on multi-stakeholder involvement. Given the many different situations in the participating countries, the project will need to develop multiple versions of ‘optimal mix of stakeholders’ accordingly. Stakeholders need to be involved throughout the project and its different phases, including: planning, implementation and conclusions, and analysing and interpreting the results. D3.1 provided some guiding principles for the ROADMAP research as the consortium and each partner conduct participatory research in action and not just in words. The Living Labs bring stakeholders together and aim to create mutual understanding and trust, which can lead to changes and further transitions, which impact institutions and practices at a more overall level, regarding the common project goal of reducing AMU significantly. The Living Labs can play a major role in not only fostering change among individual and groups of individuals, but point to ways in which institutional and structural transitions can take place (see ROADMAP Deliverable 3.1 for more on this).

The aim of this report is to review different participatory approaches to AMU-reduction in animal production with a special emphasis on approaches which foster change towards more prudent AMU.

3 Participatory approaches to the reduction of antimicrobials in animal agriculture

3.1 Bringing knowledge together to reduce AMU in animal agriculture

A key issue in PR has been the challenges and possibilities of bringing together local and scientific knowledges. In this section, we bring together research on local and scientific knowledge interactions in agriculture-related studies. While some scholars have argued that farmer knowledge is underutilized and underrepresented in technology development, research, and policy decision-making, PR has the potential to address this lack (Šūmane et al 2018). Šūmane et al argue that further attention and utilization of farmer knowledge can potentially foster more resilient and more sustainable agriculture, especially in contrast to the standardization of knowledge practices that do not account for local geo-social contexts (2018). While, as mentioned above, formal and informal knowledges are often treated as opposed, PR methods can potentially draw out the complementarity of diverse knowledges (see Table 1 on the differences and commonalities between informal and formal knowledge).

Šūmane et al (2018), following a review of eleven case studies from the international RETHINK project, concluded that farmers’ knowledge was critical and complementary to more formal knowledge in the development of more sustainable and resilient agricultural practices and technologies. Furthermore, they found that farmers already integrated knowledge from multiple sources so that informal knowledge and knowledge-sharing between farmers and scientists enhanced mutual benefit in RETHINK projects.

	Informal farmers' knowledge	Formal agricultural knowledge	
		Academia	Industry
Source	Farmers' experimentations and practical experiences on the farm	Research stations	Research stations
Ownership and certification	Practitioners, farmers, local community	Scientists	Specialists, scientists
Approach	Holistic	Complexity	Fragmentation, specialisation
Transferability	Locally specific solutions	Standardised and locally specific solutions	Standardised decontextualised solutions
Transmission and access	Exchange with peers, passed through generations	Peer-reviewed articles, conferences, formal education	Formal education, training groups, professional literature

Table 1. Commonalities and differences between informal and formal knowledge (Šūmane et al 2018)

In an effort to expand the conceptual base of participatory development of agricultural decision support systems (DSS), Jakku and Thorburn (2010) draw on work in science and technology studies (STS) and social learning in order to investigate issues of implementation on the part of farmers. In their study, they interviewed farmers, extension agents, and scientists who conducted a participatory project with a DSS called *WaterSense*, a tool aimed at supporting decisions about irrigation practices on sugarcane fields in Australia. Then, they analyzed their data through drawing on the following STS concepts: 1) technological frames 2) interpretative flexibility and 3) boundary objects. Since these concepts may be useful for ROADMAP partners as they conduct participatory research and analyze their data, we will briefly describe how Jakku and Thorburn draw on these contexts in relation to agricultural participatory research.

Technological frames can be understood as the organizational frames that affect how actors approach technologies. Technological frames can include assumptions, expectations, and knowledge as well as

specific understandings of a technology in particular. Jakku and Thorburn (2010) draw out three key dimensions of technological frames that can shape how actors encounter technologies: “(i) the nature of technology, which refers to peoples’ images of the technology and their understanding of its capabilities and functionality; (ii) the technology in use, which refers to people’s understanding of how the technology will be used and the likely or actual conditions and consequences associated with such use” (676; see also Orlikowski and Gash 1994). In ROADMAP, we might interpret “technology” as both antimicrobials themselves and the kinds of strategies or plans that stakeholders co-create in order to address the use of AM on farms in their area. Therefore, it can be useful to consider the kinds of organizational frames that motivate and shape both the use of AM and efforts to reduce their usage.

Technological frames will vary between stakeholders. In other words, there will likely be some congruence (agreement) and some incongruence (disagreement) between ways of approaching technologies among stakeholders in ROADMAP case studies (Orlikowski and Gash 1994). Interpretative flexibility describes how technologies can have different meaning to different actors. Jakku and Thorburn (2010) argue that participatory technology development “involves pursuing (through cycles of negotiation) co-learning that values both local and scientific knowledge [and therefore] that managing interpretative flexibility and searching for increasingly congruent technological frames through re-framing interpretations of the [technology], or the issue it addresses, is a key objective of participatory [technology] development” (677).¹

Boundary objects, the third STS concept that Jakku and Thorburn (2010) use to analyze participatory development of a DSS. Boundary objects is a concept originally developed by STS scholars, Susan Leigh Star and James Griesemer to describe how particular technologies or objects can function as a bridge between differently positioned actors. In other words, they can be used by actors with even very divergent technological frames and worldviews. Boundary objects are flexible enough that different actors can use them in ways that suit their needs “yet robust enough to maintain a common identity across sites” (Star and Griesemer 1989:393). For example, in the case of ROADMAP, plans for AMU reduction may assist farmers in taking practical steps toward AMU reduction while they may provide other benefits to other stakeholders such as scientific outputs for researchers or models for interventions among authorities or private companies.

A major issue that arises in relation to different forms of knowledge and different approaches to knowledge and learning is that farmers are frequently skeptical toward scientific knowledge in general or particular forms of scientific knowledge. The amount of trust that farmers feel in technologies or knowledge greatly impacts their willingness to adopt technologies or practices. In a study on the impact of presentation style for farmer acceptance of scientific knowledge Benard et al (2014) found that farmers were only moderately receptive to scientific knowledge presented in a one-sided symposium style event. Dutch pig farmers felt that the information presented to them by scientists was of little relevance to farm context and was generally “unusable.” However, Benard et al (2014) found that overcoming the potential barriers of what could be referred to as technological frames, was far more successful through one-to-one dialogue between farmers and scientists. The authors concluded that “frequent mutual visits to each other’s praxis and an open mind to learn from each other’s observations and interpretations may help to build shared solutions for the complex problem of animal welfare in pig production” (pg 449).

In addition, farmers’ learning styles and motivations can have a large impact on how they receive information and whether or not they are willing to make a particular change on their farm (de Lauwere et al

¹ We substituted “technology” for “DSS” in order to make the quotation more relevant to ROADMAP partners

2012; Jansen et al 2010; Lam et al 2011). Lam et al (2011) developed a set of types of farmers in relation to how they relate to information and outside influences. Lam et al (2011) suggest that each type of farmer might benefit from receiving information in a different way. De Lauwere et al (2012) nicely summarizes these types and modes of conveying information in the following way: the categories include “proactivists’ who can be reached by making information accessible through internet or newsletters, ‘do-it-yourselfers’ for whom extensive argumentation accompanied with clear cost/benefit information seems the most appropriate, ‘wait-and-seers’ for whom intensive personal contact might be needed because they are reluctant to change in general, and ‘reclusive traditionalists’ for whom farm magazines and mailings seem to be the best way to disseminate information.” ROADMAP partners might benefit from considering how diverse learning styles and differing approaches to information and scientific knowledge will impact participation in their case studies as well as farmer willingness to try out action plans on AMU.

3.2 PR in agriculture – supporting change through participation

The problems of passive-knowledge transfer for instigating change have been frequently noted by scholars even while this persists as a common approach to conveying information (Kumar 2002; Morgans 2019; Pretty 1995). In light of the failure of “one-size-fits-all” methods, many are turning to increased participation in research and policy arenas in order to forge stronger networks and foster possibilities for sustainable change. In this section we address some specific ways that PR can help to foster change and hope that ROADMAP partners will find these insights useful in their own case studies and LLs.

Multi-stakeholder participation can be an important way to address issues of “home blindness” on farms. In a study by Inger Anneberg, Mette Vaarst, and Jan Tind Sørensen (2012), farmers acknowledged their own tendency to “home blindness” and the benefits of discussion with an external person who could point out some of the issues that the farmer had come to ignore. While their study focused on relations between animal welfare inspectors and farmers, similar attention to blind spots might accrue from discussion between farmers and external stakeholders.

Increased awareness of legislative change and alternate perspectives is another potential benefit of multi-stakeholder participation (Cargo and Mercer 2008). As Lomillini-Dereclenne et al (2017) show, based on a study of animal welfare inspection, which is certainly a top-down measure, even discussion in this context can raise awareness among farmers, which in turn can support (limited) change. In a literature review of literature on change and farmer behavior in relation to inspection, Overstreet and Anneberg (2019) found that even in a top-down context, dialogue and discussion could significantly improve the potential for change on farms. PR, which is founded in participation and based on supporting dialogue and bottom-up initiatives therefore is even better positioned to instigate change.

Another barrier to change that PR can potentially address involves industry-level production practices. Several scholars have pointed to the pressures on farmers that make it difficult for farmers to adopt alternative production practices. Contracts between farmers and processors or retail farmers, in particular, can act as barriers to change (Andrade and Anneberg 2014; Flynn et al 2003, and Hendrickson et al 2001). Multi-stakeholder PR may enable new kinds of negotiations and initiatives that will open up alternative production relations.

Additional pressures on farmers include a number of social, economic, cultural, familial, and geopolitical pressures that can make change difficult. Many farmers live in areas experiencing rural decline and farmers are notorious for being caught in a “squeeze” between rising input costs and low prices for their goods. In addition, farmers may have difficulties managing workers, finding workers, or training workers. Many farmers also suffer from depression, age-related difficulties, social isolation, addiction,

and overwork (Andrade and Anneberg 2014; Devitt et al 2014). Furthermore, farmers may distrust authorities and formal knowledge and may feel a sense of loss of control over decision-making. In light of the myriad external (and internal) pressures that farmers are under, significant change is unlikely without attending to the structural level of pressures that have undergirded the development of agriculture in its current state (Burton et al 2012; Overstreet and Anneberg 2019; Morgans 2019).

Burton et al (2012) and Lisa Morgans (2019) argue that there has been perhaps too much focus on changing farmers' attitudes rather than attending to the structural aspects of agriculture (see also Lam et al 2011; Swinkels et al 2015). Burton et al 2012 propose that rather than focusing on attitudes, a wider cultural change is necessary. Rather than an individualizing "industrial ethos" (Fitzgerald 2008), a move toward "cowshed cultures" that involves addressing issues of infrastructure and research, human-animal interactions and dynamics on farms, and more robust agricultural communities could better address the structural-level pressures of farming.

Even while change depends on attending to societal and structural-level pressures and issues, numerous scholars have examined the dynamics of farmers' attitudes and behavior in relation to changed. Drawing on psycho-social theories such as the widely used Theory of Planned Behavior (TPB), scholars have shown that willingness to change is closely tied to perceptions of outcomes, assessment of respected peers' or advisors' attitude toward that change, and confidence in one's ability to manage a specific change (see for example Jansen et al 2010; de Lauwere et al 2012; Peden et al 2019). Participatory research that integrates dialogue between farmers who have implemented change in relation to AMU and those who are considering changes can potentially foster change through building networks for knowledge exchange and mutual-assistance. In other words, when farmers who are considering changes in AMU see reduced AMU in practice, they may be more inclined to change based on increased confidence and support for changing practices (see also Morgans 2019; Vaarst and Sørensen 2009).

3.3 Participatory approaches to AMU reduction

This section will describe some approaches to participatory methods in efforts to reduce AMU on farms, involving groups of farmers. In particular, we have focused on approaches, which have involved researchers and research projects, and this section includes a discussion of stable schools in Denmark, Farmer Action Groups in the UK, and field labs in the UK.

3.3.1 Stable Schools in Denmark

The Stable School concept was developed in 2004-2005 by a group of active organic dairy farmers from the Danish private organic dairy company 'These' took the initiative together with the organisation 'Organic Denmark', and researchers from the former Danish Institute of Agricultural Sciences (now part of Aarhus University). This group initiated a project with the aim to phase out the use of antimicrobial drugs ('antibiotics') from organic dairy herds. The main focus of the project was to eliminate the need for disease treatment through minimising the disease level in the herds. The main approach was to design individual farm and herd strategies through a participatory process using farmer groups for mutual advice and common learning, a 'farmer-advising-farmer-approach'. In practice, groups were formed of farmers from 5-8 farms involved in each Stable School Group (one or more participants per farm), who met monthly. The host farmer had formed an agenda with two problem areas and one success case and the facilitator guided a process where all farmers in a systematic way gave suggestions. The host farmer(s) concluded and committed him- or herself / themselves to certain changes and/or further investigations in possibilities for improvements (Vaarst, 2007; Vaarst et al., 2007).

The team of researchers and farmers and the facilitators identified the following points to be critical for having fostered lasting change on the farms, in the farmer groups and at dairy company level:

- 1) Starting point in everybody's own farm reality and being concrete,
- 2) Ownership – over the process, the agenda and the conclusion: the host farmer concludes and commits him/herself to work with the decisions,
- 3) Farmers help each other to plan and implement
- 4) All discussions build on an understanding of each farm and each farmer family's / team's own priorities, and not a general assumption that farmers give priority to the same things,
- 5) Each group develop in accordance with their needs and do not move further than everybody is ready to,
- 6) Mutual trust and equity: all try to be in 'the hot chair' and all try to be the respectful advisors.

Since the establishment of the first Danish stable schools, the concept was tried out in different countries as described e.g. by Ivmeyer et al. (2015), who collects experience on Stable Schools from Norway, UK, Austria, Switzerland and Germany.

Among others, the CORE Organic project ANIPLAN (2007-2010) worked with Stable Schools among other participatory advisory systems to minimize antibiotics among organic dairy farmers. Across different types of advisory approaches, the international research team identified 9 key characteristics, which were important for successful implementation of AMU reducing practices on farms, see Table 2.

In 2010, in Denmark, the Stable School approach became a part of the so-called 'obligatory animal health advisory service', where farmers could choose to be members of a Stable School instead of regular health advisory service visits by a veterinary. The Stable Schools were generally found useful and relevant for many organic farmers, also as a part of legislation (Vaarst & Fisker 2013). However, some challenges appeared, which clearly demonstrated that a successful Stable School should be built on farmers, who are motivated to take ownership and drive a development on their farm. It is a highly dynamic process of change and development, and not an 'ensuring-status-quo' approach, which otherwise could be seen as satisfactory according to the legislation. It was concluded that the risk of involving non-motivated farmers increased, when the approach was part of legislation, especially if alternatives to Stable Schools are less attractive, e.g. some farmers found that veterinarians lacked skills and interest in organic dairy production. Social bonds and identification of common interests within a group made some farmers favor this approach, but it was also questioned whether continuous group participation under these conditions can continuously bring farmers new inputs.

A key to successful farmer groups and ownership over own development was the facilitation of farmer groups by a skilled facilitator, who actively supports the process of development in the group of farms and among the farmers.

The following eight key principles of animal health and welfare planning were identified:

1. A health planning process should aim at continuous development and improvement, and should incorporate health promotion and disease handling, based on a strategy including:
 - a. Measures of current status and risks using animal-based and resource-based parameters;
 - b. An evaluation of the process;
 - c. Identified of actions; and
 - d. A process of review.
2. A health plan should be farm specific;
3. There should be a strong element of farmer ownership (and ‘farmer’ includes the whole team working on the farm);
4. External person(s) should be involved in drawing up the plan (could be advisors or fellow farmers);
5. External knowledge should be used, where appropriate, to inform the plan;
6. Organic principles should provide a framework and should recognise and incorporate a farming systems approach;
7. The plan should be written; and
8. The health plan should acknowledge good aspects. That is, also follow up on the success stories and learn from them for the future planning.

Table 2. Eight key principles for successful animal health planning towards reduction or phasing out of AMU, identified for organic dairy herds in the CORE Organic project ANIPLAN.

3.3.2 Farmer Action Groups in the UK

In a recent study conducted in the southwest of England, researchers, led by Lisa Morgans, used participatory methods aimed at AMU reduction among dairy farmers (Morgans et al 2018; Morgans 2019). Morgans recruited 30 dairy farmers who participated in Farmer Action Groups (FAGs). Each FAG included 5-8 dairy farmers who met on different host farms every 6 weeks (approximately). For each participating farm, the FAG included two phases of visits. During the first, the farmer introduced other farmers, the facilitator, and the lead researcher to their farm. Over the course of the first visit (Phase 1) the FAG co-created an Action Plan, or a set of concrete steps toward lower AMU. Phase 2 would take place six to twelve months later and involved a discussion of the points from the Action Plan and any changes on the farm.

According to Morgans et al (2018), the cumulative work of these FAGs resulted in 30 Action Plans and 300 possible ways to reduce AMU on farm that “cover a range of topics from altering ventilation in cubicle sheds to improvements in managing colostrum for calves” (10). Morgans et al (2018) estimated that at least half of these actions had either been implemented or attempted and more were planned for in the future. Further, farmers were generally enthusiastic about the peer-based Action Plans and the opportunity for knowledge sharing with other farmers. As Morgans et al described it, “farmer participants have reported a multitude of changes on their farms because of listening to their peers in the groups and seeing other participant’s farms. One farmer participant vaccinates more of their young stock since discussing respiratory disease with their FAG, which they see as having a direct impact on their antibiotic usage. Another farmer acted on suggestions from their FAG to adapt the dry cow housing so dry cows would spend more time laying” (2018:10).

Morgans et al 2018 describe some challenges that are common to participatory methods-based projects. Recruitment, for example, presented some challenges in that farmers were often hesitant to commit to the proposed monthly FAG meetings (therefore the timeline was changed to meetings every six to eight

weeks). Time constraints should also be considered by ROADMAP partners and can be addressed early on with possible farmer and other stakeholder participants to find a time commitment that all parties consider reasonable and realistic (see also Conroy et al 2005 on time constraints for livestock farmers in participation research).

A second recruitment barrier encountered by Morgans et al 2018 involved skepticism on the part of veterinarians. Veterinarians, originally expected to be the best means to recruit farmers, turned out to be highly concerned about the “risk of poor practice and misinformation being propagated between farmers” (2018:9), a concern that farmers in the study did not share. One way that Morgans et al 2018 suggest addressing this kind of concern, is by including a veterinarian in the FAG. Lisa Morgans is a veterinarian and so was able to add to (but not direct) the discussion in the FAGs, particularly on technical questions related to specific antimicrobials.

On the whole, this study is described by Morgans et al as successful. In particular, based on feedback they describe farmers as having “gained confidence from seeing and hearing from other like-minded farmers about making changes to improve herd health...They became confident in trialing new treatment protocols and initiating conversations with their vets about antimicrobial products used on their farm. Farmer participants felt empowered and encouraged by the peer-to-peer learning environment. The social support gained from discussions with other people in a similar situation going through similar issues appeared to be pivotal in fostering an attitude change.”

This study offers a number of take-aways that are crucial for ROADMAP partners. In particular, Morgans et al 2018 emphasize the importance of a skilled and experienced facilitator in the process. The facilitator on this project had 10 years of experience in agriculture in the UK and was working already in facilitation processes with dairy farmers. The facilitator participated in recruitment and played a key role in the development of Action Plans. In addition, Morgan et al 2018 described the importance of incorporating quantitative data into discussions about antimicrobials to help FAGs use concrete numbers and information in their development of an Action Plan. For example, “the researcher and facilitator used the data from the medicine review to frame questions to the group and host farmer to stimulate discussion around AMU” (2018:12). Another crucial aspect of Morgans et al’s study is that they worked with farmers to develop indicators of success. Further, Morgans et al 2018 describe the importance of establishing trust between all involved parties through commitment, follow up, and constructive discussion.

3.3.3 Field Labs in the UK

In a report on the Sustainable Organic and Low Input Dairying (SOLID) project from the UK, researchers describe using Field Labs, which are modeled on stable schools. The project examines the possibilities and practices of using mint oil cream to prevent mastitis incidences. By using mint oil, farmers and researchers hope to thereby reduce the use of antibiotics to treat mastitis. According to Zaralis 2015, “the farmers involved were keen to improve the health of dairy cows with the aim of cutting down on antibiotic use, with benefits for animal welfare and farm profitability as well as contributing to efforts to preserve antibiotics for life or death situations” (2015:4). During quarterly farm visits at different farms, farmers shared their experiences with commercial mint oil cream. Holding the meetings at different farms gave the “opportunity to the host farmer to share current issues, problems and production data and benefit from other farmers’ feedback on cow health, herd management and mastitis treatment” (2015:4).

4 Participatory approaches to AMU reduction in ROADMAP countries, according to Case Study Leaders

In addition to reviewing literature on different possibilities for participatory approaches to AMU reduction, the author team also decided to include a small inquiry on already existing participatory approaches to AMU reduction in the ROADMAP member countries. The motivation for this was to inform the coming steps to form Living Labs even better and in more context relevant ways in the ROADMAP project.

4.1 Material and methods

In 2019, ROADMAP case study leaders answered a questionnaire on participatory approaches in countries where case studies will take place as part of the ROADMAP project. In addition to questions on case leaders' plans to include Living Labs in their case studies, the questionnaire included a question on existing participatory approaches in partners' respective countries (see Annex 1). The question was stated as:

“Which participatory methods (advisory services & models, farmer groups, vet-groups, other ‘on-the-ground-actor-networks’ etc) are currently in use in your country and sector, which can be considered good platforms for reducing AMU? Please provide links & references if possible – and also in your own language.”

4.2 Results

4.2.1 Denmark

Danish Crown, the largest pig processing company in Denmark, offers (a restricted number of) farmers the opportunity to participate in a concept called “OUA” (Opdrættet uden AB – Raised without antibiotics) where they are given a higher prize for pigs, that they can guarantee have never in their lifetime been treated with AB. The farmers producing in this concept are (from time to time) gathered by Danish Crown for exchange of information. The veterinary consultancy group Svinenet works in many of these herds and may have participatory farmer group arrangements.

SEGES Pig Research Centre hosts meetings three times a year involving all (seven) large pig veterinary groups on the subject “Phasing out zinc and maintaining a low use of antibiotics.”

SEGES Pig Research Centre hosts meetings twice a year involving the feed industry, the pharmaceutical companies, the Danish Veterinary and Food Administration (Fødevarestyrelsen) and the Danish Medicines Agency (Lægemiddelstyrelsen) on the subject “Phasing out zinc and maintaining a low use of antibiotics.”

Clearly, the Stable School approach has been an approach, as described above, which was owned by the participants and had a clear focus on phasing out antibiotics, or at least reducing it significantly. It started on initiative from organic dairy producers, and was established in many other fields. From 2010, the Stable School approach was included in the so-called obligatory animal health advisory service agreement for organic farmers, which took a bit of dynamics out of the approach (‘obligatory participation’).

Some group advisory approaches involved interdisciplinary teams around (especially organic) dairy herds and worked with the farmers to reduce antibiotics, based on agendas made by the farmers. They were not formalized but part of research and development projects, and were then implemented in the above mentioned ‘obligatory animal health advisory service’ for organic farmers.

4.2.2 Italy

In Italy, big companies incorporate AMU reduction as part of their marketing strategies. To this end, these companies organize meetings between concerned actors such as veterinarians, animal feeding and zoo-technic experts, firm representatives, and producers.

In addition, Italy has instituted a national plan to reduce AMU. In 2018, the region of Emilia-Romagna set up a permanent expert working group involving all the relevant stakeholders of the livestock industry to discuss and support the implementation of the evolving legislation on AMR and veterinary AMU.

4.2.3 Mozambique

In Mozambique multiple stakeholders and experts participate in regular meetings aimed at the co-construction of best practices guidelines. Participants at these meetings include representatives of the Ministry of Agriculture, the Association of Mozambican veterinarians, the pharmaceutical industry, the Poultry Farmers Association of Maputo, and the Consumer Association of Mozambique.

4.2.4 Sweden

In their response, Sweden's case study leader mentioned "veterinary association guidelines" under our question on existing participatory methods aimed at reducing AMU. The guidelines provided by the Swedish Veterinary Association are developed by the Association's sections for large animal practitioners, small animal practitioners and equine practitioners. They are a result of expert consultations and discussions between practitioners to agree on "best practices" and subsequently referred to (on a voluntary basis) by Swedish veterinarians in their daily practice. Hence, they are not top-down instructions but something that is developed by the veterinary profession, for the veterinary profession, thus created through a participatory approach. In addition, they mentioned a veterinary network for antimicrobial stewardship as well as SvarmPat, an industry-led surveillance program.

4.2.5 Switzerland

The Swiss Calf Health Service (KGD) provides advisory services to cattle farmers, who are keeping young cattle. In cooperation with the Swiss Organic Farmers Association (Bio Suisse and FiBL) they recently launched a pilot project where up to 140 farms (keeping young cattle for organic beef or veal production) will be visited by a veterinarian to assess antimicrobial consumption as well as the living conditions (including feeding, housing, health management) and will provide advice.

A project called ProVieh, with FiBL and Bio Suisse involvement, organized working groups with farmers that exchange experience and visit each other (inspired by but slightly different from the concept of farmer stable schools) and by external input from experts. ProVieh is rather cattle-oriented so far, but has potential for pig farmers as well.

4.2.6 The Netherlands

In the Netherlands there are working groups/networks on reducing AMU in turkey and pig production. WAAK, the working group on AMU reduction in turkey production involves veterinarians and feed suppliers.

In the pig sector, case study leaders mention the research project ABRES-vet-med and the ABRES research program, which was commissioned by the Ministry of Agriculture, Nature and Food quality (EL&I). ABRES includes a working group/network as well as two projects aimed at coaching entrepreneurs in the pig sector.

4.2.7 The UK

Case study leaders from the UK mentioned supermarket-led schemes and monitor farms as two participatory strategies aimed at AMU reduction. Supermarket-led schemes provide information and create guidelines for farmers. These schemes also include farmer groups where information on best practices are shared.

Monitor farms involves networks of farms which provide demonstrations of best practices and opportunities for knowledge exchange.

4.2.8 France

In France, the strategy on AMU has been focused on non-coercitive measures. The program Ecoantibio was elaborated jointly by government, veterinary professional organisations, livestock sectors, pharmaceutical industry trades, among others.

In France, consultation takes place within inter-professional organisations (recognized by the European Union in 2013) which gather the different stakeholders in a sector. They organise the production of shared economic information, the management of quality issues and the representation of the sector. They also participate in the coordination and mediation within the sector. They have drafted the progress plans for the sectors following the Egalim law in 2018; chapters on reducing the use of antibiotics in livestock have been included.

As far as veterinarians are concerned, the two main networks of veterinarians involved in pig and poultry sectors (Réseau Cristal and Chêne vert conseil) carried a participative process in 2018. The invited stakeholders included farmers, producers' organisations, retailers, feed manufacturers, slaughterhouses, processors, breeders, scientific experts. They designed measures such as a monitoring observatory or contracts between vets and farmers including welfare issue and training (see document).

Already existing farmers and farmers' groups and networks did include AMU issues within their topics. It is useful to especially mention economic and environmental interest groups (GIEE), who are committed into participative transition and which can be funded for research projects, among which some on AMU.

Collaborative research projects have been funded thank to programs and institutions devoted to ppp which have included AMU issue to their topics, such as Institut Carnot AgriFood Transition (see for instance Sevrobust project on pig microbiot including INRAE and a cooperative) or INRAE PSDR Program (see for instance project SANT'Innov on prudent AMU use within the beef cattle value chain including INRAE, technical institutes and a cooperative).

Networking about prudent AMU to foster science fronts has been made possible for 4 years within the R2A2 network funded by INRAE (leader : Christian Ducrot). The participants included academics but also, among others, stakeholders from livestock sector, pharmaceutical industry, and government.

4.3 Summarizing comments

The situation regarding participatory approaches to AMU reduction in the ROADMAP countries vary hugely, as does the approach for example to veterinary services and roles of different stakeholders.

Exploring already existing participatory approaches to AMU reduction revealed that apparently, Living Labs had not been introduced with this purpose in any of the participating countries.

The widely different situation in the different participating countries highlight the necessity of finding solutions and approaches which match the special context with its challenges and advantages, in each country.

Exploring the range of approaches and ways of handling the challenges regarding AMR and fostering prudent use of AMU gives a good in-depth insight, and a wide and relevant background for learning for the future implementation of strategies, to ensure their sustainability and appropriateness.

5 Conclusion and future perspectives on participatory approaches to AMU reduction in animal production

In this report, we set out to explore how participatory approaches to AMU reduction in animal agriculture were formed, and we had a special focus on farmer groups. We viewed it through the lenses of more broad literature examining how the concept of ‘participation’ had been used in different ways and contexts, and with a particular focus on ‘participatory research approaches’. When it comes to development of strategies on farm level, critical views and critiques of participatory methods emphasized the need to ensure how the ownership over any development is shared and mutually agreed among the participants. This is particularly important when a project like ROADMAP builds on ‘participatory methods and approaches’.

Based on literature on farmer group approaches, it was highlighted that if they should lead to lasting change on farm level and possibly on group or sector levels, the approach should always take its starting point in everybody’s own farm reality, and ownership over the process from start to conclusion should be shared among participants. Each group of farmers should be free to develop in accordance with their needs and contextual relevance, and should not move faster or further than everybody is ready to. Literature and practice experience points to the fact that mutual trust and equity in a community which sets out to change, is paramount, and should comprise common identification of problems, successes, actions and common interpretation and analysis of the results.

Key conceptual aspects of participatory methods and research included also critical views and critiques of participatory methods, including a critical view on the use of the term ‘participation’. This includes some risks, where the view on ‘participation’ is viewed in imbalanced ways, e.g. where the academic community within a participatory research and development project dominates the views and decisions, and where there can be a risk of instrumentalising participatory devices. The balance between involvement, responsibility, power and control over the processes need to be agreed on, as a multi-stakeholder approach is taken in ROADMAP, where the processes enable social learning between the participants. If focusing solely on ‘behavioural change’, it should always be questioned whose behaviour should be changed, and the focus should be broadened from individual, farm level and farmer group level change, to transitions at the levels of governance, institutions and frameworks around animal agriculture. These points must be considered having a significant potential in the Living Labs, where ‘the optimal mix of stakeholders are brought together’, and where the facilitation needs to create mutual understanding and trust, which can lead to changes and further transitions which impact institutions and practices at a more overall level, regarding the common project goal of reducing AMU significantly.

The conclusion of a small questionnaire inquiry among CS leaders in the ROADMAP project revealed that the situation regarding participatory approaches to AMU reduction in the ROADMAP countries vary hugely, as does the approach for example to veterinary services and roles of different stakeholders. Furthermore, among already existing participatory approaches to AMU reduction it seemed that Living Labs had not been introduced with this purpose in any of the participating countries.

The widely different situation in the different participating countries highlight the necessity of finding solutions and approaches which match the special context with its challenges and advantages, in each country. Exploring the range of approaches and ways of handling the challenges regarding AMR and fostering prudent use of AMU gives a good in-depth insight, and a wide and relevant background for learning for the future implementation of strategies, to ensure their sustainability and appropriateness.

Since capacity, empowerment and ownership by all participants are concluded to be important outcomes of participatory research projects, the emphasis on multi-stakeholder communities, which could support further steps towards institutional change and interdisciplinary initiatives to innovation of technical as well as social, cultural, economic and other types, could support and foster more large-scale transitions.

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7 Annex: Copy of the question to CS leaders

Pillar 2 in progress – this is what we need to know from case study leaders

Introduction

In Pillar 2, we work with applying participatory methods to reduce AMU, and with setting up Living Labs. We are working on the guidelines and a review of methodologies. To focus these milestones and deliverables and target direct them to our needs in ROADMAP, we need to have your preliminary thoughts, ideas and plans. We do not consider your answers to the questions below as 'fixed', and we will have a workshop at the meeting in February to discuss across cases.



The purpose of this questionnaire below ...

... is to get information from the case study leaders for input in WP 3 and 4. This information will inspire, inform and help us in our reviews on strategies and participatory approaches to reduce AMU, and to formulate the robust guidelines to Living Labs. In WP3, we will set up Living Labs in collaboration with WP4 and use results from and interacting with Pillar 1. In WP4, we currently research strategies to reduce AMU among partners. Later, we will develop recommendations to improve and/or develop socio- economic or technical strategies to reduce AMU in different supply chains and production systems, based on the outcomes of the Living Labs.

Please fill in the questions below as soon as it is possible for you, and at the latest on the 22nd November 2019 15 o'clock.

Your case:	<p><i>Country & CS number:</i></p> <p><i>Animal(s) in focus:</i></p> <p><i>Contact person:</i></p>
Our question	<p><u>Strategies to reduce AMU across Europe and beyond</u> <i>In Task 4.2, we will collect information about different strategies to reduce AMU from partners in ROADMAP. Which overall strategies to reduce AMU are used in the sector and country, where your case study is carried out?</i></p>
Your answer	
Our question	<p><u>Participatory approaches to reduce AMU in your setting</u> <i>Which participatory methods (advisory services & models, farmer groups, vet-groups, other 'on-the-ground-actor-networks' etc.) are currently in use in your country and sector, which can be considered good platforms for reducing AMU? Please provide links & references if possible – and also in your own language.</i></p>
Your answer	