NUTRI•KNOW

Matchmaking of OG outcomes with market and policy

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Deliverable 2.1

UGent, WE&B

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Summary

There is an overarching challenge of effectively translating knowledge generated from EU-funded projects into practical applications within the EU agricultural sector. Despite significant advancements in agricultural practices, technologies, and product recommendations, there exists a notable gap in the adoption of this knowledge by practitioners. The EU-funded project NUTRI-KNOW aims to bridge this gap by (i) fostering the knowledge exchange on innovative solutions developed through EIP-AGRI Operational Groups (OG) aiming the most urgent needs, challenges and opportunities of farmers; (ii) building trust and establishing connections between main stakeholders for optimised implementation considering territorial specifications.

Under the frame of NUTRI-KNOW Work Package (WP) 2 *Co-creation process to align EIP-AGRI OGs outcomes with stakeholders' challenges and needs*, Task 2.1 specifically focuses on aligning the OG results with the current market and policy, providing a thorough analysis of the challenges related to standardization, policy collisions, emerging trends, and the needs of new legislation. To this end, Task 2.1 employed a comprehensive methodology including key stakeholder consultation questionnaires and interviews to engage stakeholders from different value chain steps in identifying and addressing the barriers hindering the incorporation of innovative practices into real-world agricultural activities. Results from the consultation processes are analysed to form an initial matrix of legislation, market needs and outputs and later on integrated in the meta-database (Task 1.4). As the main outcome of Task 2.1, the deliverable (D) 2.1 contains a matchmaking of OG outcomes with market and policy, highlighting the multifaceted challenges hindering knowledge uptake, such as a lack of awareness, accessibility issues, and resistance to change among practitioners. This will provide a solid base from which to start working on the exploitation of these results further in Task 3.1 *Treatment, homogenisation and translation of knowledge* and Task 4.6 *Policy recommendations*.

Deliverable 2.1 is structured into four chapters: Chapter 1 sets the stage by articulating the broader challenges in translating knowledge into practice; Chapter 2 introduces the consultation approach employed in this task, including key stakeholder consultation questionnaires and focus group interviews; results of the consultation process are presented in Chapter 3, detailing key findings from the consultation processes and providing a comprehensive analysis of market and legislative challenges and needs for implementing OG outcomes. Finally, Chapter 4 concludes the main findings and offers insightful recommendations based on the identified challenges, contributing to the project's overarching goal of fostering a more sustainable, productive, and resilient agricultural sector.

Disclaimer

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Table of Abbreviations

AD	Anaerobic Digestion
BE	Belgium
CSO	Civil Society Organisation
D	Deliverable
DK	Denmark
EIP-AGRI	European Innovation Partnership for Agricultural Productivity and Sustainability
ENG	English
ES	Spain
EU	European Union
IE	Ireland
IT	Italy
OG	Operational Group
WP	Work Package

1. Introduction

Effective nutrient management stands as a critical component of the agricultural sector's drive toward sustainability, making it imperative to enhance the knowledge transfer of such practices to ensure their widespread adoption and optimisation. Despite the continuous flow of information from several European Union (EU) funded projects (e.g. NUTRIMAN, Nutri2Cycle, ReNu2Farm, FertiManure, FertiCycle, etc.), a significant gap remains between the generation of knowledge and its practical application in the agricultural sector. Challenges impeding the transfer of knowledge to practitioners include a lack of awareness, accessibility issues such as language and technical complexity, and resistance to changing established practices. The European Innovation Partnership for Agricultural Productivity and Sustainability (EIP-AGRI) seeks to bridge this gap through the Operational Group[1] (OGs), aiming to promote innovation by fostering collaboration among a diverse set of stakeholders. Nevertheless, the uptake of new or improved management practices is lagging, underscoring the need for improved knowledge transfer mechanisms that cater to the real-world needs of practitioners. Enhancing collaboration and aligning research with on-the-ground challenges is essential for driving the sector towards greater sustainability and resilience.

To this end, the EU-funded NUTRI-KNOW project aims to broaden EIP-AGRI OGs outcomes across borders to modernise and dynamise the agri-food sector by collecting, translating and sharing easy-to-understand and practice-oriented knowledge. A meta-database is created for the OG outcomes, legislation, market needs and outputs obtained from 12 OGs from 4 EU member states (Spain, Italy, Belgium, and Ireland), aiming to support the appropriate adoption of the OG results and experience by relevant end-users. Thereby, NUTRI-KNOW will contribute to fostering and sharing knowledge and innovation and targeting the most urgent needs, challenges and opportunities of farmers but also, building trust and establishing connections between main stakeholders, intensifying thematic cooperation, co-creation and transposition of innovative solutions, considering territorial specifications.

Work Package (WP) 2 aims to explore how the engaged OGs are aligned with current EU policies (top-down approach) and the challenges and needs of the farmers and the sector (bottom-up approach). This WP will analyse the connections among actors involved in the OGs and relevant stakeholders/networks in the field of nutrient management, as well as the work already done in this field to avoid duplications. The specific objectives are: (i) Detect the alignment of OGs results with current market and legislative situation; (ii) Identify the target-audience and the urgent needs, challenges and opportunities of the sector; (iii) Adapt the knowledge gathered to the current territorial needs by developing a thematic analysis methodology; and (iv) Avoid duplication with ongoing or completed projects and networks.

More specifically, Task 2.1 focuses on the alignment of the OG outcomes to the current challenges and needs regarding market and policy at EU level. This deliverable (D2.1) introduced a bottom-up approach including the questionnaire and interview consultation processes with aims to identify the barriers and challenges in market and policy. Results from the consultation processes are analysed to form an initial matrix of legislation, market needs and outputs and later on integrated in the meta-database (Task 1.4). This will provide a solid base from which to start working on the exploitation of these results further in Task 3.1. Results from this deliverable will be put together in a general policy brief within Task 4.6.

[1] Since October 2022, the EIP-AGRI Network has become part of the EU Common Agricultural Policy (CAP) Network, new and up-to-date information will be available on the EU CAP Network website (https://eu-cap-network.ec.europa.eu/index_en) while the EIP-AGRI platform (https://ec.europa.eu/eip/agriculture/en.1.html) will remain available in a static form as a reference of all previous EIP-AGRI activities without further updates.

2. Methodology

The main outcomes of the 12 engaged OGs have been identified and analysed in WP1 with the delivery of D1.1 *Inventory and analyses of selected OGs outcomes on nutrient management,* D1.2 *Inventory of current farming practices on nutrient management* and D1.3 *Results of the cost-benefit and sustainability analysis.* Table 1 (also presented in Annex 2 the stakeholder consultation protocol) further summarises the OG outcomes in four categories (Product - P, Recommendation - R, Technology - TH, and Tool - TL), along six value chain steps (Livestock Farming, Storage Systems, Fertiliser Production, Processing Technologies, Transport, and Application).

Table 1 *– Summary of outcomes of the 12 engaged OGs in NUTRI-KNOW project.*

No. OGs	Full name of the engaged OGs	Region, country	Value chain steps	Outcomes categories
OG1	Development of a slurry concentrator with continuous total nitrogen data collection	Catalonia, Spain	Processing technologies	1TH_concentrator
OG2	Development of tools for optimising the joint management of livestock manure and the improvement of agricultural fertilisation, crop quality and environmental protection	Catalonia, Spain	Storage; Processing technologies; Transport; Application	2TL_conductivitymeters 2TL_computerApp 2TL_economicreduction 2R_agrimanagement
OG3	FERTICOOP-GO Innovations to adapt to the best available techniques (BAT) in the Catalan cooperative agricultural sector	Catalonia, Spain	Livestock farming; Storage; Processing technologies; Application	3R_BAT 3TL_rapidtesting
OG4	Livestock manure and digestates treatment to reduce emissions and produce Struvite	Emilia-Romagna, Italy	Storage; Processing technologies; Application	4TH_manuretreatment 4P_struvite
OG5	SOS-AQUAE Sustainable farming techniques and renewable fertilizers to combine agriculture, water and environment	Emilia-Romagna, Italy	Processing technologies Application	5R_agrofarming techniques 5R_drip line sub fertigation system 5TH_digestatemicrofiltration
OG6	Gas Loop - Emissions capture for a virtuous nitrogen cycle in pig livestock	Emilia-Romagna, Italy	Processing technologies Fertiliser production Livestock farming	6TH_airwashing 6P_ammoniumsulphate 6R_BAT ammonia emission reduction
OG7	RENURE - recovered nitrogen from manure	Flanders, Belgium	Fertiliser production; Application	7P_AmmoniumSalts 7R_evaluation

No. OGs	Full name of the engaged OGs	Region, country	Value chain steps	Outcomes categories
OG8	POCKETBOER 2 - More performant operation of pocket digesters	Flanders, Belgium	Processing technologies	8R_pocketdigesters
OG9	Grass2Algae - From grass juices to the cultivation of microalgae	Flanders, Belgium	Processing technologies	9P_grassjuice
OG10	Biorefinery Glas - Small-scale Farmer-led Green Biorefineries	South West, Ireland	Processing technologies	10TH_mobilegrass
				10P_presscake
				10P_monogastrics
				10P_prebioticsugars
				10P_recoveredfertilisers
OG11	MOPS - Maximizing Organic Production Systems Through integrated cropping systems	Various, Ireland	Application	11R_organiccropping
				11TL_greenmanures
OG12	Duncannon Blue Flag Farming & Communities Scheme	South East, Ireland	Livestock farming; Application	12TL_PPZmaps
				12R_waterquality
				12TL_rewardscheme

It is recognised that efforts are still needed for more efficient knowledge exchange with targeting practitioners, including (1) identifying the relevant stakeholders based on the outcome categories and involved value chain steps, which is the main objective of Task 2.2 Mapping stakeholders that are relevant for the implementation and dissemination of EIP-AGRI OGs outcomes; and (2) collecting the opinion from stakeholders on the OG outcomes and how the OGs help with their activities at different value chain steps, as highlighted in Task 2.1 Alignment of results to EIP-AGRI/AKIS, market and policy.

Considering the aligned objectives, the shared stakeholder group, and the concurrent timelines for completion in Month 15 for both Task 2.1 and Task 2.2, a bottom-up approach was crafted and applied to both tasks, effectively meeting the intended goals without inundating stakeholders with excessive information from NUTRI-KNOW project. The approach consists of a two-step consultation process: firstly, a questionnaire is designed and circulated to address the opinions of the key stakeholders in five partner countries (including Spain, Belgium, Italy, Ireland, Denmark); after which, an interview is conducted to specifically exchange opinions with the key stakeholders who are highlighted in the implementation of the OG outcomes but have not yet participated in the questionnaire. The overall approach is presented in Figure 1.

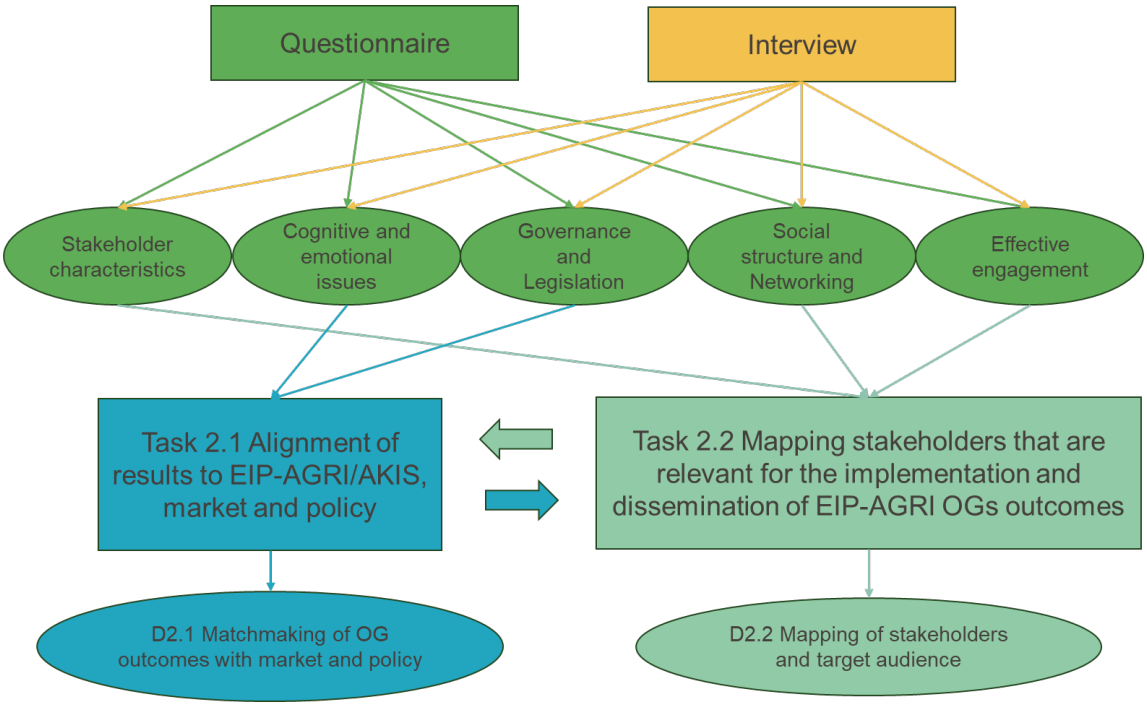

Figure 1 *Overall approach for the consultation and data collection in D2.1 and D2.2*

From both the consultation questionnaire and the focus group interview approaches, data is collected and analysed based on five dimensions. The results are fed to this deliverable (D2.1 *Matchmaking of OG outcomes with market and policy*) and/or D2.2 *Mapping of stakeholders and target audience*:

1) **Socioeconomic context and stakeholder characteristics** - Key attributes of the stakeholders representing key organisations with regards to individuals' characteristics: gender, age, education, etc. and also organisational characteristics: role in the nutrient management cycle, target group, geographical reach, etc. (**fed to D2.2**)
2) **Cognitive and emotional issues** - This dimension explores perception analysis of the involved stakeholders with regards to the NUTRI-KNOW activities (**fed to D2.1**)
3) **Governance and Legislation** - This dimension will explore the current challenges from stakeholders in the market and legislative situation (standardisation, collision with different policies, trends, needs of new legislation, etc.) (**fed to D2.1**)
4) **Social structure and Networking** - The social structure will determine the network of actors and how they relate to each other as a result of the Social Network Analysis (**fed to D2.2**)
5) **Effective engagement** – This dimension refers to those principles and criteria that will shape effective engagement in NUTRI-KNOW with regards to those activities focusing on the interaction with the stakeholders (**fed to D2.2**)

The use of questionnaires and interviews provides a systematic and comprehensive approach to identify and engage with diverse stakeholders involved in various OGs and different steps of the value chain. The stakeholder consultation questionnaire is very efficient and handy in collecting insights from a wide range of participants, including farmers, researchers, advisers, business companies, environmental groups, and non-government organisations, ensuring a holistic representation of perspectives. Built on the preliminary results of the consultation questionnaire, the dedicated interviews offer an in-depth exploration, allowing for nuanced understandings of stakeholder needs, challenges, and expectations. These direct inputs from stakeholders help pinpoint issues such as standardization, collision with different policies, emerging trends, and the

needs for new legislation during the implementation of OG outcomes, thereby enhancing the project's capacity to tailor its outcomes to the specific needs and dynamics of the agricultural sector.

2.1 Questionnaire

The stakeholder questionnaire was developed to matchmake the attributes/characteristics of the key stakeholders and their opinions with regards on the implementation of OG outcomes in their activities at different value chain steps. The questions are formulated for two types of answers: 1) objective answers including the stakeholders' organisation and attributes, 2) subjective answers collecting perceptions and opinions regarding the implementation of the OG outcomes in their professional activities.

The questionnaire consists of 42 questions in the following sections:

- Section 1 - an introduction to the questionnaire in order to explain the objectives of the consultation, as well as informing about the ethical aspects according to the ethical procedures and a consent form.
- Section 2: Stakeholders attributes – questions about the organisation and its role in nutrient management (objective). (**fed to D2.2**)
- Section 3: Knowledge & Relatedness about EIP-AGRI OGs related to NUTRI-KNOW – questions tailored for respondents based on their level of relatedness to the Outcomes of the OGs (objective). (**fed to D2.1 and D2.2**)
- Section 4: Cognitive, Knowledge about EIP-AGRI OGs outcomes- questions about respondents' opinion and perception about needs and challenges for the implementation of the outcomes of the OGs (subjective). (**fed to D2.1**)
- Section 5: Policy and Legislation challenges – questions about perceived challenges in marketing and policy regarding agricultural nutrient management (subjective). (**fed to D2.1**)
- Section 6: Networking and relationship questions – questions about social network analysis and communication aspects for effective engagement (**fed to D2.2**)
- Section 7: Demographic questions – questions about gender and age to collect statistical info of respondents and contact information (optional) (objective). (**fed to D2.2**)
- Section 8 – Acknowledgement and Data protection and storage data information

Both closed and open question formats are employed in this questionnaire, with the closed questions aiming to collect more reliable results and minimize bias, and open questions allowing respondents to develop their own point of view. The questionnaire was firstly developed in English (Annex 1) and translated into Italian, Catalan, Spanish and Dutch with the efforts of involved project partners. Then the questionnaires in native languages were preceded by emails (see a detailed protocol in Annex 2) or phone calls with the relevant stakeholders (as identified in Task 2.2) in the representative regions (Catalonia (ES), Emilia-Romagna (IT), Flanders (BE), Ireland and Denmark).

Regarding the nature of the method used to gather responses from the participants at this stage, i.e the questionnaires, have raised certain constraints. These constraints are listed below:

- A lack of completed questionnaires e.g. some respondents did not provide details of the organisations (optional questions).
- A lack of support to the respondent if any questions were not fully understood.
- Difficulty in controlling and verifying the responses

To reduce the impact of these constraints, a consultation protocol (Annex 2) was developed to guide the circulation of the questionnaires among stakeholders. Besides, the Stakeholder Database (created by the consortium) was analysed to differentiate stakeholders according to their relevance and role in contributing to the NUTRI-KNOW objective. Those with a higher relevance

will be invited to fill in a longer version of the questionnaire and those with a less relevant role will only be invited to fill in a short version of the questionnaire. The methodology and results of mapping the stakeholders are included in D2.2 *Mapping of stakeholders and target audience*.

Regarding the respondent's attitudes, some constraints and risks have also identified, as follows:

- **Conscientious answers**: Every administrator expects to obtain conscientious answers, but there is no way of knowing if the respondent has thought about the question before answering. Sometimes the answers are chosen before reading the whole question or the possible answers. Sometimes respondents move from one question to another quickly, or make quick decisions, affecting the validity of the data.
- **Understanding and interpretation**: The problem of not asking questions face-to-face is that they can be interpreted differently. Without someone to explain the questionnaire and make sure that each individual understands the same, the results can be subjective. Respondents may also find it difficult to understand the meaning of some questions that are clear to the creator. Thus, this lack of communication can lead to biased results.
- **Feelings and emotions**: A questionnaire cannot fully capture the emotional responses or feelings of the respondents. Without delivering the questionnaire face-to-face, there is no way to observe facial expressions, reactions or body language. Without these subtleties, important information may go unnoticed.
- **Respondents own motivation**: As with any type of research, bias can be a problem. The participants of the questionnaire may be interested in your product, idea or service. Others may be participating because of the questionnaire theme. These trends can lead to inaccuracies in the data, generated by an imbalance in the respondents who think disproportionately positively or negatively on the subject. Besides, there could also be bias and variations in the motivation of respondents to a short or long version questionnaire, leading to withdraw or incomplete participation and eventually lower impact of the results.

2.2 Interview

Given the aforementioned limitations of the questionnaire approach, the deployment of an interview strategy emerges as a critical supplemental method to foster qualitative engagement with key stakeholders and to gather subjective responses from focus groups, thereby facilitating a more comprehensive analysis. Notably, an analysis of questionnaire responses revealed a significantly low engagement level among Italian stakeholders, adversely affecting the representation of Italian OGs and diminishing the overall analysis quality. Furthermore, no response received from the Transport sector as an important component in the nutrient management value step, and the absence of representation from the Financial entities coupled with minimal participation from National level bodies limits the knowledge obtained for economic and legislative barriers, which underscores the imperative need to extend outreach efforts to these critical stakeholders.

Consequently, the primary objective of conducting focus group interviews centres on delving into discussions with interviewees regarding the alignment of OG outcomes with the sustainability requisites of the nutrient-value chain sector and exploring avenues to expedite their sector-wide implementation.

A protocol (Annex 3) was developed to guide the pre-interview preparation, during interview, and after-interview reporting. Use of the interview data was ensured by sharing the data policy document (Annex 4) with the interviewees for their consent. The structured interview will encompass the following five sections:

1. **Interviewee's Profile**: This section is intended for cases where the interviewee's profile details are either unknown or unclear. Should the information be pre-known, the interviewer is tasked with completing this segment independently. (**fed to D2.2**)

2. **Knowledge about OGs Outcomes:** This involves presenting questionnaire results to interviewees and soliciting their opinions, with OGs outcomes information being shared in advance. (**fed to D2.1**)
3. **Stakeholders mapping:** Interviewees will be shown a list of stakeholders (SHs) and, if possible, a map delineating key SHs within their region, with the aim of identifying key contacts directly on the map. Discussions will also encompass financial/funding agencies and national representativeness. (**fed to D2.2**)
4. **Barriers and Enablers:** Leveraging questionnaire results, this section seeks to openly discuss legislative hurdles perceived by interviewees in implementing OGs outcomes, alongside new legislative specifics. (**fed to D2.1**)
5. **Communication Preferences**: Here, the intention is to discuss questionnaire-derived controversies and the NUTRI-KNOW project's communication plans, seeking feedback from participants. (**fed to D2.2**)

The questions posed in each of the five sections were designed to be flexible, allowing for expansion or exclusion tailored to the interviewee's expertise and interests, to ensure the elicitation of relevant and qualitative responses. While this approach enhanced engagement and yield in-depth insights, it may carry several potential risks when interpreting the results, including:

- **Inconsistency across interviews**: Flexibility in question presentation can lead to inconsistencies across different interviews, making it difficult to compare responses directly or aggregate data for broader analysis.
- **Bias introduction**: Tailoring questions to the interviewee's interests might introduce confirmation bias, where the responses obtained are influenced by the interviewer's preconceptions or by leading questions that align with the interviewee's known viewpoints.
- **Subjectivity**: The qualitative nature of such interviews may result in highly subjective data that can be interpreted in various ways, potentially skewing the results based on the interviewer's perspectives or the specific context of the interview.
- **Overemphasis on specific areas**: There is a risk of overemphasizing certain topics that the interviewee is more knowledgeable or passionate about, potentially neglecting other important areas of inquiry that might provide a more balanced understanding.

Consequently, the interpretation of the focus group interview outcomes was structured into two distinct scenarios:

- In the case of the interviews with stakeholders from Ireland, Spain, and Belgium, the emphasis was placed on validating the findings from the stakeholder consultation questionnaire. The discussions concentrated on confirming these results and obtaining specific insights reflective of the stakeholders' roles within the agricultural sectors.
- Regarding the Italian interviews, due to the limited data from the stakeholder consultation questionnaire, a combination of standardised and tailored questions was employed. This approach facilitated comparability and supported a more quantitative analysis of the responses.

3. Results

Results collected from stakeholder consultation questionnaire and the focus group interviews were analysed separately, while the results from the stakeholder consultation questionnaire were clustered per country, the results collected through focus group interviews were analysed according to their geographic representation and their main role in the nutrient management value chain.

3.1 Results from questionnaire

The stakeholder consultation questionnaire has been circulated within the five partner countries (Ireland, Belgium, Spain, Italy and Denmark) between October and December 2023. In total 49 respondents were received, with 19 of them conducting nutrient management activities mainly in Ireland, 3 in Italy, 10 in Spain, 11 in Belgium, and 2 in Denmark (Figure 2). There are also 4 respondents who indicated an inclusion in the agricultural sectors of several countries within and beyond Europe. Accordingly, the analysis of the collected opinions was conducted by clustering the respondents from each country and one extra group as "Multi".

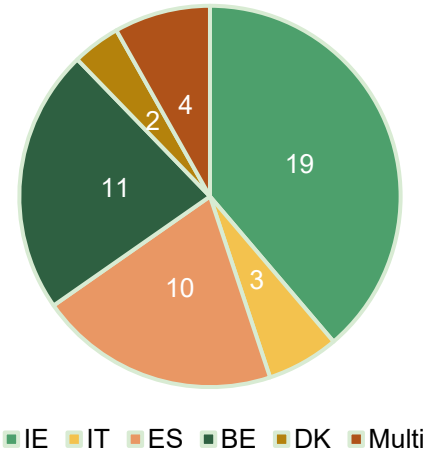

Figure 2 – Number of the respondents to the stakeholder consultation questionnaire in each partner country. IE – Ireland, IT – Italy, ES – Spain, BE – Belgium, DK – Denmark, Multi – respondents involved in the agricultural sectors of several countries. Note that the 2 respondents in the "Multi" group have a domain in Belgium and Denmark, respectively.

As answered by 24 out of the 49 respondents (IE: 8; ES: 6; BE: 7; DK: 1; Multi: 2), their motivation (multiple choices) to search for nutrient management innovations is presented in Figure 3 and summarised as the followings:

- Improving soil health and fertility as well as crop nutrient use efficiency (46% respondents).
- Reducing environment impact and nutrient losses (25% respondents).
- Saving on fertilizing costs or claim for financial remuneration (12.5% respondents).
- Regulatory compliance due to authorities requesting action and customer or certification demands (8% respondents).

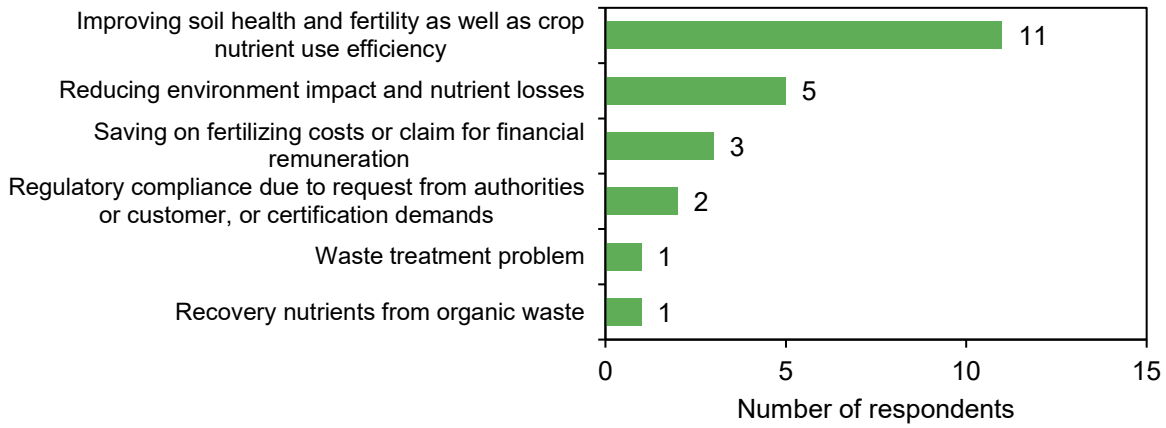

Figure 3 – Number of respondents who selected the listed reasons in Q7 (multiple choices) in the questionnaire (Annex 1) as their motivation to search for nutrient management innovations.

While the common thread across these motivations is the dual focus on improving environmental outcomes and achieving economic benefits, the country-specific reasons reflect the local agricultural practices, regulatory environments, and market pressures. For instance, the Irish respondents specifically emphasised their aims to improve soil health and fertility, and a strong interest in reducing their CO_2 footprint. Spanish respondents are driven by customer requests and regulatory demands for nutrient management, as well as a desire for financial remuneration. In Belgium, given a high density of livestock industries, specific concerns are given to issues like manure or waste treatment and nutrient recovery from organic waste, alongside financial incentives.

3.1.1 Knowledge about the NUTRI-KNOW engaged OGs

To explore the impact of the 12 engaged OGs within and crossing countries, respondents were asked to evaluate the level of awareness and effectiveness of the OG outcomes (Q7 in Annex 1). Overall, the average awareness scores across all countries (column "SUM" in Table 2) indicate a low to moderate level of awareness of the OGs, with no OGs scoring above the midpoint (3 out of 5) on average. Though a wide variation in awareness levels is identified for different OGs across the respondents from different countries, the respondents showed a generally higher awareness of the local OGs (scored 2-4) than those from other countries/regions (scored 1-2). This suggested that the impact of the engaged OGs is mostly limited within certain area and more efforts are needed to increase the impact crossing national/regional boundaries. Among the 24 respondents to the awareness of the OGs, 7 were from Belgium (BE) and they exhibited high awareness of certain OGs, particularly OG7 (RENURE), OG8 (PocketBoer 2), and OG9 (Grass2Algae), with scores significantly higher than respondents from other individual countries. Note that in the case of this question, the "Multi" group consists of only one respondent who conducts agricultural activities in multiple countries but domains in Belgium, which could explain the particularly high awareness for OG8 (PocketBoer 2) and OG9 (Grass2Algae). Still, the Belgian OGs (OG7, OG8, OG9) received a higher average score calculated from the evaluation of all respondents (column "SUM" in Table 2), which suggests that these OGs might have a generally more international scope or better multi-country engagement (except the slightly higher scores given by Spanish respondents to Italian OGs than to Belgian OGs). Besides, due to an absence of Italian respondents to this question in the questionnaire, the awareness of the Italian OGs was generally low across the board, with no score higher than 2.

Table 2 *– Average score given by the respondents to the stakeholder consultation questionnaire regarding their awareness of the 12 engaged OGs. Note that participants were asked to rate from 1 (I do not know this project) to 5(very well, my organization is a partner). The color code from white to red represents the weight of average score from 1-5.*

		IE (n=8)	ES (n=6)	BE (n=7)	Multi* (n=1)	SUM** (n=22)
ES	OG1. Slurry concentrator	1.9	2.7	1.6	1.0	2.0
	OG2. Manure management tool	1.5	2.3	1.9	1.0	1.8
	OG3. FERTICOOP-GO Innovations	1.3	2.3	1.7	1.0	1.7
IT	OG4. STRUVITE	1.6	1.8	2.0	1.0	1.8
	OG5. SOS_AQUAE	1.8	1.3	1.2	1.0	1.4
	OG6. GAS LOOP	1.4	1.3	1.7	1.0	1.5
BE	OG7. RENURE	1.8	1.2	3.7	4.0	2.2
	OG8. PocketBoer 2	1.5	1.5	4.0	5.0	2.4
	OG9. Grass2Algae	2.0	1.5	3.3	4.0	2.4
IE	OG10. Biorefinery Glas	2.0	1.2	1.7	1.0	1.6
	OG11. MOPS	2.3	1.0	1.7	1.0	1.7
	OG12. Duncannon Blue Flag Farming	1.6	1.0	1.7	1.0	1.5

* *The **Multi** here consists of only one respondent with activities domaining in Belgium.*

** ***SUM*** *represents the average score calculated from all respondents across countries.*

Upon an awareness of the 12 engaged OGs, the efficiency of the OG outcomes was evaluated by 16 respondents (IE: 6, ES: 4, BE: 5, Multi: 1) by answering Q9-20 in Annex 1, with scores ranging from 1 (not relevant) to 5 (very useful). Table 3 presents the average scores calculated from respondents per country, with an overall average (SUM) of all the respondents. It was found that most OGs have scores that indicate moderate to high perceived efficiency of outcomes across the respondents. No group has an average efficiency rating that falls below 2, and several have ratings above 3. The SUM column indicates the overall perception of efficiency for each OG, with OG7 (RENURE) and OG8 (PocketBoer 2) tied for the highest average efficiency rating at 3.4, suggesting a general consensus on their utility.

There is variation in how respondents from different countries rate the same OGs. For instance, OGs receive higher efficiency scores from respondents of their originating countries, which may be attributed to a higher awareness as shown in Table 2. Similar to the score for awareness, the respondent demonstrating agricultural activities in multiple countries gave an exceptionally high to the Belgian OGs (OG7 and OG8), with a maximum 5. This probably indicates that the outcomes of these OGs are viewed as very relevant or useful in a broader international context, which is also in agree with the fact that the respondents are regarded as key stakeholders showing strong connection with the OG partners. The variance in scores between countries also indicates that the impact or perceived usefulness of OG outcomes may be tied to regional relevance and the specific agricultural and environmental context of each country.

Table 3 *– Average score given by the participants regarding their evaluation on the efficiency of outcomes from the 12 engaged OGs. Note that participants were asked to rate from 1 (not relevant) to 5 (very useful). The colour code from white to red represents the weight of average score from 1-5.*

		IE (n=6)	ES (n=4)	BE (n=5)	Multi* (n=1)	SUM** (n=16)
ES	OG1. Slurry concentrator	2.8	3.0	3.4	3.0	3.1
	OG2. Manure management tool	2.3	4.0	2.6	3.0	2.9
	OG3. FERTICOOP-GO Innovations	2.3	3.3	2.6	3.0	2.7
IT	OG4. STRUVITE	2.3	3.3	3.2	1.0	2.8
	OG5. SOS_AQUAE	1.3	3.3	2.8	1.0	2.3
	OG6. GAS LOOP	2.3	4.5	3.0	1.0	3.0
BE	OG7. RENURE	2.5	3.3	4.4	5.0	3.4
	OG8. PocketBoer 2	2.2	4.0	4.2	5.0	3.4
	OG9. Grass2Algae	2.2	2.8	3.4	1.0	2.6
IE	OG10. Biorefinery Glas	3.2	3.0	3.0	1.0	2.9
	OG11. MOPS	3.2	3.0	2.6	1.0	2.8
	OG12. Duncannon Blue Flag Farming	3.0	2.5	2.0	1.0	2.4

* *The **Multi** here consists of only one respondent with activities domaining in Belgium.*

** ***SUM*** *represents the average score calculated from all respondents across countries.*

In synthesizing the awareness of the OGs with the effectiveness evaluated by the respondents, there is a clear trend that higher awareness often correlates with higher perceived effectiveness. Conversely, if respondents are not fully aware of an OG's outcomes, they may undervalue its potential benefits or be unable to implement it effectively due to a lack of understanding or information. To bridge this gap, focused efforts on increasing awareness through targeted dissemination and education are essential. By enhancing awareness, respondents are more likely to recognize and utilize the OG outcomes to address their specific challenges, leading to more successful and broader implementations.

3.1.2 Challenges in the implementation of OG outcomes

When referring to the challenges in the implementation of the OG outcomes in real practice (Q23 in Annex 1), a quarter of the respondents are not aware of the technologies, products, or tools

available (Figure 4), which is aligned with the generally low to moderate awareness of the OGs as identified in Section 3.1.1. The limitation of low awareness becomes particularly significant when attempting to match specific OG outcomes with challenges in implementation. If stakeholders are not sufficiently informed about the existence and purpose of an OG, they are less likely to engage with it or leverage its findings to overcome their specific challenges. This lack of awareness of the specific OG outcomes also hampers the further matchmarking of specific OG outcomes with the identified challenges and needs in market and policy. Therefore in the following sections, the challenges and needs are analysed in a general perspective of respondents from each country. It again highlights the importance of NUTRI-KNOW objectives: to **improve the communication and knowledge dissemination between the innovation sources and the end-users in the agricultural community**.

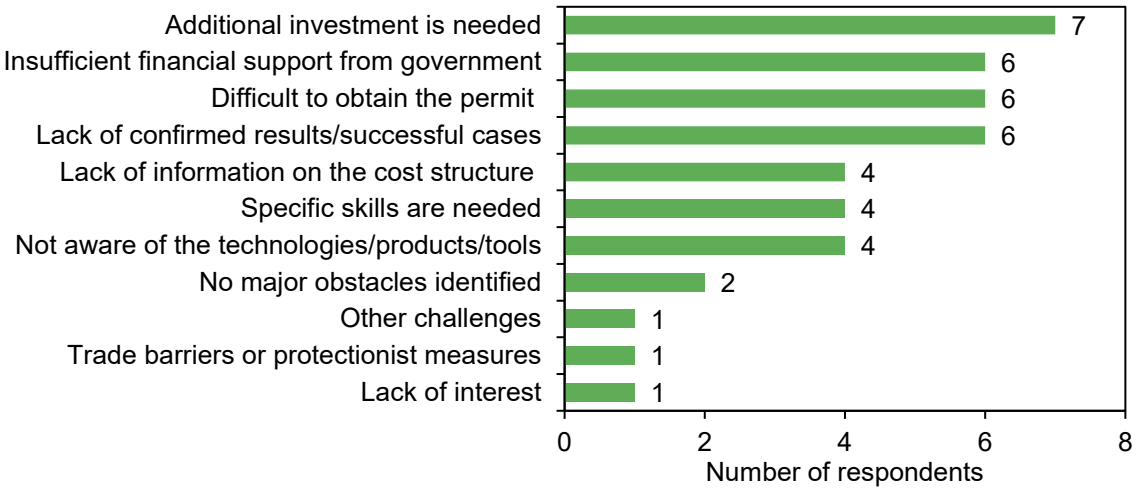

Figure 4 – Number of respondents who indicated the challenges they faced in the implementation of OG outcomes, as listed in Q22 (multiple choices) in the questionnaire (Annex 1).

Among all the listed challenges, the most common one is **the requirements of additional investment in infrastructure or to adopt new methods in their activities,** indicated by 44% of respondents. This challenge could stem from the high upfront costs associated with implementing new technologies or processes, for example the installation of ammonia washing machine in OG6 (Gas Loop) and the pocket digester in OG8 (PocketBoer 2), which may be financially burdensome for farmers and other stakeholders in the agricultural sector.

The second most cited challenge is identified by 38% of respondents as **the lack of confirmed results/successful cases from historical implementations**. It mainly refers to a hesitancy to adopt new practices without established success stories, which is understandable given that agriculture is a sector where the cost of failure can be high and margins are often tight. This necessitates not only additional evidence to affirm the efficacy of the OG outcomes but also improved communication strategies directed at end-users, such as storytelling by neighbouring practitioners and peer communities.

Tied in the second place with the previous challenge, 38% of respondents find **it difficult to obtain the necessary permits under current legislations**. This could be due to complex regulatory frameworks in Europe that may not yet be fully adapted to new agricultural technologies or practices, making the process of obtaining permission time-consuming and challenging. Also, 38% of respondents feel that **the financial support from the government is not sufficient**. This suggests that existing subsidies or financial incentives may not fully cover the needs of practitioners looking to implement new agricultural results or that the process to qualify for such support is too restrictive.

These main challenges match well with the most important supporting resources indicated by the same respondents in Q21 of the questionnaire: among the 10 listed resources concerning policy and legislation, knowledge and communication, cost and financial support, as well as

environmental impact, the "**Feasibility of the national permits (easy/difficult to obtain certification)**", "**Regular updates about communication activities and networks**" and "**Financial supportive policies and schemes**" are recognized as the top 3 important.

Alongside the legislative issue, 25% of respondents indicate that **specific skills are needed to implement the technologies, products, or tools**. This could be recognized as a challenge in Europe where agricultural practices are diverse and sometimes traditional, requiring significant training and education to shift to new methods. It also reflects the complexities of translating agricultural research and innovation into practice in Europe. **Lack of information on cost structure** is also listed as a concern, suggesting there is uncertainty about the financial implications of implementing proposed OG outcomes. The lack of clear cost structures can make it difficult for stakeholders to plan and budget for new implementations, which is a significant barrier to innovation uptake.

Distribution of respondents to Q31 Incoherence between policies

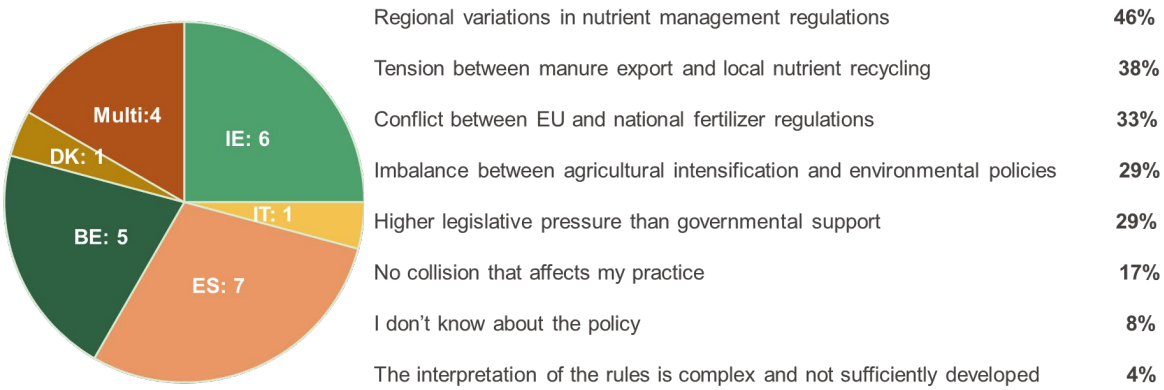

Figure 5 *Number of respondents from each country (pie chart) to Q31 in the questionnaire (Annex 1) concerning policy coinherence and the percentage of respondents voted for each of the given options.*

When diving deeper into the legislative challenges, i.e. the existing coherence between the policies (Figure 5), 46% of respondents indicated that **different regions have inconsistent regulations concerning nutrient management**. This incoherence can be problematic as it may lead to confusion among farmers who operate in multiple regions or between borders and could also create competitive disadvantages or advantages based on the region. There are also 38% of respondents who highlighted the **tension between the export of manure and the local recycling of nutrients,** which suggests that there are conflicts in policies that govern the movement and use of organic waste and by-products, which is a crucial aspect of sustainable agriculture. **Conflict between EU and national fertilizer regulations** is identified as a significant challenge by 33% of the respondents when it comes to fertilizers. Such conflicts may arise from the EU's broader environmental goals clashing with national agricultural policies or practices, potentially leading to difficulties in compliance and implementation. Nearly 30% of the participants see an **imbalance between the push for increased agricultural productivity and the policies designed to protect the environment**. This reflects the challenge of aligning the need for food production with the commitment to environmental stewardship. Similarly, **higher legislative pressures than governmental support was identified by 29% of the respondents**, suggesting that the legislative demands on farmers and agricultural stakeholders are not sufficiently matched with support and assistance from the government. This discrepancy can lead to difficulties in policy adherence and may discourage the adoption of more sustainable practices.

There are also some responses for "**Other challenge**" and "**I don't know about the policy**" which suggests that there are other unnamed challenges and a lack of awareness about policy among

some respondents. A small segment refers to the interpretation of rules being complex and not sufficiently developed, indicating that clarity and accessibility of information are also concerns.

Specifically, one of the responses received from a Belgian farmer indicated that there are too many rules and enforcement limit creativity and ensure that good management based on small-scale, down-to-earth farmer insight sometimes becomes impossible to implement independently. This was also confirmed by the comments from a Belgian respondent suggested that there must be an accelerated decision on the Nitrogen Approach Program as a basis to guide the farmer and technology supplier through the implementation. Another respondent conducting agricultural practices in multiple countries also highlighted that the Integrated Nutrient Management Action Plan and the upcoming update of the Nitrates Directive (91/676/EEC) is a very non-transparent process. The failure to recognize RENURE as a fertilizer substitute remains a mystery, hindering a broader implementation of outcome 7P_ammoniumsalts from OG7 (RENURE).

Similar remarks were also received from the Irish stakeholder and Spanish stakeholder. They highlighted that the current regulations at state level regulate the nutrient management practices without having carefully analyzed the impact nor consulting the administrations in charge. Current nutrient planning is too complex with little simple takeaways for users. Besides, new guidelines on fertiliser production (e.g. the Fertilising Product Regulation (EU) 2019/1009) just enacted.

These insights reflect the complex landscape of agricultural policy in the EU, where multiple levels of governance and various policy goals can sometimes result in conflicting regulations that challenge stakeholders in the agricultural sector. The need for harmonization and clearer communication between these regulatory layers is essential for creating an enabling environment for sustainable agricultural practices.

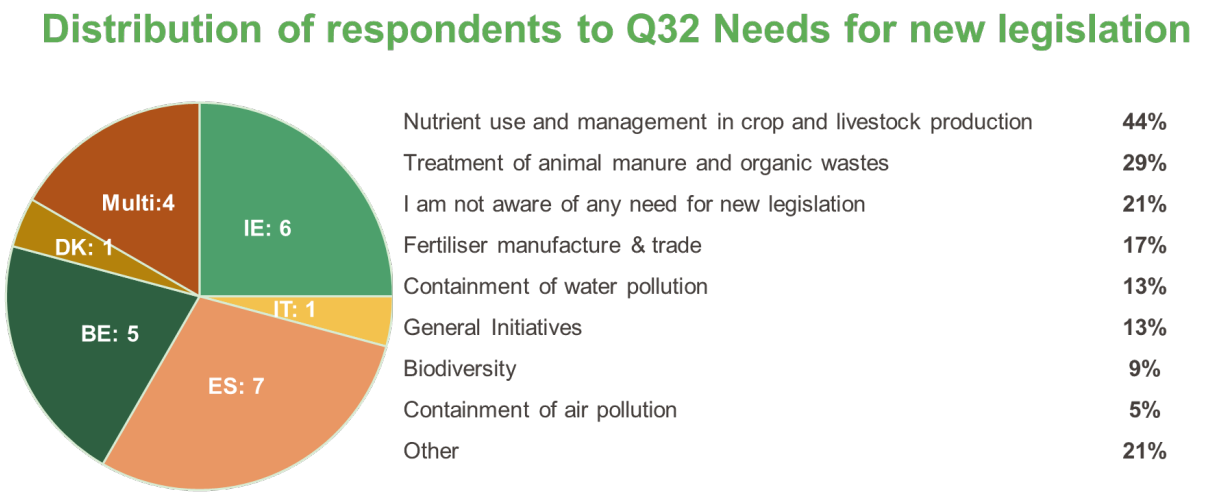

Figure 6 *Number of respondents from each country (pie chart) to Q32 in the questionnaire (Annex 1) concerning needs for new legislations, and the percentage of respondents voted for each of the given options.*

The respondents were also encouraged to suggest new legislations (Q32 in Annex) to address the coherences identified, 44% of the respondents suggested additional legislative need for **Nutrient use and management in crop and livestock production** (Figure 6). This likely reflects the ongoing concerns regarding the efficient and environmentally friendly management of nutrients within agricultural systems, which is central to both productivity and sustainability. Following is the need for new legislation in **Treatment of animal manure and organic wastes (29%)**. This concern is likely driven by the need to improve waste management practices to prevent environmental pollution and to promote the recycling of organic materials. There is also a call for updated or new regulations around **Fertilizer manufacture & trade (17%)**, which is a crucial part of the agricultural supply chain and has direct implications for environmental health and safety. A number of respondents see the **containment of water pollution (13%)**, **biodiversity (9%)** and **containment**

of air pollution (5%) as an area requiring legislative attention. This reflects concerns over the impact of agricultural practice on the water and air quality as well as a growing awareness of the importance of biodiversity in agricultural systems, although it is not the highest priority among those participated in the questionnaire.

The need for **general initiatives (13%)** could refer to a broad range of potential legislative initiatives beyond the specific categories listed, suggesting a general sentiment that there are various areas within agriculture where new policies could be beneficial.

A significant percentage (21%) has other specific needs for legislation that are not listed in the main categories, including:

- Greater appreciation of the agronomic realities associated with soil and nutrient management.
- Agroforestry supports not appropriate as land becomes designated as forestry.
- A suggestion that it would be necessary to modify Law 77/2022, regarding the End of Waste condition.

Interestingly, a significant percentage (21%) of participants **do not see the need for any new legislation**, which might suggest that they find current regulations sufficient or that they believe improvements could be made through better enforcement of existing laws.

These results demonstrate a clear demand for legislative evolution in various areas related to agriculture, with a strong emphasis on nutrient management and waste treatment. Specific concerns were raised by respondents regarding the interaction between agricultural practices and environmental policies, indicating a need for more targeted legislation that can address the specific challenges faced by the agricultural sector.

3.1.3 Effectiveness of the regional resources and supports

Corresponding to the challenges identified, actions and resources at EU and regional level are needed. To identify the most urgent needs regarding communication on knowledge, legislation, environment, economic and social aspects, the respondents are asked to rank the importance of information or supports offered for the implementation of OG outcomes in a general perspective. The results showed that **Feasibility of the national permits (easy/difficult to obtain certification)** is ranked as the most important, followed by **Regular updates about communication activities and networks**, which are also the top 2 priorities recognized by respondents in each country, suggesting a crucial need across countries to address the barriers regarding legislation and knowledge communication. Financial support and compliance with legislation were also highlighted as consistently important, suggesting a common need for economic facilitation and legal certainty in the sector. There are also concerns about **Support from advisory agencies and compatibility with existing infrastructure**, emphasizing the role of guidance and integration in implementation efforts. The **environmental impact** of the implementation is considered important but tends to be a lower priority compared to facilitation and support factors. Although financial support has been highlighted as one of the top-needs, respondents to this questionnaire generally do not mind the cost for implementation so much, given other facilitative factors take precedence.

Regarding the effectiveness of regional resources available to support their nutrient management activities, participants were asked to give a score from 1-5, being 5 is very effective and 1 is not effective at all. Table 4 presents the average scores calculated for respondents from each country (IE: 6, ES: 4, BE: 5) and one respondent demonstrating activities in multi-country (Multi), with a summarizing overall average provided (SUM). Results showed that the participants' perceptions of the effectiveness of various resources vary widely. In general, the **Financial support programs** received the highest overall effectiveness score (3.8), while the **Standardization body** (2.5) and **Legal framework** (2.9) were regarded as low effectiveness. When looking from the national perspective, both Belgian and Spanish respondents indicated a moderate to high level of effectiveness for the resources of **Financial supporting program**, **Technical guidance**

documents, **Knowledge exchange** and **Advisory Agencies** (average score 3.4-4.8), while respondents from Ireland rated their resources moderately low (<3.5), indicating the respondents are overall not very satisfied with the available resources in that country and thus improvements are needed to increase the effectiveness of the listed resources.

Table 4 *- Average score given by the participants regarding their evaluation on the effectiveness of the regional available resources to support their nutrient management activities. Note that participants were asked to rate from 1 (not effective) to 5 (highly effective). The colour code from white to red represents the weight of average score from 1-5.*

	IE	ES	BE	Multi*	SUM**
Standardization body	3.0	3.0	1.8	4.0	2.6
Technical guidance documents	2.8	4.0	3.4	5.0	3.5
Financial supporting program	2.8	4.0	4.8	4.0	3.8
Legal framework	3.4	2.3	2.3	5.0	2.9
Market outreach initiatives	3.0	3.8	3.2	3.0	3.3
Knowledge exchange	3.2	4.3	4.0	3.0	3.7
Advisory Agencies	2.8	4.8	4.0	2.0	3.7

* *The **Multi** here consists of only one respondent with activities domaining in Belgium.*

*** **SUM** represents the average score calculated from all respondents across countries.*

The effectiveness of these resources is critical for nutrient management activities. The perception of their effectiveness can influence the willingness of respondents to engage with these resources and their subsequent impact on nutrient management practices. Though varying scores reflect differences in regional approaches to nutrient management and the resources developed to support such activities, more attention and efforts are needed on the resources scored with low effectiveness.

3.2 Interview

During the course of January and February 2024, 9 interviews were conducted in the 4 member states, with the aims to (i) collect stakeholders' insights on challenges and needs in implementing the OG outcomes, focusing on those stakeholders who have been identified as key stakeholders along the nutrient management value chain, but did not yet answer the questionnaire; (ii) broaden the knowledge of regional OG outcomes and call for feedback on the results received via the questionnaire.

Among the 9 interviews listed in Table 5, 2 were conducted in Spain with respondents representing farmers and farmer advisor, technology provider, respectively. The involved value chain steps are livestock farming, processing technologies and fertiliser production. There were also 2 interviews conducted in Belgium, with an emissions sector advisor and a stakeholder from the private financial sector which are not directly involved in the nutrient management value chain but rather active in supporting the farmers to implement the innovations. Four interviews were conducted in Italy, involved respondents from civil society organizations (CSOs), technology provider, fertiliser producer, political and advocacy manager, and agro-livestock sectors. Their opinions have filled in the gap left from a relatively lower number of responses to the questionnaire from Italian stakeholders. In Ireland, apart from the 19 respondents connected through the consultation questionnaire, one more interview was conducted with an Irish technology provider who is involved in the value chain steps of fertiliser production and storage systems.

Table 5 *–Overview of the interviews conducted with key stakeholders in 4 member states.*

Represented stakeholder category	Involved value chain step	Responsible NUTRI-KNOW partner	Member States
Farmers, farmer advisor	Livestock farming	UVIC-UCC	Spain

Represented stakeholder category	Involved value chain step	Responsible NUTRI-KNOW partner	Member States
Technology provider;	Processing technologies; Fertiliser production	UVIC-UCC	Spain
Technology provider	Fertiliser production, Storage systems or Transport	TEAGASC	Ireland
Civil society organizations	Whole value chain without specification	CRPA	Italy
Technology provider; Fertiliser producer	Fertiliser production	CRPA	Italy
Political and advocacy manager	Whole value chain without specification	CRPA	Italy
Agro-livestock sector	Storage systems, Transport and distribution	CRPA	Italy
Emissions sector advisor	Whole value chain without specification	Biogas-E	Belgium
Private financial sector	Whole value chain without specification	UGent	Belgium

The primary shared motivation for seeking solutions to optimize nutrient management is to improve environmental impact—specifically reducing nutrient losses to the environment. This includes a focus on soil health, water quality, and overall ecological impact. Cost savings and responding to regulatory pressures are also common concerns. While environmental and cost considerations are unanimously significant, the specific reasons for each country vary, reflecting different national priorities and regulatory landscapes. For example, the main focus indicated by one of the Spanish respondents is on enhancing soil health and fertility, which implies a desire for long-term agricultural sustainability. While the Belgian stakeholder from financial sector highlighted the different reasons at current and future perspectives, i.e. at this moment, legislation and financial pressure dominate the decision of farmers. However, in future years this may shift more towards concerns on environmental issues and sustainable development goals.

Despite of their interest and needs on innovations for agricultural nutrient management, the interviewees showed a relatively low awareness on the OGs engaged in NUTRI-KNOW which are focusing on the local innovations for nutrient management. Given that only the three OGs from each region were introduced for each region-specific interview, the responses collected from the interviewees only reflect the objective knowledge and opinions. Still, it showed that OG3 (FERTICOOP-GO Innovation), OG4 (STRUVITE), OG10 (Biorefinery Glas), and OG8 (PocketBoer 2) gained a higher awareness among the local respondents.

3.2.1 Barries and enablers in the implementation of OG outcomes

During the interviews, the challenges and legislative needs identified through the stakeholder consultation questionnaire was shown to the interviewee for their opinions. It was confirmed in all the three countries (i.e. Belgium, Spain, and Ireland) that there are difficulties with stringent and unclear legislations, particularly around obtaining permits, particularly for the outcomes 6P_ammoniumsulphate in OG6 (Gas Loop), 7P_ammoniumsalts in OG7 (RENURE) and 8R_recommendations for pocket digesters in OG8 (PocketBoer 2), which hinders the implementation of new technologies or practices. Besides, there is also a confirmed consensus on the insufficiency of government financial support and the need for further investment in infrastructure. Additionally, in response to the low awareness of the OGs and a lack of available

information on cost structures and the benefits of historical successful cases, there is a need for better communication and dissemination on the available knowledge for the innovative technologies and methods.

The Spanish respondents also suggested that the agricultural regulations should be less strict, allowing for greater innovation and flexibility in nutrient management practices. One has specifically highlighted the challenges with the administration's clarity regarding the application of digestate generated from anaerobic digestion (AD) installations (linking to 8R_ recommendations for pocket digesters in OG8 PocketBoer 2), calling for a clarity on the inclusion of digestate to be used as an organic fertilizer (linking to 7P_ammoniumsalts in OG7 RENURE). In Belgium, the respondents indicated that there is a concern about the discrepancies in legislation, leading to administrative burdens, particularly regarding the use of products as secondary feedstock and recycling nutrients (linking to 7R_ Recommendations for the application of RENURE products in OG7 RENURE). Consequently, Belgian farmers face uncertainty due to new nitrogen legislation, which may affect their decision to use the innovations now and in the future.

The cases in Italy are slightly different: given a lack of responses from Italian respondents to the questionnaire, the Italian interviewees in the focus group interviews were asked to answer the questionnaire questions Q23, Q31 and Q32 (see Annex 1) regarding the challenges they faced in implementing the OG outcomes and the legislative needs to overcome the challenges. The results showed that, apart from general challenges stated in all the countries (e.g. difficult to obtain permit, limited financial support, complex policy), a significant challenge for Italian respondents is the lack of necessary skills and training required to adopt new nutrient management technologies, such as the 4TH_manure treatment technology for struvite recovery in OG4 (STRUVITE), the 5R_agrofarming techniques and 5R_drip line sub fertigation system in OG5 (SOS-AQUAE) and the 6TH_ammonia washing machine in OG6 (Gas Loop). They suggested that the stakeholders are not fully motivated due to a lack of confirmed results/successful cases from historical implementation to make the stakeholder to understand the importance and also the advantages they can draw from implementing the innovations.

Overall, the shared challenges suggest a need for **more supportive legislative frameworks that facilitate innovation, clearer financial support mechanisms, and improved access to information and training** to ensure successful implementation of research project outcomes and operational groups in the agricultural sector.

3.2.2 Legislative coinherence and needs

When asked about opinions on the incoherence between different policies, the Irish and Spanish respondents indicated that much of the technology is already invented, the real need is to find are application models, since the wheel begins to move when there is a clear reference. He also indicated that there is a need for a policy around AD facilities (linking to OG8 PocketBoer 2) and a need for validated evidence based on the general initiatives on new concepts in farming like climate neutral farming to guide the farmers (linking to OG11 MOPS and OG12 Duncannon Blue Flag Farming). This was agreed with the opinion of the Belgian interviewee who suggested that it is more important to harmonize legislation than to effectively create new legislation. Three Italian stakeholder highlighted the complex and potential conflict between EU and national fertilizer regulations regarding use of fertilising products (linking to OG6 Gas Loop and OG4 STRUVITE). Therefore, they suggested that the EU fertiliser regulations have to be transposed into a national context, for example the bio-based fertilisers and recovered ammonium sulphate from manure processing are still limited by the Nitrates Directive (91/676/EEC). Moreover, there is also a question of whether or not the manure composting process has to be considered is in the same way as composting of organic municipal waste, and also barriers in farmers' mistrust of renewable fertilizers (linking to the application recommendations in OG7 RENURE). Referring to the situation in Spain, the interviewees highlighted the need for a law to define the end of the waste status, for the manure treatment and the use of organic-waste derived fertilizers. They also highlighted the need for an agreement between the European Commission and Parliament to legislate on the issue of animal welfare.

4. Conclusions and limitations

The identified challenges and needs differ from each country when matchmaking the stakeholders' awareness of the OGs, the perceived efficiency of their outcomes, and the effectiveness of regional resources supporting nutrient management activities:

In Spain (ES):

- **Awareness and efficiency of local OG outcomes**: Spanish respondents show a relatively high awareness of their local OGs (OG1, OG2, OG3), which indicates a solid foundation for engagement. While OG2 (Manure management tool) stands out with higher efficiency scores (4.0), suggesting that their outcomes are perceived as very useful.
- **Main challenges and needs**: Spanish respondents desire less strict regulations and less bureaucracy to allow for greater innovation in nutrient management practices; the need for more substantial financial backing from the government is critical; there is a call for clearer regulations regarding the application of digestate as an organic fertilizer.
- **Regional Resources**: The effectiveness of Advisory Agencies and Knowledge Exchange are highly rated (4.8 and 4.3), which are crucial for supporting these OGs. However, to further improve the efficiency of OG outcomes, Spain might focus on enhancing Standardization Bodies and Legal Frameworks, which have lower effectiveness scores.

In Italy (IT):

- **Awareness and efficiency of local OG outcomes**: Awareness of Italian OGs (OG4, OG5, OG6) by Italian respondents is low, with only one Italian respondents from the focus group scored 4 for OG4 (STRUVITE), pointing to a need for improved communication and outreach. Among the three Italian OGs, OG6 (Gas Loop) has a notably high efficiency score from the international respondents (3.0). Improving the efficiency of OG4 (STRUVITE) and OG5 (SOS-AQUAE) may require addressing their international visibility and relevance.
- **Main challenges and needs**: A prominent challenge is the lack of necessary skills and education needed to adopt new nutrient management technologies; the lack of confirmed results or success stories hampers stakeholder motivation to implement innovations; respondents also find it challenging to adapt and make prototypes due to the complex landscape of available technology and skill sets.
- **Regional Resources**: The effectiveness of the Legal Framework is rated low. Enhancing this could help improve the perceived efficiency of outcomes by providing clearer guidelines and support.

In Belgium (BE):

- **Awareness and efficiency of local OG outcomes**: Belgian respondents are very aware of the Belgian OGs (OG7, OG8, OG9), particularly OG8 (PockeBoer 2) and OG9 (Grass2Algae), which could be due to strong local activities or successes. Whereas, OG7 (RENURE) and OG8 (PockeBoer 2) gained the highest average efficiency ratings, indicating that their outcomes are useful and well-received.
- **Main challenges and needs**: Discrepancies in legislation lead to administrative burdens, especially concerning secondary use products and nutrient recycling. For example, the new nitrogen laws cause uncertainty for farmers, affecting current and future use of innovations; there is a feeling that government financial support is not enough to cover the needs for implementing innovative practices.
- **Regional Resources**: The Financial Supporting Program in Belgium is rated highly effective. To further support the efficiency of OGs, Belgium might consider improving the effectiveness of Standardization Bodies and Technical Guidance Documents.

In Ireland (IE):

- **Awareness and efficiency of local OG outcomes**: Irish respondents have a moderate awareness of their local OGs (OG10, OG11, OG12) with moderate scores on the efficiency, indicating room for improvement. Raising awareness could be one way to improve this.
- **Main challenges and needs**: Just like other countries, Irish respondents also highlighted the challenge of needing additional investment to implement new methods or infrastructure; there's a necessity for having confirmed results or cases of historical success to justify and encourage the adoption of new practices, as the agricultural sector is cautious due to tight margins and the risks associated with change. Obtaining permits is difficult under current legislations, which points to a need for a more streamlined and clear regulatory process that supports agricultural innovation.
- **Regional Resources**: The effectiveness of regional resources like Advisory Agencies and Knowledge Exchange is rated moderately. Strengthening these resources could aid in improving the efficiency of OG outcomes.

Feedback from questionnaire respondents frequently highlighted that the extensive 42-question format is overly lengthy and generally unwelcome among respondents. This sentiment contributed to the modest response rate, despite extending the consultation period from two to three months. Noting that a quantitative sample was never sought but more about key informants from each sector. Moreover, the prevailing low awareness of the OGs compounds the issue, rendering it impractical to expand the questionnaire to include more detailed inquiries about specific OG outcomes. However, it underscores the importance of the communication and dissemination activities NUTRI-KNOW project in effectively aligning each OG outcome with the market and policy challenges and needs identified. This deliverable, from the standpoint of stakeholders, expands insight into the legislative and economic challenges encountered during the implementation of the engaged OGs. It deepens the comprehension of barriers as identified by the NUTRI-KNOW consortium through a qualitative survey in Task 1.3, as detailed in the D1.3 *Report on cost-benefit and sustainability analysis*. Moreover, synthesizing findings from D2.1 and D2.2 lays the groundwork for delineating specific needs and obstacles to user acceptance. These insights will be further enriched by the fuzzy cognitive mapping workshops scheduled in Task 2.3 aiming to identify the knowledge needs and barriers for user acceptance. Results of D2.1 are important components of the data matrix in the meta-database (T1.4 Summary meta-database) aligning the WP1 and WP2 outputs, which will serve as the basis for the creation of practice-oriented materials in WP3 and support the WP4 knowledge delivery and transferring to boost the impact of the 12 engaged OGs in NUTRI-KNOW project.

5. Annexes

5.1 Annex 1: Questionnaires (ENG)

NUTRI•KNOW

NUTRI-KNOW questionnaire

Introduction

The Nutri-Know project aims to broaden knowledge on the outcomes of EIP-AGRI Operational Groups (OG) and other research and innovation projects on nutrient management in the agricultural sector. The project is looking at six stages in the nutrient management value chain (Livestock Farming, Storage Systems, Processing Technologies, Fertiliser Production, Transportation/Distribution, and Fertiliser Application). To this end, Nutri-Know seeks to collect and assess the learnings from the EIP-AGRI Operational Groups as well as relevant projects and transform them into easy-understanding practical materials that can be used by farmers, practitioners, and other relevant end-users across Europe.

This survey aims to identify relevant players and collect opinions from different stakeholders on the outcomes of 12 engaged EIP-AGRI operational groups in Nutri-Know project (https://www.Nutri-Know.eu). In this questionnaire there are questions focusing on the current status of nutrient management practices and who the main actors are.

The data collected from the participants will be kept confidential and will only be used for the purpose of the research. All responses will be stored securely and access to the data will strictly follow the FAIR principle (Findable, Accessible, Interoperable, Reusable). Personal information will be kept separate from the survey responses and will only be used for the purpose of follow-up or clarification of responses.
Participation in the survey is voluntary, and participants have the right to refuse to answer any questions or to withdraw from the survey at any time. The collected data will be used only for the purpose of the research and will not be shared with any third parties or used for commercial purposes.

By participating in the survey, participants consent to the collection, storage, and use of their responses for the purpose of the research.

Thank you for your participation in this survey.

* 1. **Do you want to continue?**

- ◯ Yes
- ◯ No

NUTRI•KNOW

NUTRI•KNOW

NUTRI-KNOW questionnaire

Your organization description

The following questions are in relation to the description of the activity to the organisation you represent.

* 2. **Please indicate in which stage of the nutrient value chain your organisation's or professional activity is located** (*multiple answers are allowed*)

- ☐ Livestock farming
- ☐ Processing technologies
- ☐ Storage system
- ☐ Transportation/Distribution
- ☐ Fertiliser production
- ☐ Fertiliser application
- ☐ Other (please specify)

* 3. **What is your organisation's main role in nutrient management?**
Please select one or two options that best defines your organisation's activity

- ☐ Farmer/practitioner
- ☐ Farm advisor
- ☐ Technology provider
- ☐ Fertiliser production
- ☐ Research & Academia
- ☐ Public Administration - National
- ☐ Public Administration - Regional
- ☐ Agricultural chambers
- ☐ National Food Authorities
- ☐ Food industry
- ☐ Media
- ☐ Financial Institution
- ☐ Civil society organisation (CSOs, non-profit)
- ☐ Organization operated under EU level
- ☐ Short Term action (project, initiative, etc.)
- ☐ Other: Enter text

* 4. **Please indicate the main geographical level at which your organisation operates**

- [ ] European
- [ ] Regional (county, territory)
- [ ] National
- [ ] Local

* 5. **Please indicate if your organisation is mainly active in any of the following countries.**
If you do not have a principal activity in any of these countries, please indicate in which ***country*** *your organisation has its principal activity*

- [ ] Spain
- [ ] Italy
- [ ] Ireland
- [ ] Belgium
- [ ] Other countries (please specify):

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Knowledge & Relatedness about EIP-OGs related to Nutri-Know

In the following questions we will ask your knowledge about the the EIP_AGRI OG outcomes that the Nutri-Know project aims to promote.

*** 6. What is the main reason for you to search for solutions to optimize nutrient management during your daily activities?**

- ◯ I have problems with waste treatment.
- ◯ I want to improve the N-P use efficiency of my crop
- ◯ I want to recover nutrients from the organic waste
- ◯ I want to separately recover N and P from the organic waste
- ◯ I want to reduce nutrient losses to the environment (soil, water, air)
- ◯ I want to save on fertilising costs
- ◯ I want to reduce my CO2 footprint
- ◯ My customers (or certification scheme) are requesting me to do so
- ◯ Authorities are requesting me to do so
- ◯ I want to have some financial remuneration
- ◯ I want to optimise the transport phase (fragmentation of supply, cost of transportation, etc)
- ◯ I want to improve my soil health and fertility
- ◯ I want to reduce pollution

*** 7. To which extent do you know about the EIP-agri operational groups that are related to nutrient management?**

Please rate from 1 (I do not know this project) to 5 (very well, my organization is a partner)

	1 - I do not know this project	2	3	4	5 - I know this project very well
Development of a slurry concentrator with continuous total nitrogen data collection: this innovation involves the separation of livestock manure into two distinct liquid fractions, one highly concentrated in nitrogen (N) and phosphorus (P), and the other significantly diluted	◯	◯	◯	◯	◯
Development of tools for optimising the joint management of livestock manure and the improvement of agricultural fertilisation, crop	◯	◯	◯	◯	◯

quality and environmental protection					
FERTICOOP-GO Innovations to adapt to the best available techniques (BAT) in the Catalan cooperative agricultural sector	○	○	○	○	○
Livestock manure and digestates treatment to reduce emissions and produce Struvite	○	○	○	○	○
SOS-AQUAE: Sustainable farming techniques and renewable fertilizers to combine agriculture, water and environment	○	○	○	○	○
Gas Loop - Emissions capture for a virtuous nitrogen cycle in pig livestock	○	○	○	○	○
RENURE: REcoverd Nitrogen from manURE	○	○	○	○	○
POCKETBOER 2 - More performant operation of pocket digesters	○	○	○	○	○
Grass2Algae - From grass juices to the cultivation of microalgae	○	○	○	○	○
Biorefinery Glas - Small-scale Farmer-led Green Biorefineries	○	○	○	○	○
MOPS - Maximizing Organic Production Systems	○	○	○	○	○
Duncannon Blue Flag Farming & Comunities Scheme	○	○	○	○	○

* 8. **For the operational groups you already know, through which way did you learn about them?**

Social media, e.g. Twitter, Facebook, LinkedIn, etc	
EU CAP or EIP-AGRI websites	
Newsletters	
Demo event	
Physical workshops	
Webinar	
Other	

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Cognitive, Knowledge about EIP-Agri OGs Outcomes

In the following questions we will ask your opinion regarding the implementability of the EIP_AGRI OG outcomes that the Nutri-Know project aims to promote

How do you see the results of the operational groups (click to see the detailed results) help with your organizational activities? *Please take your time in answering the following questions*

* 9.

OG1: Development of a slurry concentrator with continuous total nitrogen data collection

Catalonia, Spain

Outcome:

Technology for nutrient concentration of slurry at a low cost, without additional emissions, and with minimal energy consumption. This innovation involves the separation of livestock manure into two distinct liquid fractions, one highly concentrated in nitrogen (N) and phosphorus (P), and the other significantly diluted.

Please rate from 1 (not relevant) to 5 (very useful)

* 10.

OG2: Development of tools for the optimization of joint management of livestock manure and the improvement of agricultural fertilization, crop quality and environmental protection

Catalonia, Spain

Outcomes:

1. Use of conductivity meters for optimized fertilization with *in-situ* determination of NPK content of slurry.
2. A computer application to quickly and accurately generate the livestock management book and fertilisation plans.
3. Application of economic emission reduction strategies during slurry storage (acidification; addition of straw).
4. Recommendations to improve the livestock manure management.

Please rate from 1 (not relevant) to 5 (very useful)

* 11.

OG3: FERTICOOP-GO Innovations to adapt to the best available techniques (BAT) in the Catalan cooperative agricultural sector

Catalonia, Spain

Outcome:

1. Best available techniques (BAT) to reduce ammonia and greenhouse gas emissions in farms and slurry pools.
2. Use of rapid testing systems and IT platforms to facilitate fast and reliable recommendations for fertilisation.

Please rate from 1 (not relevant) to 5 (very useful)

* 12.

OG4: Livestock manure and digestates treatment to reduce emissions and produce Struvite

Emilia Romagna, Italy

Outcome:

1. Development and implementation of the STRUVITE prototype treatment system to reduce greenhouse gas emissions from Livestock manure and digestates.
2. Application of recovered struvite to promote the N and P relocation in areas characterized by nutrient deficiencies.

Please rate from 1 (not relevant) to 5 (very useful)

* 13.

OG5: SOS-AQUAE Sustainable farming techniques and renewable fertilizers to combine agriculture, water and environment

Emilia Romagna, Italy

Outcome:

Innovative application of 'renewable' fertilizers derived from livestock slurries and digestate by drip lines in sub-irrigation, to optimize the efficiency use of the local-available nutrients.

Please rate from 1 (not relevant) to 5 (very useful)

* 14.

OG6: Gas Loop - Emissions capture for a virtuous nitrogen cycle in pig livestock

Emilia Romagna, Italy

Outcome:

1. Ammonia Washing Machine (TRL 9) to reduce ammonia emission and improve the air quality inside the pig housing;
2. Production of ammonium sulphate (4 %N – 6,4 %N) as alternative for synthetic N fertilizers.

Please rate from 1 (not relevant) to 5 (very useful)

* 15.

OG7: RENURE: REcoverd Nitrogen from manURE

Flanders, Belgium

Outcome:

1. Recovery of ammonium salts from livestock manure as alternative for synthetic N fertilizers.
2. Recommendations for the application of RENURE products and dissemination of the impact throughout Flanders.

Please rate from 1 (not relevant) to 5 (very useful)

* 16.

OG8: POCKETBOER 2 - More performant operation of pocket digesters

Flanders, Belgium

Outcome:

Elaboration of recommendations based on the experiences dairy farmers who are already using pocket digesters, to find solutions for common problems and improve performance

Please rate from 1 (not relevant) to 5 (very useful)

* 17.

OG9: Grass2Algae - From grass juices to the cultivation of microalgae

Flanders, Belgium

Outcome:

Processing the excess farm-edge grass into grass juice which is suitable for cultivation of microalgae biomass as alternative protein source.

Please rate from 1 (not relevant) to 5 (very useful)

* 18.

OG10: Biorefinery Glas - Small-scale Farmer-led Green Biorefineries

SouthWest, Ireland

Outcome:

1. Demonstration of a small-scale mobile grass biorefinery on multiple farms.
2. Simultaneous production of multiple products from grass, including an improved fodder press-cake fiber for cattle, protein concentrate feed for monogastrics, high value prebiotic sugars (for the food and feed markets) and recovery of nutrients for use as fertilizer.

Please rate from 1 (not relevant) to 5 (very useful)

* 19.

OG11: MOPS - Maximizing Organic Production Systems

Various locations in Ireland

Outcome:

Optimisation of organic horticulture production through crop planning and effective use of green manures and other organic manures and fertilisers to improve continuity of supply and reduce reliance on imported inputs

Please rate from 1 (not relevant) to 5 (very useful)

* 20.

OG12: The Duncannon Blue Flag Farming and Communities Scheme

South-East Ireland

Outcome:

1. Demonstration of a range of innovative and cost-effective farm management practices for water-quality protection.
2. A template for the development of farm-specific pollution potential zone 'PPZ' maps.
3. A template for a water-quality focused, results-based, reward scheme which could be used to improve water-quality in particularly sensitive catchments.

Please rate from 1 (not relevant) to 5 (very useful)

* 21. **In a general perspective, how would you rate the level of importance of the following items in supporting the implementation of the results from research projects and operational groups?**

Please rank from 10 (the most important) to 1 (the least important)

- Cost for implementing the products, recommendations, technologies, or tools.
- Results of historical successful demonstrations.
- Access to the technical documents or Decision support tools.
- Support from the advisory agency.
- Impact to the environment (quality of air, soil, water, biodiversity, etc.).
- Compliant with local legislation or not.
- Compatibility with existing farm infrastructure and equipment.
- Financial supportive policies and schemes.
- Regular updates about communication activities and networks.
- Feasibility of the national permits (easy/difficult to obtain certification).

* 22. **Please select from the list below which challenges you would currently face in order to implement the results from a research project or operational groups** (at a general level)

Please click the relevant ones (accept multiple choices)

- ☐ I cannot think of any major obstacles to implementing the outcomes of the proposed OG
- ☐ I am not aware of the technologies/products/tools
- ☐ There is a lack of confirmed results/successful cases from historical implementation
- ☐ It is difficult to obtain the permit according to the current legislations
- ☐ Lack of interest
- ☐ There are trade barriers or protectionist measures to access markets in other regions
- ☐ Specific skills are needed to implement the technologies/products/tools
- ☐ Additional investment is needed in infrastructure or to adopt new methods
- ☐ The financial support from government is not sufficient
- ☐ Lack of information on the cost structure of implementing some of the outcomes of the proposed OG
- ☐ Other challenges (please specify)

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* 23. Please indicate the level of effectiveness of available resources in your organisation's activity about this Resource:

Standardization body (e.g. International Plant Protection Convention (IPPC), International Organization for Standardization (ISO) and national standardization organizations)

Please indicate NO, if not applicable, and if YES, indicate the following categories from 1 (not effective) to 5 (highly effective)

Not effective		Medium effective		Highly effective	N/A
☆	☆	☆	☆	☆	○

* 24. Please indicate the level of effectiveness of available resources in your organisation's activity about this Resource:

Technical guidance documents (e.g. Best-Available-Techniques (BATs), Best Management Practices (BMPs), Good Agricultural Practices (GAP), etc.)

Not effective		Medium effective		Highly effective	N/A
☆	☆	☆	☆	☆	○

* 25. Please indicate the level of effectiveness of available resources in your organisation's activity about this Resource:

Financial supporting program (e.g. Rural Development Program, EIP-AGRI, Common Agricultural Policy (CAP), etc.)

Not effective		Medium effective		High effective	N/A
☆	☆	☆	☆	☆	○

* 26. Please indicate the level of effectiveness of available resources in your organisation's activity about this Resource:

Legal framework (e.g. European Green Deal, Nitrates Directives, National Emission Ceiling Directive, Fertilising Products Regulation, etc.)

Not effective		Medium effective		High effective	N/A
☆	☆	☆	☆	☆	○

* 27. Please indicate the level of effectiveness of available resources in your organisation's activity about this Resource:

Market outreach initiatives (e.g. Agricultural trade shows and exhibitions, Industry Associations and Trade Groups, Community Supported Agriculture (CSA), Social media campaigns and online platforms, etc.)

Not effective		Medium effective		High effective	N/A
☆	☆	☆	☆	☆	○

* 28. Please indicate the level of effectiveness of available resources in your organisation's activity about this Resource:

Knowledge exchange (e.g. between researchers and endusers, industries and farmers, among farmers, etc.)

Not effective		Medium effective		High effective	N/A
☆	☆	☆	☆	☆	○

* 29. Please indicate the level of effectiveness of available resources in your organisation's activity about this Resource:

Advisory Agencies (e.g. Government Agricultural Agencies, Farm Advisory Services, Technology and Innovation Hubs, etc.)

Not effective		Medium effective		High effective	N/A
☆	☆	☆	☆	☆	○

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Policy and Legislation challenges

This section includes questions regarding challenges in marketing and policy regarding agricultural nutrient management.

* 30. **Is there any incoherence with different policies in your country/region that impact your activities?**

(answer accept multiple choices)

- [ ] Conflict between EU and national fertilizer regulations
- [ ] Regional variations in nutrient management regulations
- [ ] Tension between manure export and local nutrient recycling
- [ ] Imbalance between agricultural intensification and environmental policies
- [ ] Higher legislative pressure than governmental support
- [ ] No collision that affects my practice
- [ ] I don't know
- [ ] Other (please specify)

* 31. **Please select if your organisation`s activity is in the need of new legislation in your country/region?**

If yes, please specify on which aspect the new legislation is needed and provide an explanation for each aspect

- [ ] I am not aware of any need for new legislation
- [ ] Fertiliser manufacture & trade
- [ ] Nutrient use and management in crop and livestock production
- [ ] Biodiversity
- [ ] Treatment of animal manure and organic wastes
- [ ] Containment of water pollution
- [ ] Containment of air pollution
- [ ] Waste and food waste
- [ ] Non-regulatory nutrient management
- [ ] General Initiatives
- [ ] Other (please specify)

32. Do you have any other comments or feedback on the current market and legislative situation?

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Networking and relationship questions

In this section, we would like to analyse who you consider to be the relevant stakeholders for your organisation in the nutrient management cycle

* 33. **Based on the knowledge of the Nutri-Know consortium, we have already identified several relevant organisations in the sector.**

Please add (if any) the level that your organisation has with the following organisations where 1 implies that you have low relation, 3 that you have a significant relationship, e.g. you collaborate in a project or initiative at the moment.

	1 - low level relation	2 - medium level relation	3- significant relationship
Associació de Joves Agricultors i Ramaders de Catalunya (JARC)	○	○	○
Grup Denfensa del Ter	○	○	○
OPAS, Organizzazione Prodotto Allevatori Suini	○	○	○
Boerenbond	○	○	○
Unio Pagesos Catalunya (UP)	○	○	○
Quintanes	○	○	○
Spanish Biogas Association (AEBIG)	○	○	○
Federació d'Agricultors Viveristes de Catalunya	○	○	○
EIB, European Investment Bank	○	○	○
European Sustainable Phosphorus Platform (ESPP)	○	○	○
Department of Climate Action, Food and Rural Agenda of the Catalan Government (DACC)	○	○	○
Waste Agency of Catalonia (ARC)	○	○	○
Catalan Water Agency (ACA)	○	○	○

Catalan Agency for Business Competitiveness (Acció)	○	○	○
Ministry for Ecological Transition and the Demographic Challenge of the Government of Spain (MITECO)	○	○	○
Ministry of Agriculture, Fisheries and Food of the Government of Spain (MAPA)	○	○	○
EIP-AGRI	○	○	○
Directorate-General for Agriculture and Rural Development (DG AGRI)	○	○	○
Directorate General for Internal Market, Industry, Entrepreneurship and SMEs (DG GROW)	○	○	○
Directorate-General for Environment (DG ENV	○	○	○
Catalan Council of Organic Production (CCPAE)	○	○	○
Biorefine Cluster	○	○	○
Group of experts in the treatment of livestock waste (GETDR)	○	○	○
Greentech Media	○	○	○

From the list above, are you missing any other relevant organisations with whom you are collaborating? If so, please rate the level of interaction where 1 implies that you have no relation, 3 that you have a significant relationship, e.g. you collaborate in a project or initiative at the moment

* 34. Regarding educational and communication material on innovative solutions in the area of nutrient management, which channels or formats do you prefer to receive more detailed information about them?

For each format below select from 1 (not my favourite option) to 5 (the most desirable option)

	1 - non desirable option				5- most suitable option
Digital self-assessment options	○	○	○	○	○
Informative booklets	○	○	○	○	○
Audio-visual resources (video, podcast, etc.)	○	○	○	○	○
Engaging infographics	○	○	○	○	○
Concise leaflets	○	○	○	○	○
Comprehensive factsheets	○	○	○	○	○

Other formats (please specify):

* 35. How would you prefer to access these educational materials mentioned above or receive updates about workshops, training sessions, and related activities?

	1 - less preferable communication channel				5 - most appropriate communication channel
Staying informed and engaged through an online **community of practice**	○	○	○	○	○
Receiving updates via **email**	○	○	○	○	○
Following NUTRI-KNOW on **social media**	○	○	○	○	○

Other (please specify)

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Demographic questions

This section includes questions to address statistical information from respondents

36. **Gender**

- ◯ Female
- ◯ Male
- ◯ I do not wish to state

37. **Age**

- ◯ 18-29
- ◯ 30-49
- ◯ +50

38. **Name of your organisation (if any)**

39. **Email contact to be included in our Stakeholder Database**

40. **Contact Person**

41. **Website of your organisation (if any)**

42. Do you have any comments about this survey and the questions within it? *Please write down your comments*

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Acknowledgement

This questionnaire was developed by the NUTRI-KNOW project. Your response and participation are very important for the development of the project as they will help us to analyse its social context.

The NUTRI-KNOW database may contain certain personal information about you as part of our general project activities, including contact details, professional affiliation, and areas of expertise. We have become aware of your information in a number of ways - directly from you, from others, or over time through our relationship with you - and may have received it and/or retained it in various forms, whether in writing, electronically, verbally, or otherwise.

We use this information for project-related purposes only. For example, we need this information to identify participants for the NUTRI-KNOW events, for expert interviews and workshops, etc. You can be certain that we will not use your personal information for commercial purposes. We take steps to ensure that your personal data is stored safely.

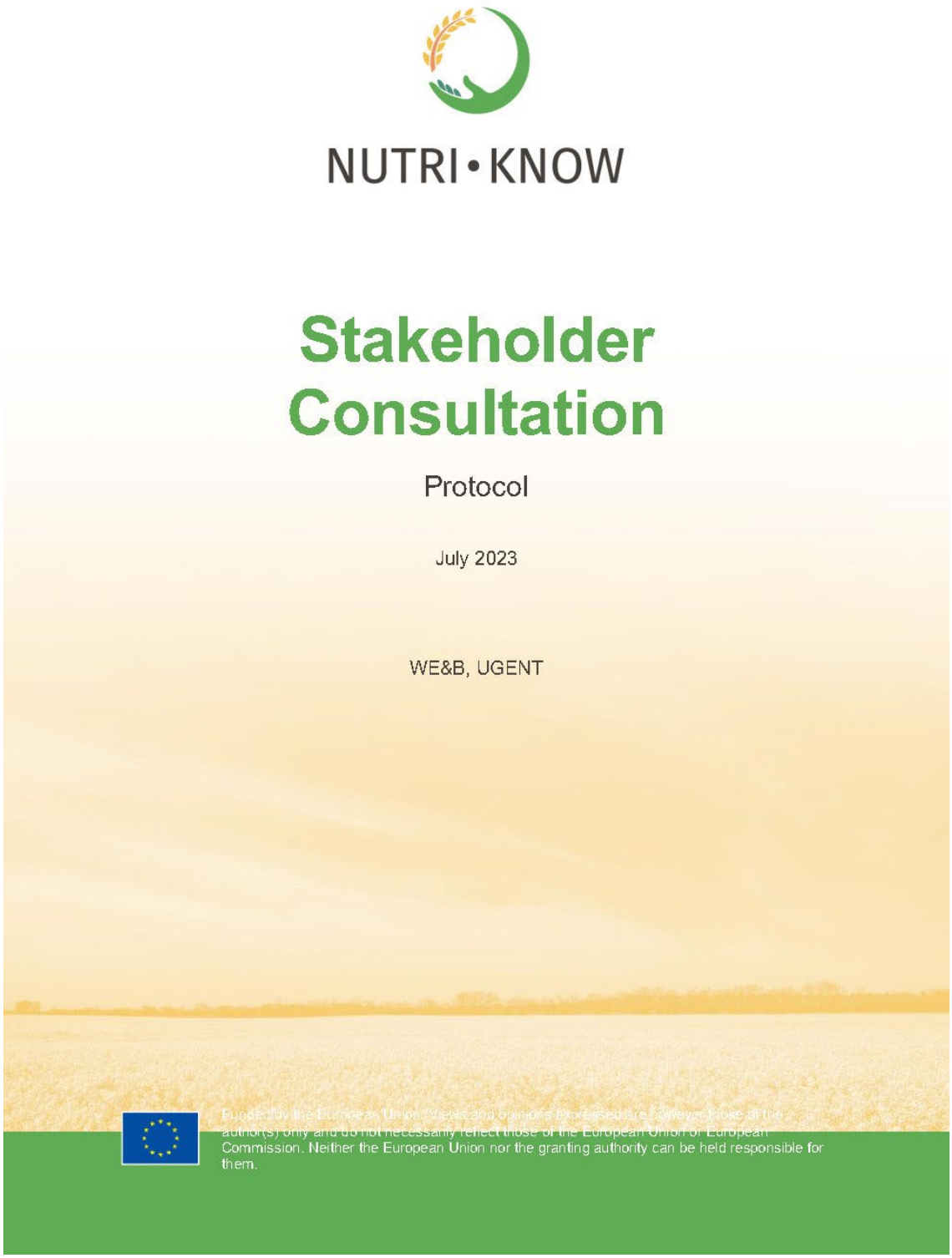
Stay in touch with NUTRI-KNOW via the project website: www.Nutri-Know.eu

If you wish to retract your personal data, please contact us (WE&B) via email: info@weandb.org

Again, thank you very much for the participation and for your time,

The NUTRI-KNOW team

5.2 Annex 2: Consultation protocol (for Questionnaire)



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Technical References

Project acronym	Nutri-Know
Project full title	NUTRI-KNOW - BROADENING THE IMPACT OF EIP-AGRI OPERATIONAL GROUPS IN THE FIELD OF NUTRIENT MANAGEMENT: KNOWLEDGE EXPLOITATION AND EASY-TO-UNDERSTAND MATERIAL FOR FARMERS AND PRACTITIONERS
Call	
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V1			

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1. Introduction

In recent years, significant knowledge has been accumulated through European Union (EU)-funded projects regarding managing practices, technologies, products, and recommendations in the primary sector. This wealth of knowledge includes advancements in agricultural management practices, the development of new technologies, and the introduction of innovative products. However, there is a substantial gap between the generation of this knowledge and its adoption by practitioners in the field. While efforts have been made to disseminate knowledge and facilitate collaboration among stakeholders, the knowledge generated from EU projects is not being effectively transferred to and embraced by practitioners in the primary sector. This gap hampers the potential benefits and impact of the knowledge and innovation generated through these projects.

The reasons for this knowledge uptake challenge could be multifaceted. It may stem from a lack of awareness among practitioners about the available knowledge and its relevance to their specific contexts. Additionally, there may be barriers related to the accessibility and usability of the information, including issues such as language barriers, complex technical jargon, or the absence of user-friendly tools and guidelines. Furthermore, the adoption of new practices and technologies often requires changes in established routines and practices, which can be met with resistance or scepticism from practitioners who may be hesitant to deviate from their traditional approaches.

Addressing this knowledge gap is crucial to unlock the full potential of innovative practices, technologies, and products developed in the primary sector. The European Innovation Partnership for Agricultural productivity and Sustainability (EIP-AGRI[1]) Operational Group (OG) brings together farmers, researchers, advisers, businesses, environmental groups, consumer interest groups, and non-government organizations (NGOs) to advance innovation in the agricultural sector. Despite the continuous flow of information, new or improved managing choices have not been appropriated by practitioners as expected. More efforts should be focused on developing effective knowledge transfer mechanisms that facilitate the dissemination of research outcomes and recommendations in a practical and user-friendly manner. Collaboration between researchers, practitioners, and other stakeholders should be strengthened to ensure that the knowledge generated aligns with the practical needs and challenges faced by those working in the primary sector. Ultimately, by narrowing the knowledge gaps and facilitating the adoption of innovative practices, the agricultural sector can evolve toward more sustainable, productive, and resilient systems.

To this end, the EU-funded NUTRI-KNOW project aims to broaden EIP-AGRI OGs outcomes across borders to modernise and dynamise the agri-food sector by collecting, translating and sharing an easy-to-understand and practice-oriented knowledge. A meta-database of OGs outcomes, legislation, market needs and outputs to support the appropriate adoption of the OG results and experience by relevant end-users through 12 OGs from 4 EU member states (Spain, Italy, Belgium, and Ireland). Thereby, NUTRI-KNOW will contribute to fostering and share of knowledge and innovation and aiming the most urgent needs, challenges and opportunities of farmers but also, building trust and establishing connections between main stakeholders,

intensifying thematic cooperation, co-creation and transposition of innovative solutions, considering territorial specifications.

WP2 aims to explore how the engaged OGs are aligned with current EU policies (top-down approach) and the challenges and needs of the farmers and the sector (bottom-up approach). This WP will analyse the connections among actors involved in the OGs and relevant stakeholders/networks in the field of nutrient management, as well as the work already done in this field to avoid duplications. The specific objectives are: (i) Detect the alignment of OGs results with current market and legislative situation; (ii) Identify the target-audience and the urgent needs, challenges and opportunities of the sector; (iii) Adapt the knowledge gathered to the current territorial needs by developing a thematic analysis methodology; and (iv) Avoid duplication with ongoing or completed projects and networks.

This document provides guidance to WP2 partners on how the exploratory phase of the stakeholder consultation will be undertaken in accordance with a conceptual framework and based on the requirements of the whole WP.

Furthermore, the document provides the necessary procedures, planning, protocols, roles and responsibilities within the NUTRI-KNOW consortium with regards to the consultation process, as well as introductory overview of the analytical model that frames it. These aspects furthermore address the key stakeholders who have been identified at this stage of the project implementation.

2. Objectives of the Consultation and Dimensions of Analysis

The objectives to address a consultation to key stakeholders are the following:

- To identify key barriers and obstacles to address further uptake of outcomes of EIP-OG.
- To find out who relevant players and stakeholders that can maximise the use of the EIP-OG outcomes and get involved in NUTRI-KNOW activities?
- To map the key characteristics of stakeholders interested or influential in the uptake of EIP-OG outcomes.
- To know how we can effectively engage with key stakeholders.

To address the objectives addressed above we can identify 5 dimensions of analysis:

1) **Socioeconomic context and stakeholder characteristics** - For this dimension we will collect key attributes of the stakeholders representing key organisations with regards to individuals' characteristics: gender, age, education, etc. and also organisational characteristics: role in nutrient management cycle, target group, geographical reach, etc.
2) **Cognitive and emotional issues** - This dimension explores perception analysis of the involved stakeholders with regards to the Nutri-Know activities.

3) **Governance and Legislation** - This dimension will explore the current challenges from stakeholders in the market and legislative situation (standardisation, collision with different policies, trends, needs of new legislation, etc.).
4) **Social structure and Networking** - The social structure will determine the network of actors and how they relate to each other as a result of the Social Network Analysis.
5) **Effective engagement** – This dimension refers to those principles and criteria that will shape effective engagement in NUTRI-KNOW with regards to those activities focusing on the interacting with the stakeholders.

2.1. What are the EIP-OG outcomes?

The project Deliverable 1.1 *Inventory and analyses of engaged OGs outcomes on nutrient management* summarises the main outcomes collected from the 12 engaged EIP-AGRI OGs concerning nutrient management, including the focus outcome categories (Product, Recommendation, Technology, and Tool), the involved value chain steps (Livestock Farming, Storage Systems, Fertiliser Production, Processing Technologies, Transport, and Application), status and maturity level (started, pilot, near to practice, on market) and the relevant EU/national/regional regulations.

This D1.1 stated that efforts are still needed for more efficient knowledge exchange with targeting practitioners, including (1) identifying the relevant stakeholders based on the outcome categories and involved value chain steps; (2) collecting the opinion from stakeholders on the OG outcomes and how the OGs help with their activities at different value chain steps. Therefore a consultation process with stakeholders is needed on that end

The table below provides a summary of OGs outcomes and a code provided per each of them.

Table 1 – Summary of OGs outcomes and a code provided per each of them.

EIP-AGRI OG	Region, country	Keyword category	Status	Code metadata base
Development of a slurry concentrator with continuous total nitrogen data collection	Catalonia, Spain	Farming equipment and machinery; Fertilisation and nutrients management	Finalised	1TH_concentrator
Development of tools for optimising the joint management of livestock manure and the improvement of agricultural	Catalonia, Spain	Soil management and fertilisation	Finalised	2TL_conductivitymeters
				2TL_computerApp
				2TL_economicreduction
				2R_agrimanagement

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EIP-AGRI OG	Region, country	Keyword category	Status	Code metadata base
fertilisation, crop quality and environmental protection				
FERTICOOP-GO Innovations to adapt to the best available techniques (BAT) in the Catalan cooperative agricultural sector	Catalonia, Spain	Agricultural practice; Fertilisation and nutrient management; Waste and by-product management	Ongoing	3R_BAT 3TL_rapidtesting
Livestock manure and digestates treatment to reduce emissions and produce Struvite	Emilia-Romagna, Italy	Farming equipment and machinery Fertilisation and nutrients management Climate and climate change	Ongoing	4TH_manuretreatment 4P_struvite
SOS-AQUAE Sustainable farming techniques and renewable fertilizers to combine agriculture, water and environment	Emilia-Romagna, Italy	Farming equipment and machinery Fertilisation and nutrients management Soil management / functionality Water management	Ongoing	5R_packages
Gas Loop - Emissions capture for a virtuous nitrogen cycle in pig livestock	Emilia-Romagna, Italy	Animal husbandry and welfare Climate and climate change	Ongoing	6TH_airwashing 6P_ammoniumsulphate
RENURE	Flanders, Belgium	Fertilisation and nutrients management	Ongoing	7P_AmmoniumSulphate 7R_evaluation
POCKETBOER 2	Flanders, Belgium	Climate and climate change Energy management Waste, by-products and residues management	Finalised	8R_pocketdigesters
Grass2Algae	Flanders, Belgium	Agricultural production system Waste, by-products and residues management	Finalised	9P_grassjuice
Biorefinery Glas - Small-scale Farmer-led Green Biorefineries	SouthWest, Ireland	Biomass, value chain, bioeconomy, circular economy, nutrients, fertiliser	Finalised	10TH_mobilegrass 10P_presscake 10P_monogastrics

EIP-AGRI OG	Region, country	Keyword category	Status	Code metadata base
				10P_prebioticsugars
				10P_recoveredfertilisers
MOPS - Maximizing Organic Production Systems Through integrated cropping systems	Various, Ireland	Plant production and horticulture, fertilisation and nutrients management, supply chain, marketing and consumption, farming competitiveness and diversification, organic farming, cooperation	Finalised	11R_organiccropping
				11TL_greenmanures
Duncannon Blue Flag Farming & Communities Scheme	SouthEast , Ireland	nutrient use efficiency, leaching, water quality	Ongoing	12TL_PPZmaps
				12R_waterquality
				12TL_rewardscheme

2.2. What are key characteristics and opinions sought of the Stakeholder Analysis?

The stakeholder analysis will be based on a snowballing process where we will look for key stakeholders attributes/characteristics and opinions with regards on the OG outcomes and how the OGs help with their activities at different value chain steps. They can be divided in two type of question categories: 1) Objective answers: the stakeholders organisation and attributes, 2) Subjective answers: perceptions and opinions about implementing OG outcomes and their potential role.

The analysis of the stakeholder database V.01 (created with the knowledge of the consortium) will allow us to differentiate stakeholders according to their relevance and role in contributing to the NUTRI-KNOW objective. Those with a higher relevance will be invited to fill in a longer version of the questionnaire and those with a less relevant role will only be invited to fill in a short version of the questionnaire.

3. Action Plan – General procedure

This section provides a procedure about how NUTRI-KNOW partners should get in contact with key selected stakeholders. The table below provides the overview of the general procedure and a tentative schedule.

Stakeholders' Consultation
WP2

Table 2 – General procedure for Nutri-Know stakeholder Consultation and Roles

Steps	Description	Tasks	Calendar	Role
STEP 1 Before submitting the questionnaire	This step comprises those preliminary tasks that need to be done before launching the questionnaire such as development of email prototypes, review of the questionnaire, necessary translations, etc.	- Identifying information about stakeholders – Stakeholders Worksheet	14th July 2023	All partners to send contribution to WE&B
		- Review of the questionnaire template and procedure	July-August 2023	All partners to send contribution to WE&B and Ugent
		- Creation of questionnaire link in local languages (IT, EN, SP, DL, CAT) & Control test - Preparing communication texts to contact stakeholders - First questionnaire at ESNI (Ugent), 20th September	September 2023	WE&B, Ugent, CRPA
STEP 2 Launching the questionnaire	In this step the questionnaire will be launched and responses collected	- Sending out emails with questionnaire (two versions) - Longer version of the questionnaire can be also delivered during workshops and other events - Follow up email/phone, other events? - Acknowledging participation	October 2023	All WP2 partners
STEP 3 Analysing the questionnaire	This step involves the analysis of responses and assessment if further consultation is needed	- Collecting data in common database - Assessing if further consultation is needed	November – December 2023	WE&B /Ugent
STEP 4 Iteration and/or interviews	This step, involves the iteration of previous step if considered	- Iteration of previews step and/or organisation of in-depth interviews	December 2023– January 2024	TBD

Key rules:

- Updates of all documents are always welcome, but they will be centralised by the WP2 leader, WE&B.
- Each partner responsible for gathering data from the key stakeholders should report any doubts to WP2 Task leaders (WE&B, Ugent)
- Each partner should be aware of the Ethics procedure, according to WP6 and check them in order to comply with data protection rights.

- For each of the stakeholders, anyone can take note and notify WE&B of their own impressions and reflections, if any.
- Keep an active dialogue with WE&B for any problem that is encountered along the way.

4. Stakeholder Database

The stakeholder database consists of information related to each stakeholder identified. Updates during the course of the project are expected at any time, as this procedure will follow a snowball process, according to the consultation presented here. The management of the stakeholders and their data will be centralising by the WP2 leader, WE&B. Although all NUTRIKNOW partners will contribute to this database, WE&B will be the database owner and therefore will undertake all updates on behalf of the partners. With the first request of inputs from the NUTRI-KNOW consortium we will create the *Stakeholder Worksheet version* 1.

Each WP2 partner is designated a role and should be in charge of consulting the stakeholder assigned to them in the stakeholder database.

The database will always remain available for review and in read-only format in NUTRI-KNOW share-point.

The following table describes the main fields of the stakeholder database.

Table 3 Description of the fields in the Stakeholder Database

Target group	In this column a drop-down menu allows to select a generic target group in which the identified stakeholder is included (1. FarmersRelated; 2. Technology_ProviderUser; 3. FertilisersRelated; 4. CSOs_OtherNonPorfit; 5. FinancialInstitution; 6. PublicAdministration_Policy; 7. Media; 8. EU; 9. ShortTermActions; 10. Academia; 11. ServicesToFarmers; 12. Other). If "Other" select in the next column "Other" as well.
Specific target group	Depending on the generic target group selected in the previous column, another drop-down menu will appear with more specific target groups. If more than one option suits the stakeholder, please select the one that is more related. If none of the options correspond to the stakeholder identified, select "Other"
If "Other" Target group (write which one)	If the option selected in the previous column is "Other", write down the target group in which the stakeholder identified should be included.
Organisation	Name of the organization identified as stakeholder
Website	Website of the organization
Contact	Contact of the organization
Email of Contact	Email of contact
Associated NK Partner	Partner/s who identified the stakeholder (drop-down menu)
4-Helix	Group of stakeholders of the quadruple helix to which the stakeholder belongs (drop-down menu)
Geo-level	Drop-down menu with the following options: Local; Regional (county, territory); National; European
Country-related	Drop-down menu with options of the country of the OGs to which the stakeholder is related (possibility of choosing multiple options)

Nutrient Value Chain	Drop-down menu with value chain options (possibility of choosing multiple options)
Associated EIP-OG	Drop-down menu with EIP-OGs to which the stakeholder is related (possibility of choosing multiple options)
Outcome EIP-OG	Drop-down menu with the CODE of the outcomes identified per OG to which the stakeholder is related (possibility of choosing multiple options)
Role	According to your own criteria, write down the potential role of the stakeholder identified in the implementation and dissemination of the outcomes selected

5. The Questionnaire

The questionnaire (not representative at statistical level due to the fact that will be addressing key stakeholders) is based on closed questions mainly, so that the gathered results are more reliable and will minimize bias, but we will also introduce some open questions to let the respondents develop their own point of view.

The language used will be Italian, Catalan, Spanish, English and Flemish.

The questionnaire will be preceded by prior contact via email or telephone with each of the stakeholders

The questionnaire itself will consist in the following sections:

- Section 1 - An introduction to the questionnaire in order to explain the objectives of the consultation, as well as informing about the ethical aspects according to the ethical procedures and a consent to collect questions.
- The questions which will be divided in following sections:
  - Section 2: Stakeholders attributes – questions about the organisation (objective).
  - Section 3: Knowledge & Relatedness about EIP-OGs related to Nutri-Know – questions to create a logic and screening of respondents based on their level of relatedness to the Outcomes of the OGs (objective).
  - Section 4: Cognitive, Knowledge about EIP-Agri OGs Outcomes-questions about respondents' opinion and perception about needs and challenges about the implementation of the outcomes of the OGs (subjective).
  - Section 5: Policy and Legislation challenges – questions about perceived challenges in marketing and policy regarding agricultural nutrient management (subjective).
  - Section 6. Organisation – questions about social network analysis
  - Section 7 Sociodemographic – questions about gender and age to collect statistical info of respondents and contact information (if they want to add) (objective).
- Section 8 – Acknowledgement and Data protection and storage data information

5.1. The questionnaire template

The questionnaires can be found in the five languages in this folder of the SharePoint.

5.2. Limitations in a questionnaire expected

Regarding the nature of the method used to gather responses from the inhabitants at this stage, i.e the questionnaires, have raised certain constraints. These constraints are listed below:

- A lack of completed questionnaires
- A lack of support to the respondent if any questions were not fully understood.
- Difficulty in controlling and verifying the responses

Regarding the respondent's attitudes, some constraints and risks have also identified, these are as follows:

- *Sincerity*: while there are many positive aspects related to the use of questionnaires, a lack of sincerity can be a problem. The respondents may not be 100% honest in their answers. This can happen for several reasons, including the social desirability bias and the desire to protect privacy. To avoid the lack of sincerity, respondents have been informed that the process does not require personal identification.
- *Conscientious answers*: every administrator expects to obtain conscientious answers, but there is no way of knowing if the respondent has thought about the question before answering. Sometimes the answers are chosen before reading the whole question or the possible answers. Sometimes respondents move from one question to another quickly, or make decisions in a fraction of a second, affecting the validity of the data.
- *Understanding and interpretation*: The problem of not asking questions face-to-face is that they can be interpreted differently. Without someone to explain the questionnaire and make sure that each individual understands the same, the results can be subjective. Respondents may also find it difficult to understand the meaning of some questions that are clear to the creator. Thus, this lack of communication can lead to biased results.
- *Feelings and emotions*: A questionnaire cannot fully capture the emotional responses or feelings of the respondents. Without administering the questionnaire face-to-face, there is no way to observe facial expressions, reactions or body language. Without these subtleties, important information may go unnoticed.
- *Respondents own motivation*: as with any type of research, bias can be a problem. The participants of the questionnaire may be interested in your product, idea or service. Others may be participating because of the questionnaire theme. These trends can lead to inaccuracies in the data, generated by an imbalance in the respondents who think disproportionately positively or negatively on the subject.

Email Templates

- **Email to participants**

Subject: Participation in the Nutri-Know Project Questionnaire

Dear Sir/Madam,

Stakeholders' Consultation
WP2

I hope this email finds you well.

The reason for this email is because you have been identified as a relevant actor in the agri-food sector. We would like to request your collaboration in the enclosed questionnaire, prepared under the framework of the Nutri-Know project (https://www.nutri-know.eu). This project, funded by the European Commission Horizon Europe research program, aims to broaden knowledge on the outcomes of EIP-AGRI Operational Groups (OG) and other research and innovation projects on nutrient management in the agricultural sector. The EIP-AGRI OGs bring together farmers, researchers, advisers, businesses, environmental groups, consumer interest groups, and non-government organizations (NGOs) to advance innovation in the agricultural sector. The Nutri-Know project intends to modernise and dynamise the agri-food sector by collecting, translating and sharing an easy-to-understand and practice-oriented knowledge.

One of the aims of the project is to explore the challenges and needs of the stakeholders from the agri-food sector. To this end, the questionnaire intends to collect opinions from different stakeholders on the outcomes of the 12 engaged EIP-AGRI OGs. With your participation, as a relevant stakeholder, you will contribute to build knowledge in the agri-food sector.

Kindly, find here the link to access the survey.

Finally, we thank you for your participation and collaboration.

Sincerely,

The Nutri-Know team

- **Email to send the questionnaire to Nutri-Know Advisory Board members**

Subject: Participation in the Nutri-Know Project WP2 Questionnaire

Dear Nutri-Know Advisory Board Members,

In the frame of the Nutri-Know project WP2 on Co-creation process to align EIP-AGRI OGs outcomes with stakeholders' challenges and needs, we have designed a questionnaire which aims to to collect opinions from relevant stakeholders on the outcomes of the 12 engaged EIP-AGRI OGs. This consultation is intended to explore the challenges and needs of the stakeholders from the agri-food sector.

In order to engage with you and draw on your experience as an Advisory Board member, we would like to kindly invite you to fill in the questionnaire. You can find the link here.

By participating in this endeavour, you would be taking part in building knowledge about the urgent needs, challenges and opportunities of the agri-food sector in your region, thus contributing to a more comprehensive definition of project needs. Your contribution would also enable us to validate or nuance the adequacy of the current market and legislative situation that have been identified so far in the project.

Many thanks and looking forward to receiving your valuable inputs,

The WP2 Task Leaders

Stakeholders' Consultation
WP2

- **Email to follow-up questionnaire respondents**

Subject: Kind Reminder: Participation in Nutri-Know Project Questionnaire

Dear Sir/Madam,

I hope this email finds you well. This is a kind follow up on the participation in the questionnaire for the Nutri-Know project on nutrient management in the agri-food sector. Your input is highly valued, and we are eager to gather insights from relevant actors such as yourself.

We kindly urge you to take a few moments to contribute with your perspective. Your valuable input will significantly aid in our efforts to enhance our understanding of the challenges and needs of stakeholders from the agri-food sector.

Should you have encountered any issues or have concerns about the questionnaire, please feel free to reach out to us.

We sincerely appreciate your time and cooperation in this endeavor.

Warm regards,

The Nutri-Know Team

- **Email acknowledging participation**

Subject: Acknowledgment of Your Participation in the Nutri-Know Project Questionnaire

Dear Sir/Madam,

Thank you for taking the time to participate in the Nutri-Know project questionnaire. Your valuable input as a key figure in the agri-food sector is greatly appreciated and will contribute to enhancing our understanding of the challenges and needs within the industry.

We look forward to utilizing your insights to advance knowledge in the agri-food sector.

Best Regards,

The Nutri-Know Team

5.3 Annex 3: Consultation protocol (for interviews)

BEFORE THE INTERVIEW

- Plan meetings of 1 hour duration, they can be online or face-to-face
- Add information in the Column F in the Stakeholder Worksheet for the planned interviews
- Check and adapt the questions if needed and validate these changes with the WE&B team
- Familiarise yourself with the questions before the meeting
- Please, **do not forward in advance interview questions to actors** as the intention of the interview is to gather sincere and spontaneous answers.
- Be sure you can **record** the conversation. Ask for permission to do so.
- Keep in mind that if there is no answer to a certain question, this is also valuable information for us.
- In a last mail exchange before the interview (e.g. when confirming our reminding about the agreed date) attach the information about the OGs Outcomes and send the data policy information.

DURING THE INTERVIEW

- As you start the interview, please begin with filling out the table below. The table provides details of the name of the person and their roles
- Introduce Nutri-Know project and the objective of the interview again
- Ask for recording of the session:
  - If the session is online, once the session is recording ensure to record Agreement YES on the Consent Sheet Form
  - If the session is offline, the informed sheet can be signed by the participant
- Ask the questions and let the participant(s) speak freely
- Closing the interview – Summarize the major findings with them and explain the next steps:
  - All results from the interview will be analysed in an aggregated way and presented in a report, never from an individual perspective
  - The recording will be deleted once we have reviewed the answers and aggregated the results.
  - Thank the interviewee for their time and ask if they have any open questions

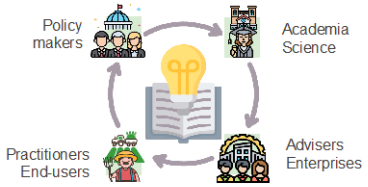
Date and Location	
Facilitator(s)	
Rapporteurs (if any)	
Participant (s) name	

Stakeholder consultation survey

To facilitate the dissemination and communication of the outcomes from the 12 engaged OGs in NUTRI-KNOW project, a stakeholder consultation survey is developed:

1) to identify the group of stakeholders who are **closely involved** in the nutrient management activities and show great interest in the progress of innovative practice;
2) to identify the **barriers and challenges** in the current **market and legislation**.

Multi-actor approach



Six question sessions

1) Your role and activities
2) Knowledge & Relatedness about the OGs
3) Opinion on the OG outcomes
4) Policy and Legislation challenges
5) Networking and communicating
6) Demographic questions

5

Funded by the European Union

02.04.24

Notes: In the last three months of 2023, we circulated a questionnaire to encourage opinions from all types of stakeholders regarding their awareness of the OGs and the current challenges in implementing the OG outcomes. There are 6 question sessions as listed here.

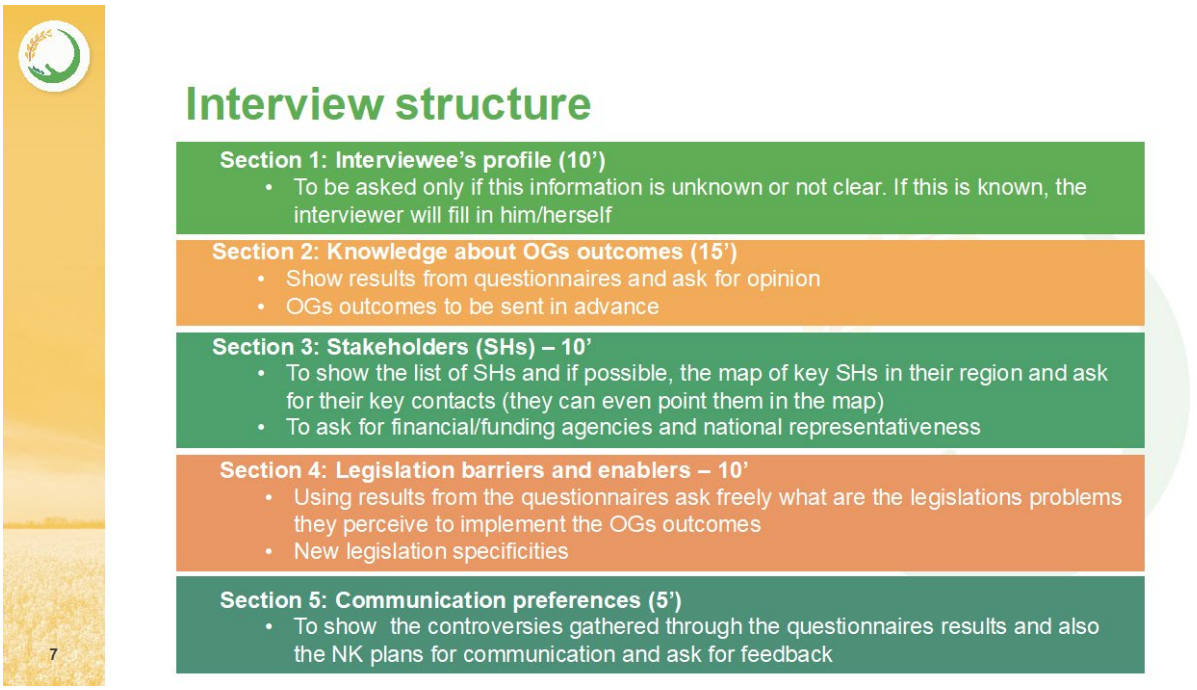
THE INTERVIEW QUESTIONS

6

Funded by the European Union

02.04.24

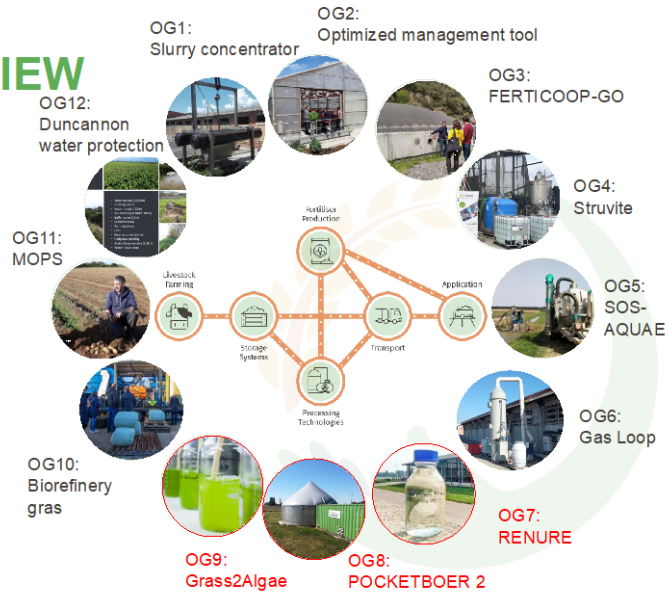
Notes: Slide 6 – to Slide 21 entail questions of the interview



Notes: The interview is a shortened version of the stakeholder consultancy questionnaire, with the aim to specify the opinions of key stakeholders that are currently missing in our identified stakeholder fuzzy map. With this interview, we would like to discuss with you about the primary results of the questionnaire and learn from you perspectives how you see these challenges can be addressed. The interview consists of 5 sections:
1. an introduction of each other and the project. Here we would try to collect any missing information from the interviewee's profile;
2. the knowledge about OG outcomes
3. outreach for key stakeholders,
4. barriers and enablers, as well as
5. Communication preferences.

PROJECT OVERVIEW

NUTRI-KNOW aims to broaden the knowledge obtained from 12 Operational Groups (OG) in 4 Member States (ES, BE, IE, IT) along 6 steps of nutrient management value chain. The final goal of the NUTRI-KNOW project is not only to **share easy-to-understand and ready-to-practice knowledge**, but also to **connect people and territories through an active community of practice**.



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Funded by the European Union

02.04.24

Notes: After having ensured that the consent sheet has been handed and you are recording the conversation, the project might need to be introduced. Please find here a short introduction:

NUTRI-KNOW aims to broaden the knowledge obtained from 12 Operational Groups (OG) in 4 Member States (ES, BE, IE, IT) along 6 steps of nutrient management value chain. The final goal of the NUTRI-KNOW project is not only to share easy-to-understand and ready-to-practice knowledge, but also to connect people and territories through an active community of practice.

Within the 12 OG, 3 are about innovations from Flanders, as marked in red at the bottom. The project is looking at six stages in the nutrient management value chain, namely Livestock Farming, Storage Systems, Processing Technologies, Fertiliser Production, Transport, and application.

Engaged operational groups in Belgium

OG7: RENURE: REcoverd Nitrogen from manURE

Flanders, Belgium

Outcome:

1. Recovery of ammonium salts from livestock manure as alternative for synthetic N fertilizers.
2. Recommendations for the application of RENURE products and dissemination of the impact throughout Flanders.

For more information:
https://ec.europa.eu/eip/agriculture/en/find-connect/projects/operationele-groep-renure

Funded by the European Union

Notes: Ensure that you send this information before the interview

Engaged operational groups in Belgium

OG8: POCKETBOER 2 - More performant operation of pocket digesters

Flanders, Belgium

Outcome:

Elaboration of recommendations based on the experiences dairy farmers who are already using pocket digesters, to find solutions for common problems and improve performance

For more information:
https://ec.europa.eu/eip/agriculture/en/find-connect/projects/pocketboer-2-performantere-werking-van

Funded by the European Union

Notes: Ensure that you send this information before the interview

Engaged operational groups in Belgium

OG9: Grass2Algae - From grass juices to the cultivation of microalgae

Flanders, Belgium

Outcome:

Processing the excess farm-edge grass into grass juice which is suitable for cultivation of microalgae biomass as alternative protein source.

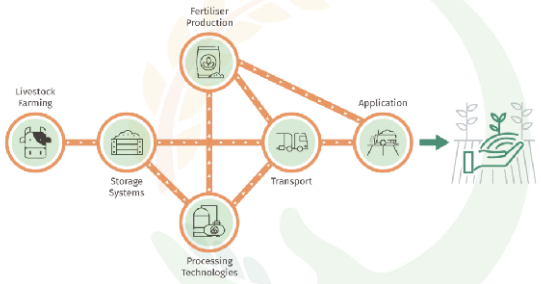
For more information:
https://ec.europa.eu/eip/agriculture/en/find-connect/projects/grass2algae

Funded by the European Union

Notes: Ensure that you send this information before the interview

Interview Section 1: Interviewee's profile

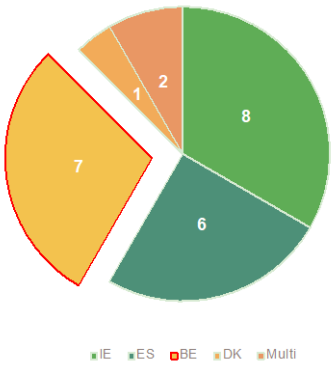
- ❑ Consent Sheet signed (or recorded)
- In which stage of the nutrient value chain are you involved (see figure)?
- What would you say is your main role in nutrient management: policy, research, practitioner, advocacy, society, etc.?
- At which geographical level do you generally operate: local, regional, national, international?
- Where are you active? (Spain, Italy, Belgium, Ireland, other)



Funded by the European Union

Notes: In this section we make sure that we have all the information regarding the profile of the interviewee's organisation or of the interviewee's person in case he/she does not represent any organisation (the slide shows the information to make sure to have). If this information is already known, this section can be skipped.

Section 2: Knowledge about OGs outcomes



Q1: What is the main reason for you to search for solutions to optimize nutrient management during your daily activities?

I want to improve the N-P use efficiency of my crop	2/7
I want to reduce nutrient losses to the environment (soil, water, air)	1/7
I want to save on fertilising costs	1/7
I have problems with waste treatment.	1/7
I want to recover nutrients from the organic waste	1/7
I want to have some financial remuneration	1/7

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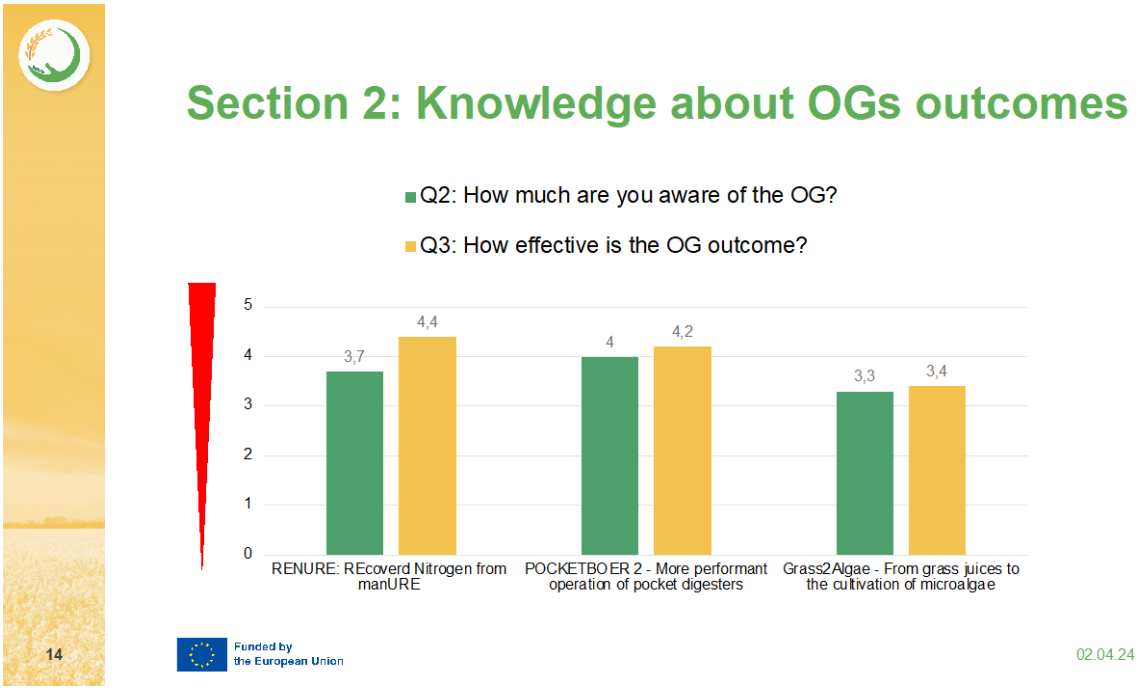
02.04.24

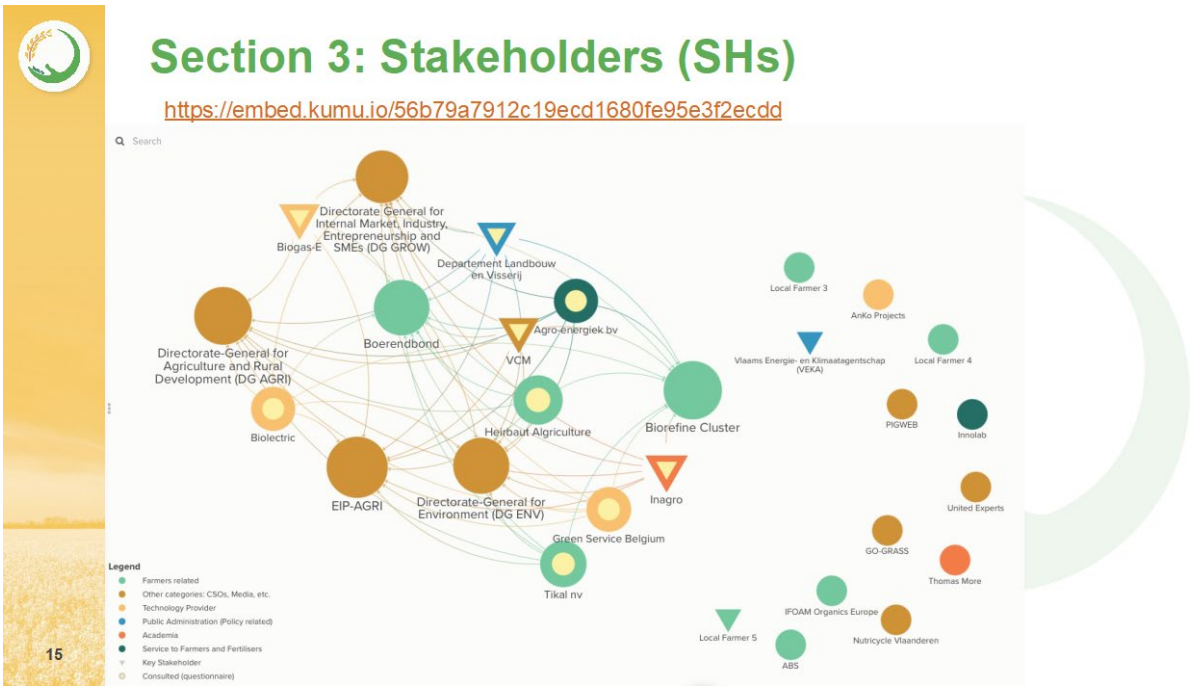
Notes: Here in Flanders, we have received 7 responses for the following questions. The first question refers to the most urgent need of the stakeholder when searching for solutions in nutrient management practice. The reasons of stakeholders in Flanders are diverse, from improving nutrient efficiency, to reducing environmental impact and fertilising cost.

According to your knowledge, what would be the most common reason for farmers in this region to search for nutrient management solutions?



Notes: The second and third questions explored the awareness or effectiveness among local stakeholders, with higher score representing higher level of awareness or effectiveness. In general, the Flemish OGs are scored at a medium to high level of awareness and effectiveness among the local stakeholders.

Are you aware of the three OGs in your region? How would you score their effectiveness?

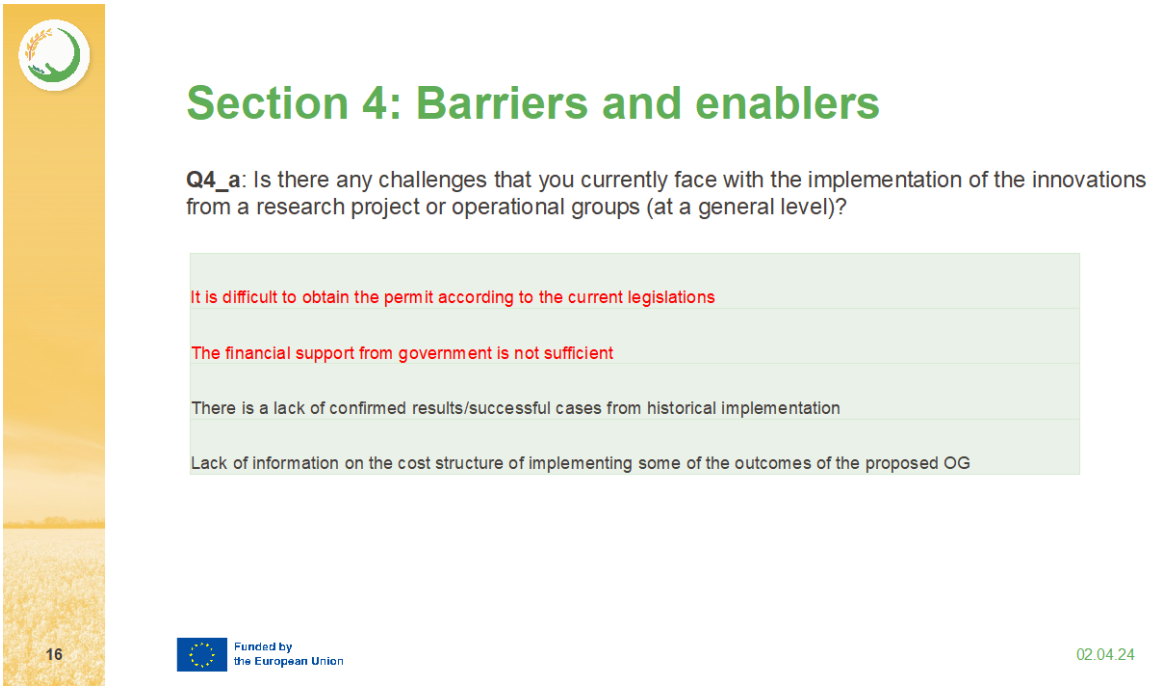


Notes: With the knowledge of Nutri-Know partners and the answers obtained in the previous questionnaire, we have built a first map of stakeholders and their connections in relation to actors that could be influential in maximizing the use of the results of the OGs, (show the slide or click on

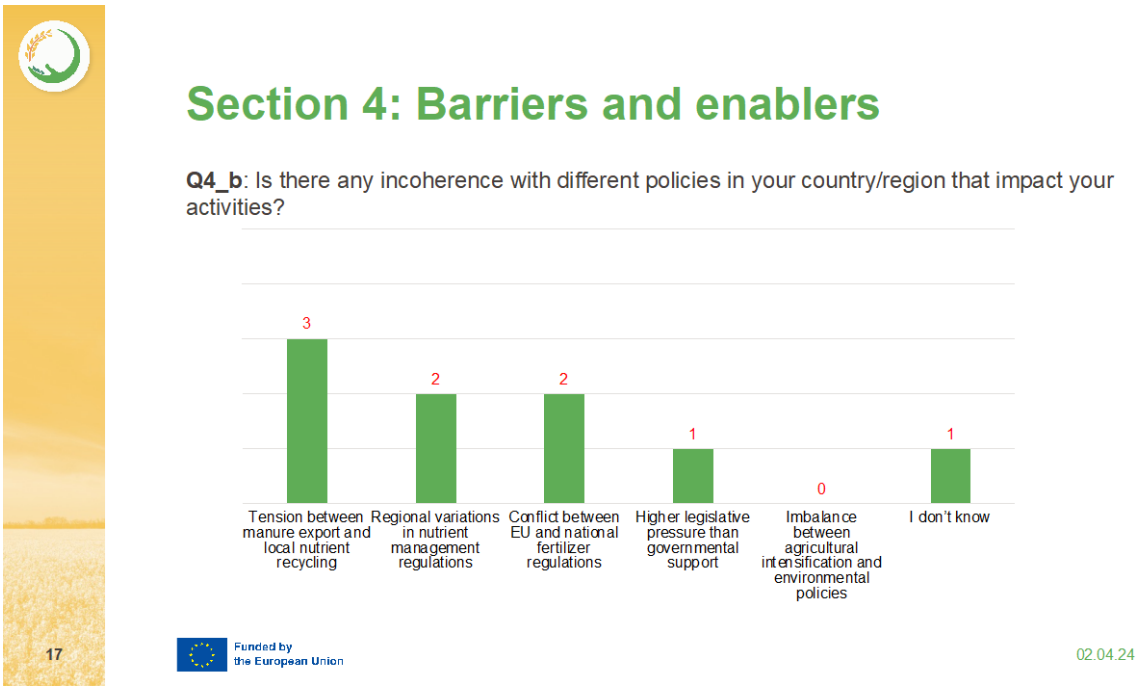
the link). The yellow dots mark the stakeholders that have already answered the questionnaire. *What do you think? Who is missing? What connections are missing?*

We have not identified any national level actors or funding agencies. *Can you think of any? If so, who would you connect them to on the map?*

Note: if the meeting is online, you can paint directly on the map, and if it is offline, we suggest you bring a printed copy where you can hand-draw your answers.
Note 2: This map shows the connections that we have identified, it does not mean that they are ALL the actors of the nutrient management value chain, but the ones that the NK consortium has considered relevant for the project's objective. The map shows the identified connections, the larger spheres are the stakeholders that are better positioned in terms of connections in the network. Those that are not connected do not mean that they are not connected in reality, only that their connection has not been identified for the time being.

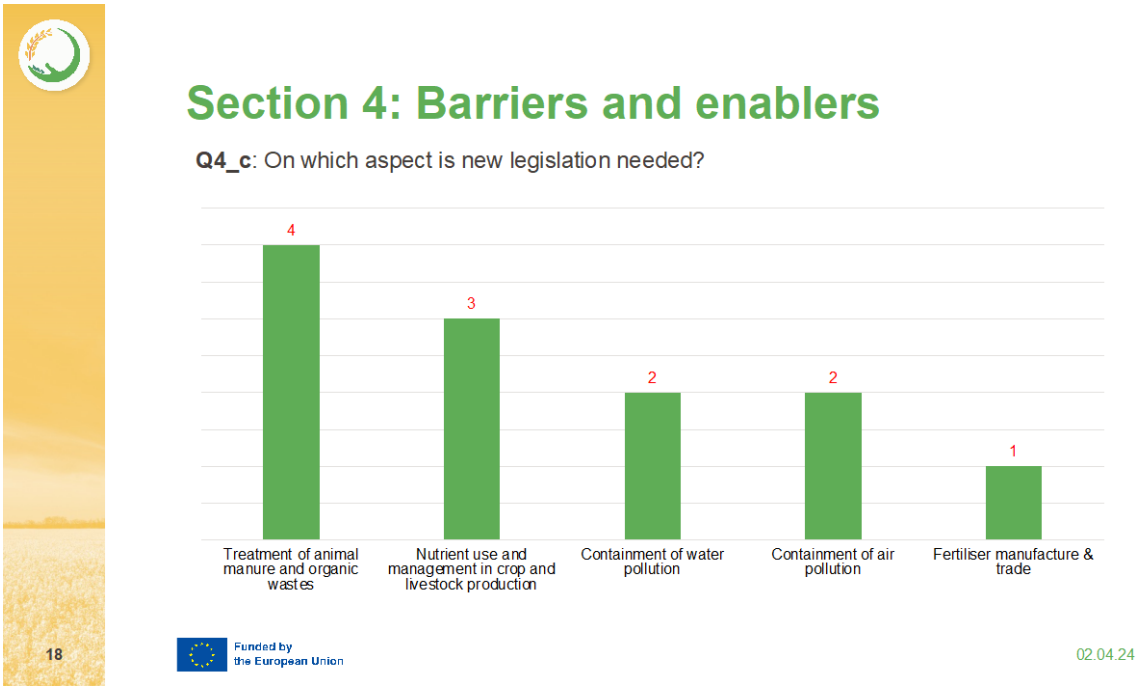


Notes: The respondents highlighted the challenges in getting the legislation permit and lack of financial support. There are other options of challenges, but respondents in Belgium do not think those are of any issue:
I am not aware of the technologies/products/tools
Lack of interest
There are trade barriers or protectionist measures to access markets in other regions
Specific skills are needed to implement the technologies/products/tools
Additional investment is needed in infrastructure or to adopt new methods
Do you agree with the results? How do you see the possible approach to address these challenges?

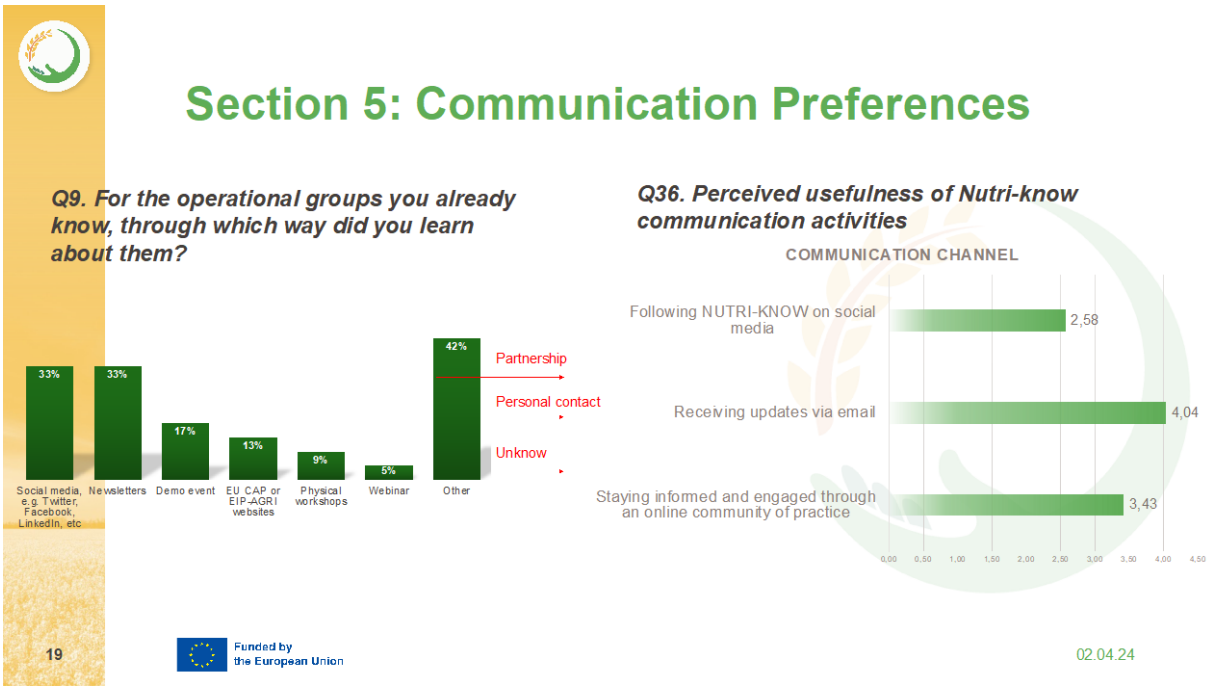


Notes: In response to the legislation barriers and enablers, Flemish stakeholders highlighted the tension between manure export and local nutrient recycling, there are also regional variations in nutrient management regulations, conflict between EU and national fertilizer regulations.

What do you think is the most standing out incoherence?

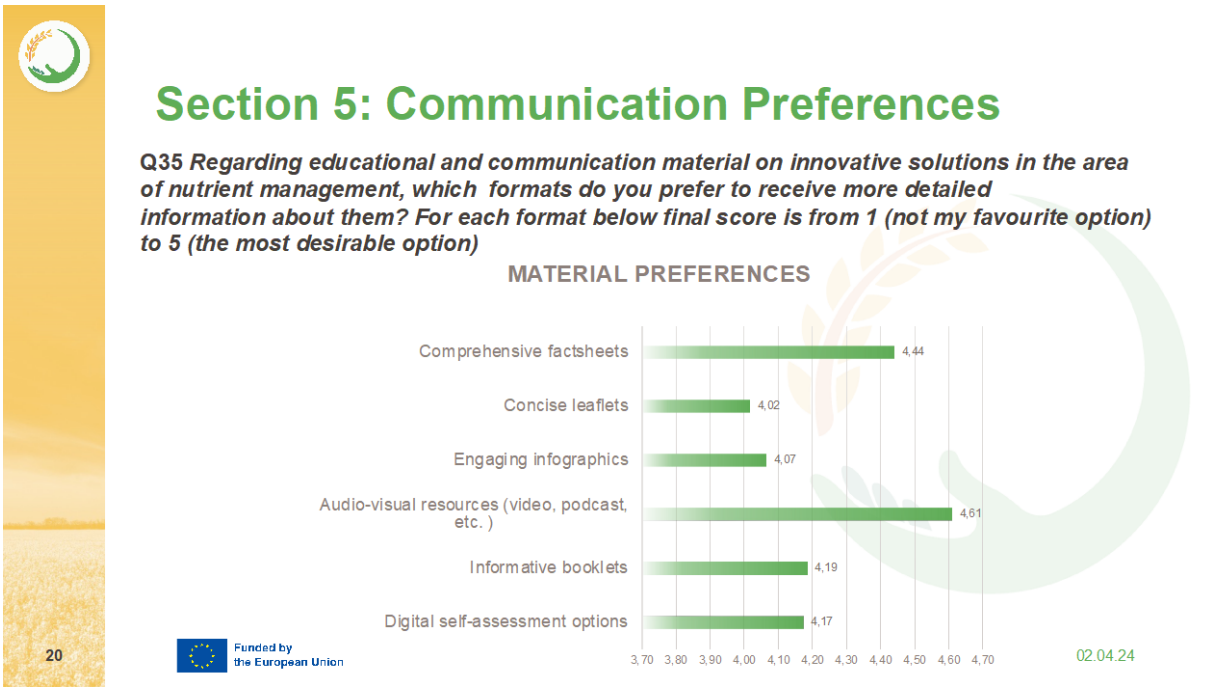


Notes: The respondents to the questionnaire have highlighted the need for new legislations in treatment of animal manure and organic waste, nutrient use and management in crop and livestock production. *Do you agree with it? Could you please give an example, what should be improved in regulations for treatment of animal manure and organic waste?*



Notes: From the responses collected in the questionnaire, we found some deviation in the communication preferences. For example, when they are asked how did they know about the OG, socia media seem to be an effective approach; however, when evaluating the effectiveness of different communication channels, social media was scored the last perceived. It means the social media might be more powerful in this type of communication than what we thought.

Do you agree? What is your preferable communication channel?



Notes: This question relates to the preferences in sharing communication material. Show the results of the questionnaire and ask whether they agree with them. *What would be your preffered type of material?*

END OF THE INTERVIEW

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AFTER THE INTERVIEW

- Transcribe (in English) the interview (according to the record of the conversation) and save it in a document with the following naming format: WP2_Interview_your organisation name_location_date (ddmmyyyy) (eg. WP2_Interview_WE&B_Barcelona_12012024).
- Have look at Interview & Transcription Tips.pdf.
- In the text, highlight your own thoughts, appreciations and relevant statements.
- Provide a short summary (one two paragraphs with your own reflections that could help the analysis and integration).
- Ensure that you have collected the consent sheet from participants and stored it properly. If you have a physical signed consent sheet of the interviewee, send a scan of it via mail as well as the original via post to WE&B. If you have recorded the consent by voice at the beginning of the interview send the part of the recording when the consent is given to WE&B.

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5.4 Annex 4: Research information letter (consent sheet)

DATE, LOCATION

Dear Ms./Mr. ……..,

NUTRI-KNOW is a project funded by the European Commission Horizon Europe research program (Grant agreement No 101086524) that aims to contribute to a safe and cost-efficient nutrient management, which is a strategic element for the EU agricultural sector (http://nutri-know.eu). NUTRI-KNOW aims to support the modernisation and dynamisation of the agrifood sector by broadening EIP-AGRI Operational Groups (OGs) outcomes across borders. NUTRI-KNOW will contribute to foster and share knowledge and innovation aiming to address the most urgent needs, challenges, and opportunities for farmers.

What does it mean for you to participate in the NUTRI-KNOW Project?

- **Participation is voluntary**

Your participation in the NUTRI-KNOW project is voluntary and you can choose to stop participating at any time. You can withdraw your consent at any time without giving any reason. It shall be as easy to withdraw as to give consent. Withdrawing consent shall not impact the legality of processing done before the withdrawal. There will be no negative consequences for you if you decide to withdraw your consent. Data and information that has been collected up to the point of withdrawal will continue to be used by the NUTRI-KNOW Consortium, unless the participant requests that their data is removed from the dataset.

If you should decide to withdraw your consent, please contact the research contact person and let them know of your intention of leaving the research project. You can contact the research contact person at the address given below (Ms. Beatriz Medina). Please keep in mind that if you do not provide us with your authorization now or if you cancel it in the future, you will not be able to participate in this study.

We hope that most participants will find the discussion interesting and thought-provoking. If, however, you feel uncomfortable in any way during the interview session, you can decline to answer any question or to end the interview.

- **How do we store and handle the information you provide?**

The provided information will be treated anonymously, which means it will be aggregated with other data and not used as individual data. This is in accordance with the data protection regulation from the European Commission: art. 5.1, “b”, of the Regulation (EU) 2016/679 of the European Parliament and of the Council, of 27th April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC. The results from the study will be stored in the NUTRI-KNOW database which will be archived by WE&B and will be deleted one year after the project ends. The results will be made available to other collaborating researchers within the NUTRI-KNOW project.

Results from this study will be used for the NUTRI-KNOW project and for scientific purposes only. Personal data will be processed in a manner that ensures appropriate security and confidentiality of personal data, which includes preventing unauthorized access to or use of personal data and the equipment used for processing. Recorded information will be processed during the phase of data analysis and will be included in project internal reports or later in scientific publications. Your recorded information will only be processed for the purposes of the project (‘purpose limitation’) and limited to what is necessary in relation to the purposes for which they are processed (‘data minimisation’). The results of this study may be published in scientific magazines, conference proceedings or books.

- **Contact person**

If you want to receive a copy of the results of this study, if you would like to request any further information about your rights as a participant in the testing phases, if you are not satisfied with the way this study is being carried out, or if you have any question or complaint during the testing phase, please contact the leading researcher:

Beatriz Medina,

WE&B

beatriz.medina@weandb.org

Thank you on behalf of NUTRI-KNOW team, we are looking forward to speaking to you soon!

CONSENT SHEET FORM

LINK ACCESS

General		
I confirm I have read and understood **the Information Letter and Consent Sheet** (attached) for the above project. The information has been fully explained to me and I have been able to ask questions, all of which have been answered to my satisfaction.	Yes ☐	No ☐
I **give my consent** to participate in the interview of the research project entitled NUTRI-KNOW	Yes ☐	No ☐
I **give my consent** to record this interview.	Yes ☐	No ☐
I understand that this project **is entirely voluntary and if I decide that I do not want to take part, I can stop taking part in this project at any time without giving a reason.** I understand that deciding not to take part will have no negative consequences for me.	Yes ☐	No ☐
I understand that participation may involve being interviewed and tested by researchers, members of the NUTRI-KNOW.	Yes ☐	No ☐
I understand that I **will not be paid or receive any materialistic reward for taking part in this project.**	Yes ☐	No ☐
I know who to contact if I have any question about the NUTRI-KNOW, my participation thereto or my privacy.	Yes ☐	No ☐
I consent to take part in this project having been fully informed of the **risks, inconveniences and benefits** which are described in full in the Information Letter which I have been provided with.	Yes ☐	No ☐
I agree to being contacted by researchers by email and phone as part of this project.	Yes ☐	No ☐
I agree that my data is collected in a central database. In order to facilitate scientific discoveries, **my non-identifiable data** will be made available to the public (in absolutely anonymous form) for the use permitted by research.	Yes ☐	No ☐
Data processing		
I consent to the **collection of personal data** such as my **name, email address** in accordance with the purposes of this research project.	Yes ☐	No ☐
I understand that personal information about me, including the transfer of this personal information about me outside of the EU, will be protected in accordance with the General Data Protection Regulation.	Yes ☐	No ☐

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