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Initial DSS prototype

Deliverable D4.9

INNOVATIVE DECISION-MAKING TOOL FOR DEFINING THE MOST SUITABLE MANURE MANAGEMENT STRATEGIES TO ACHIEVE A SUSTAINABLE LIVESTOCK FARMING SYSTEM DURING THE WHOLE VALUE CHAIN

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Deliverable D4.9 – Initial DSS prototype			
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1. INTRODUCTION

Livestock farming is a key sector that involves 40 % of the total agricultural activity in Europe. representing a total value for products equal to € 170 billion. However, there is an increasing concern due to livestock farming's contribution to environmental pollution since it generates more than 1.4 billion tonnes/year of manure leading to significant greenhouse gases (GHG) and air pollutants emissions (NH3, NOX)as well as to soil and water contamination caused by hazardous manure chemicals and biological contaminants (called here emerging contaminants). In this context extensive effort has been carried out for years to assess the detrimental effects of farming systems and to develop abatement methods to be implemented. However, despite major advancements, many fundamental issues are beyond the scope of existing legislation.

The main objective of NUTRITIVE is to develop a decision-making tool (DSS, decision support system) able to define the most efficient and sustainable (in its three pillars: environmental, economic, and social) manure management strategies for a given livestock farm limiting manure air emissions as well as soil and water contaminants. This will allow for the formulation of technical guidelines and recommendations that will support policy makers with enhanced knowledge to establish requirements for future European policies.

To fulfil this objective, the project is divided into six work packages (WP): WP1 Up-to-date inventory; WP2 Novel management strategies/technologies investigation; WP3 Modelling and Life Cycle Assessment (LCA); and WP4 Guidelines formulation; WP5 Communication, dissemination, and exploitation; WP6 Management (Figure 1).

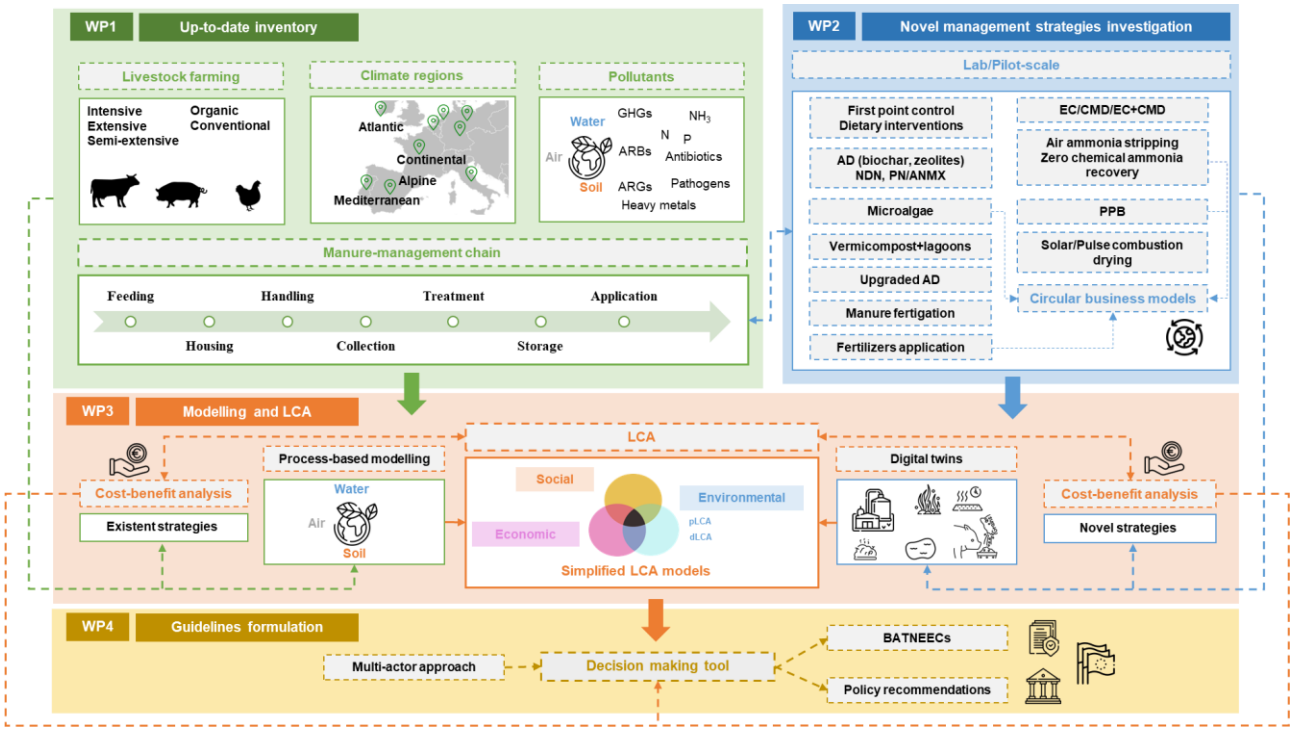

Figure 1. NUTRITIVE methodology.

NUTRITIVE anticipates a wide spread of the project outcomes, with the synthesis of the consortium as a baseline: 22 partners (4 Chinese) from 8 different countries across Europe, covering 6 climatic regions (2 Chinese ones), representing the whole supply chain experts, from animal feed to soil application.

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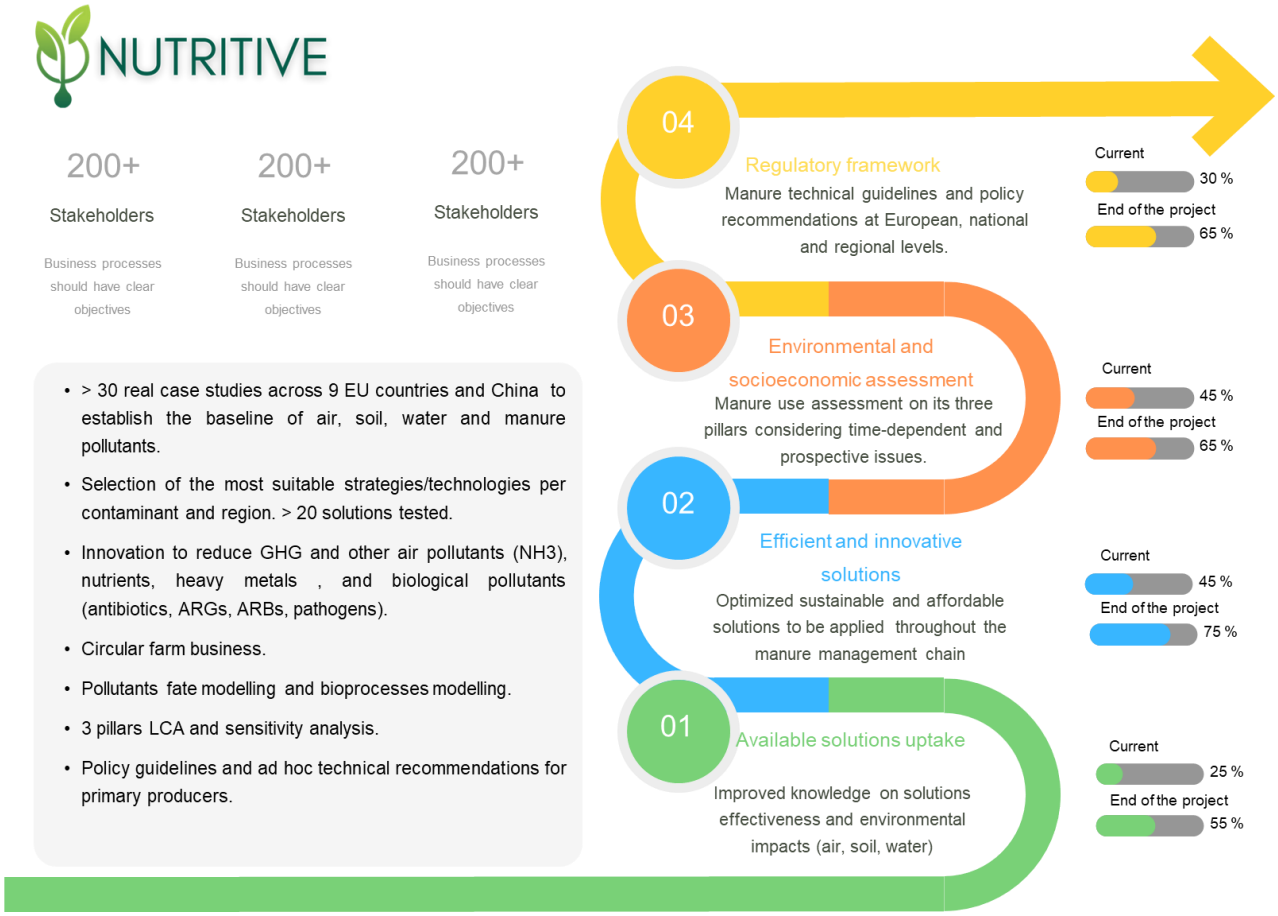

Figure 2. NUTRITIVE overview.

2. NUTRITIVE DSS CONCEPT

The NUTRITIVE Decision Support System (DSS) is being developed as an online, user-facing platform that translates heterogeneous evidence generated across the project into practical, decision-oriented recommendations for different stakeholder groups, namely farmers, advisors and policy makers. Its purpose is to support manure management choices that must reconcile farm constraints with environmental performance, economic feasibility and social acceptability, while accounting for nutrients and emerging contaminants across the value chain.

In operational terms, the DSS will combine information provided by the user about their farm context, such as livestock type and numbers, baseline handling and storage practices, and relevant operational constraints, with parameters linked to the location (e.g., climate context). This input layer will be connected to project-generated results, including monitoring and analytical datasets from case studies, technical and operational characterisation of candidate strategies and technologies, and modelling outputs and life-cycle sustainability assessments. Where needed, external reference sources (such as public environmental datasets and regulatory thresholds) will be incorporated to place results in context and support interpretation from an adoption and compliance perspective.

The agreed concept foresees a structured approach to data ingestion and integration, enabling transparent comparison of alternative strategies and technologies and ensuring that outputs are adapted to the decision needs of each user group. Ultimately, the DSS will provide a shortlist of suitable Best Available Techniques Not Entailing Excessive Costs (BATNEECs) and management options and will communicate comparative performance through clear, user-friendly formats that facilitate decision-making.

3. PROTOTYPE CONCEPTUALISATION AND INFORMATION FLOWS

To establish a shared vision of the DSS and reduce downstream integration risks, MEDRAR led a partner co-creation session focused on defining the core logic of the tool and the end-to-end user experience. This session was used to align expectations across WPs, identify the minimum information required to enable the first decision-support functionalities, and agree how WP outputs should converge into a single coherent platform. The resulting blueprint is intentionally treated as a living definition that will be revisited iteratively as WP results mature and as implementation constraints are validated during development.

The conceptualisation work clarified the scope of information the DSS must integrate, distinguishing between project-generated outputs (ranging from analytical case-study data to technology characterisation and modelling/assessment results) and external reference sources needed for benchmarking and compliance framing. It also defined the type of information that users will be asked to provide, structured around mandatory inputs, automatically inferred parameters (such as location-dependent conditions), and optional inputs that allow refinement of scenario comparisons. In parallel, the expected outputs were specified as recommendations and scenario comparisons spanning environmental, economic, social and legal/compliance dimensions, with the depth and language adapted to the needs of farmers, advisors and policy makers.

Finally, partners agreed a set of interaction and visualisation principles to support usability and comparability. The DSS is expected to guide users through structured input flows reduce user burden through inference where possible, and present results in formats that enable rapid interpretation and trade-off analysis, such as traffic-light ratings, comparison tables and radar-style summaries. To make integration scalable as the project progresses, harmonised data templates (e.g., parameter-wise CSV structures) have been defined to feed the platform through APIs, limiting

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rework and ensuring consistent information flows as datasets, models and algorithms are progressively incorporated.

4. INITIAL DSS PROTOTYPE

To make the current progress tangible and to illustrate how the DSS concept is being translated into a digital product, this deliverable includes access to a first DSS demonstrator. The demonstrator materialises the blueprint described in the previous sections and provides a user-facing view of what the tool is intended to become as the project advances.

At this stage, the demonstrator should be understood primarily as a functional user interface prototype. It showcases the expected look and feel of the platform, the main user profiles and navigation logic, and the intended end-to-end user journey. In practical terms, it allows stakeholders to explore how the system will guide users through the process: what type of information the DSS will request from each user, how inputs are structured and captured, and what kind of outputs the DSS is expected to provide back to the user in a decision-support context.

Importantly, the demonstrator is not yet the full DSS. The current version does not implement the complete data integration layer, nor the core algorithms and computational logic required to run scenario calculations and generate evidence-based recommendations. These elements will be progressively incorporated in the next development phases as WP datasets, models and assessment results mature and are made available for integration. The demonstrator therefore acts as a scaffold for iterative development: it enables early validation of usability and interaction principles with partners and end users, while providing a clear reference for the forthcoming technical implementation.

Guest access: Link to Nutritive DSS Demo