

## Shaping a knowledge and innovation agenda for a responsible Dutch dairy transition

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Currently, climate change and biodiversity loss are the most pressing sustainability issues in the Netherlands, and other regions in Europe, dairy farming plays an important role in both issues. Approximately 60% of Dutch agricultural land is in use by dairy farms, which is 28% of the entire country (roughly 1.2 million ha). Roughly 1.6 million cows are kept in the Netherlands with an average milk yields of 9255 kg/animal in 2020. This is high compared to the EU average of 7500 kg/animal. This high production is achieved, among others, by importing nutrients to the farm. Due to the high nutrient import and livestock density, the Netherlands has a manure surplus. In the Netherlands, making dairy farming more land-based and nature-inclusive, is part of the current circular agriculture policy vision of Dutch government. The idea is that farms will not have a manure surplus if dairy farms have relatively low numbers of cows per ha or if they have a partnership with a nearby arable farmer that uses the manure. This is quite an ambitious plan as it is estimated that roughly 40% of Dutch dairy farmers do not meet the suggested definition of land-based dairy farming. Numerous contextual factors play a role in this, such as the high prices and restricted availability of land and social and cultural factors: what does it mean to be a 'good' farmer for farmers (do they want to be a nature-inclusive farmer or do they prefer a more intensive farm?) And how is this influenced by their social environment? Especially, the latter raises the question whether, and how, actors in the dairy farming network think about land-based and nature-inclusive agriculture. Are they willing and able to take their responsibility to bring about change? And how should we understand the 'responsibility' of these actors? This thinking triggered a modest study in which we organized two workshops with actors active in the entire dairy value chain. We invited them to talk about two scenarios: an extensive and nature inclusive dairy farming scenario and a more intensive dairy farming scenario with collaborating with arable farmers. During the workshop we invited participants to identify the facilitators and barriers to change toward realizing one of the two scenarios, and we harvested the knowledge questions that participants have about the realization of the scenarios. These two elements were used to shape a research agenda and to reflect on possible roles research can play in supporting established actors to change.