Table S1. Non-exhaustive overview of agricultural simulation models in literature.

MODEL NAME	REFERENCE	INSTITUTE	TEMPORAL RESOLUTION	SPATIAL RESOLUTION	EXTENT	MECHANISM
CLUE	[72]	Wageningen University, Netherlands	yearly time step	7 to 32km grid	National - continental level with finer allocation	Empirical model simulating multiple land-use types simultaneously.
CLUE-s	[69]	Wageningen University, Netherlands	yearly time step	1m grid	Combination of national to continental with local to regional extent	Empirical model simulating multiple land-use types simultaneously.
DYNA CLUE	[73]	Wageningen University, Netherlands	yearly time step	1 km grid	Multi-scale applied to the European Union	Empirical model combining top-down allocation of land use change with a bottom-up determination of conversions.
FORE-SCE	[74]	US Geological Survey, EROS Centre	yearly time step	250m grid	Sub regions in the Western Great Plains (USA)	Combining theoretical, statistical, and deterministic modelling techniques to project future land cover change.
DINAMICA	[75]	Federal University of Minas Gerais, Brasil & Intelligenesis do Brasil	yearly time step	100m grid	Small sub-regions in the Amazon basin in Southern Brazil	Stochastic cellular automata model to simulate spatial patterns.
(no name)	[76]	International Livestock Research Institute, Kenya & International Centre for Tropical Agriculture, Colombia	yearly time step	Plots of land	Hypothetical landscape with 300 parcels and 106 households	Conceptual model
LandSHIFT	[77]	University of Kassel, Germany	5-year time step	5 arc-minute grid	Continental to global extent	Empirical model for land use change dynamics based on country-lever inputs
GTAP + IMAGE	[78]	Wageningen University and Research Centre & Planbureau voor leefomgeving, Netherlands	10-year time steps	Countries	National to continental level	Non-spatially explicit combination of an economic and biophysical model

Table S2. AD AM ODD protocol.

Overview	
Purpose	The spatial simulation of the number of farmers and the size of farms in a real-world setting allowing the testing of different scenarios influencing the profitability of the farm
State variables and scales	The main entity in the model is the farmer. Farmers can be of different types: animal farmer (land based or non-land based), greenhouse farmer, permanent crop farmer or rotational crop farmer. All farmers have an age, use a certain number of agricultural parcels that together form its farm, and belong to a certain municipality (the municipality where their "main" parcel or home is). The spatial unit of the model is the parcel, parcels have a certain size, belong to a farmer and to a municipality and have neighbours. The model is capable of running for larger extends (e.g., regions or countries) and each time step, represents a year.
Process overview and scheduling	Every time step (year), farmers die, retire of decide to continue farming. If the farmer dies or retires, a chance for succession is determined based on the location of the farm and its profitability for land-based farming types (crop farming and herbivore farming) or a general succession change for non-land-based farming types (greenhouses and granivore farming). The profitability of the farm is defined by a function which related the revenue of the farm to the total area of the farm. If the farm has no successor, for each of the parcels defining the farm a new farmer is searched in the vicinity of the parcel. If the new farmer is of a different type, the parcel is converted leading to agricultural land use change.
Design concepts	
Design concepts	Due to stochasticity in different steps of the model, the results will be different after every model run, with changes in the number of farmers and the farm size. The remaining number of farmers and their farm structure are, as such, the main results to obtain from the output. The decision of a farmer to retire and for a new farmer to take over a farm, are strongly depending on the profitability of the farm. Changes in the parameters determining the profitability (e.g., subsidies), will impact the decisions made by the farms. These can be used for future scenario testing. The interaction of farmers is limited to the exchange of parcels when a farmer quits, and the availability of information on expected yield for crops in the region, helping them in the decision-making process on next year's crop.
Details	

Initialization	Initialization is based on the provided input data from surveys to create a starting situation close to reality for the starting year. The initial farmer population is created based on the number of farmers per spatial entity (e.g., municipality) and further information on farmers' age distribution, farm types and initial agricultural land use of the parcels. This step is not necessary if information about the user of each agricultural parcel is available.
Input data	The model requires information on the number of farmers of each modelled type in each entity (e.g., municipality), the age distribution of the famers and the mortality chances at each age. Secondly, it requires the input of a dataset of agricultural parcels and their current agricultural land use, with derived information on location, size and neighbouring parcels and possible changes to the parcel on a yearly basis (urbanisation, conversion to nature). For the crop decision making process, information is required on the current price or expected price evolution of the modelled crops, the expected yield for each crop and information on the rotation of crops.
Submodels	First, the land use of parcels changes based on the input data (urbanisation, conversion to nature). Next, farmers leave the system by dying (stochastically determined based on the general mortality chances of the population) or retiring. The farmer retires at the legal retirement age when a successor is present, or at a later age according to a calibrated probability. The decision making of a possible successor to take over a farm or not is stochastically determined according to a probability based on the regional retirement chance available in statistics, which is combined with the profitability of the farm for land-based farming types. Farms without a successor, end activities and parcels are divided among farms cultivating neighbouring parcels. Priority is given to farms of the same type. If not of the same type, the parcel is converted to a suitable agricultural land use for the farm type. Lastly, farms with yearly crop rotations decide on a new crop on their fields based on the expected probability, defined by the combination of the expected yield for the possible crops and the price level for the crop, in combination with the rotation probabilities in the region.