

Using scenarios to test innovative tools

Problem

A key aim of GenTORE is to develop innovative selection and management tools that enable farmers to breed cattle that will be resilient to different and changing environments, whilst also maximising efficiency. Previous research has told us that a fundamental obstacle here is defining exactly what ‘different and changing environments’ we anticipate.

Solution

We cannot accurately predict the future, so instead we will use future scenarios. Scenarios are coherent and credible alternative futures, characterised by a range of environmental, social and economic conditions. Using these future scenarios, we can test the performance of proposed selection and management strategies.

What will we need?

Two important aspects of scenario analysis are the **baseline conditions**, and a **set of scenarios**.

Baseline conditions:

- The baseline is the starting point of the model, it will describe the production environment of today.
- We plan to test strategies on a combination of intensive and extensive dairy and beef systems in France, Spain, Sweden and the UK, so we will need lots of data about these systems for an accurate starting point.
- Within GenTORE, a comprehensive set of data are available that describe the current production circumstances of an average farm in multiple regions across Europe (including those mentioned above), accounting for many economic, social and environmental factors.

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Publication

You can read more about **SSPs** and **RCPs** at:

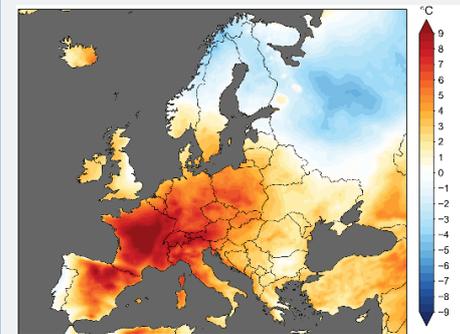
SSP – ([Link](#))

RCPs – ([Link](#))

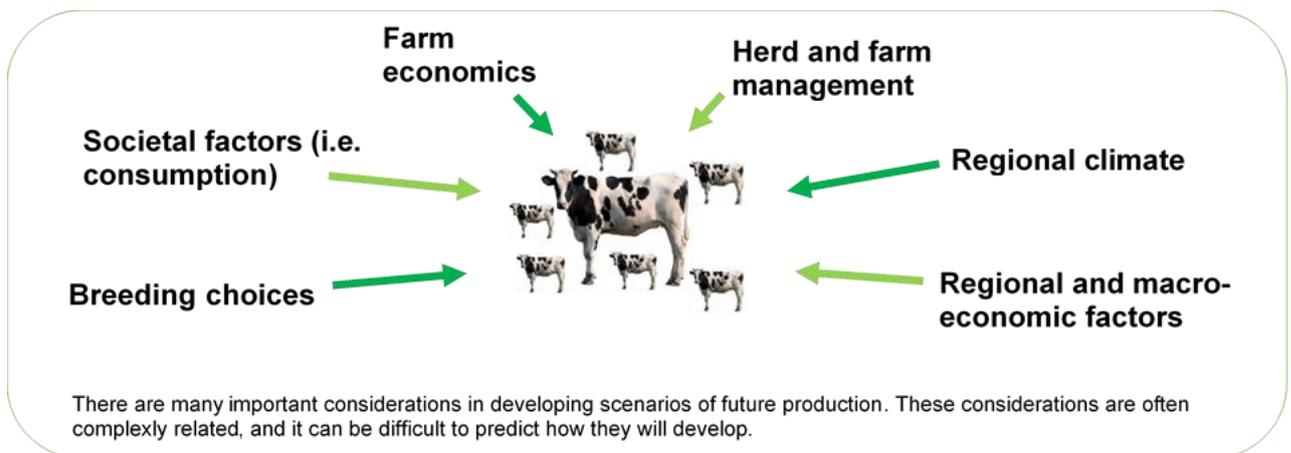
Keywords

Shared Socio-economic Pathways (SSPs)
Representative Concentration Pathways (RCPs).

Illustrations



Credit: ECMWF, Copernicus Climate Change Service



A set of scenarios:

- The so-called Shared Socio-economic Pathways (SSPs) include five scenarios that describe major aspects of global human development, a couple of these are summarised in Table 1.
- SSPs are linked to a set of climate scenarios called Representative Concentration Pathways (RCPs). They are linked because the climate is affected by human development.
- The RCPs include four scenarios that describe how the global climate is likely to evolve over the course of the 21st century, a couple of these are also summarised in Table 1.
- Using SSPs and RCPs, we can ensure our future scenarios include the key drivers that will define many aspects of future food chains and production circumstances.

Which scenarios will we choose?

SSPs and RCPs are global-scale scenarios. However, much research within GenTORE is specific to regional-scale production. Therefore, these global-scale scenarios must be carefully modified to be relevant at a specific regional-scale, so that we can understand the consequences of specific challenges to a farm system. For example, the most severe impacts of climate change are likely to stem from the increasing frequency and magnitude of extreme local weather events, rather than resulting from an incremental increase in global average temperature.

What will we learn?

Once we have chosen specific scenarios from the SSPs and RCPs, and made them regionally appropriate, they will be combined with baseline data for specific regional production systems in order to test selection and management strategies. We will then be able to assess the impact of these strategies on farm resilience and efficiency, gaining key insights into trade-offs between short-term decisions and longer-term outcomes.

Type	Scenario	Brief description
Climate	RCP2.6 (optimistic)	The world aims for, and achieves, sizeable reductions in emissions of GHGs. Following this scenario, there is a considerable chance of limiting global warming to 2°C above pre-industrial levels, by 2100.
	RCP8.5 (pessimistic)	Global GHG emissions continue to rise, as nations choose not to switch to a low-carbon future. In this scenario, temperature increases are considerable higher than with RCP2.6.
Socio-economic	SSP1 (optimistic)	Rapid shift to sustainable development, characterised by low materialism, less resource intensive diets, greater emphasis on renewable energy and energy efficiency, stringent environmental regulations, rapid diffusion of knowledge and technology, and effective international cooperation in all areas.
	SSP5 (pessimistic)	Continued rapid and fossil-fuelled development, characterised by high and widespread materialism, status consumption, resource intensive diets, and limited international cooperation on matters of the environment.

Table 1: Brief details of scenario components that will be considered in the construction of alternative futures by GenTORE researchers.

“GENomic management Tools to Optimize Resilience and Efficiency - GenTORE” is an H2020 project which aims to develop innovative genome-enabled selection and management tools to empower farmers to optimize cattle resilience and efficiency in different and changing environments.
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