

The regenerative production model: a proposal to overcome the environmental and climate crisis

The **regenerative model** includes a whole series of practices that promote **soil health** and, with it, that of all the elements that make up the system. It is based on integrating agriculture, livestock and forestry as the axis of **a sustainable food system** that reproduces natural patterns and processes. It differs from the conventional model in that **it allows the accumulation of organic matter in the soil**, integrating the animals into the functioning of the system and reducing the inputs needed to produce food. In this way, it has **important advantages over the conventional model** in order to overcome the current environmental and climatic crisis.

■ Origin and sources of the regenerative production model

The regenerative model was first defined in the early 1980s, when the **Rodale Institute** defined the term "regenerative agriculture" as a real environmental and economic alternative to conventional agriculture. Since then, with the Australian Darren Doherty as the initial promoter of its introduction in many parts of the world, the regenerative production model has **expanded and spread throughout the world**.

The regenerative model is not a unique concept but includes a whole series of practices that promote **soil health** and, with it, that of all the elements that make up the system: **crops, animals, forests and people**. The sources on which the regenerative model is based are diverse (**Table 1**), including different agricultural alternatives (natural agriculture promoted by Masanobu Fukuoka in Japan, organic agriculture, carbon agriculture or pasture cropping), agroforestry or a combination of trees with crops or

livestock, the design of key lines to retain water, programmed intensive grazing (through holistic management or rational Voisin grazing) or Polyface farms where living soil, plants and animals are integrated.

■ Objective and bases of the regenerative model

The objective of the regenerative model is to integrate agriculture, livestock and forestry as the axis of a **sustainable food system** that reproduces natural patterns and processes and establishes a global vision of the productive system that includes environmental, economic and social aspects. The regenerative model is a way of producing with the objective of being:

- **Ecologically regenerative:** it promotes practices that do not degrade the soil, but rather regenerate it and thereby improve the services provided by ecosystems, animals, plants and the humans who live in them.

TECHNIQUE	DESCRIPTION
Natural farming	Based on intervening as little as possible in the system to let natural processes do their work. It proposes the rotation of crops within the same year and looks for the right moment to carry out each action.
Organic agriculture	Cultivation system based on the optimal use of natural resources, without using chemical products and promoting the production of biofertilisers and native microorganisms.
Carbon agriculture	It consists of leaving the soil unploughed, since tilling the fields can alter the natural structure of the soil and release the stored carbon into the atmosphere.
Pasture cropping	It involves sowing winter cereals directly onto perennial meadows that are active in summer.
Agroforestry	Cropping system that combines trees with crops or livestock in the same area to increase synergies between them.
Keyline design	System that allows water storage, distributing it homogeneously along key lines according to the topography of the ground.
Holistic management	Based on planning how to use very high livestock densities in small spaces, but with very long recovery periods, following a predetermined schedule.
Rational Voisin grazing	System based on a combination of the knowledge of the ecophysiology of the resprouting of grass and needs and animal welfare, in order to choose the most suitable plot at all times for the grass and for the livestock.
Polyface farms	They are resilient agro-silvo-pastoral farms that integrate living soil, plants and animals, increasing the fertility of the system.

Table 1. Main techniques on which the regenerative production model is based.

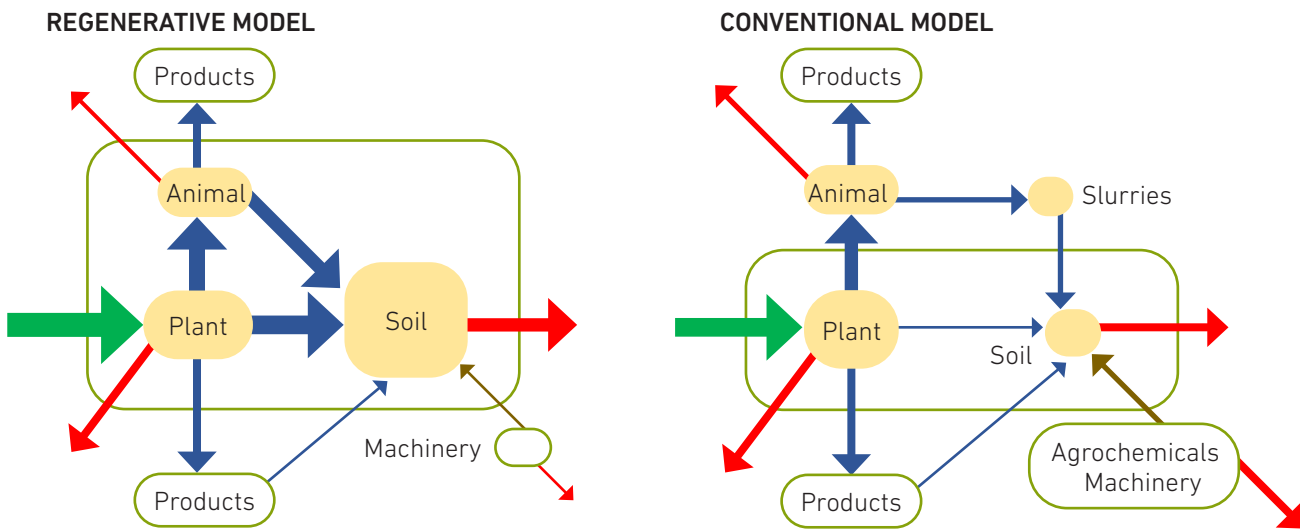


Figure 1. Comparative diagrams of the regenerative production model and the conventional one. Green arrows, photosynthesis. Red arrows, breathing. Blue arrows, flows. Brown arrows, inputs.

- **Economically profitable:** it aims to make farms profitable by drastically reducing costs and increasing yields.
- **Socially sustainable:** it allows the creation of employment and local wealth and is committed to the sustainable and healthy management of food production that can be available to any farmer.

There are **five elements of the production system** in which it is possible to intervene and which are the bases for a regenerative production model: (i) the diversity of plants; (ii) the return of plant materials to the ground; (iii) interventions that block the functioning of soil biological processes; (iv) the functioning of the soil and the carbon cycle; and (v) water as a limiting factor in the productivity of the system. These five elements are described in the sheet "Analysis of a productive system from a regenerative perspective".

Advantages of the regenerative model over the conventional one to overcome the environmental and climate crisis

The regenerative and conventional models differ in some very important aspects that make them show very contrasted schemes (Figure 1). Thus, the **regenerative model is based on** (i) **accumulating organic matter in the soil**, which makes it possible to maintain the trophic web and reduces carbon losses; (ii) **integrating animals** into the functioning of the system, which reduces the system's outputs and allows the internal cycle to be enhanced; (iii) **reducing the inputs** needed to produce food, since it does not use agrochemicals and uses little heavy machinery. On the other hand, the **conventional model** is characterised by: (i) **accumulating little organic matter in the soil**, because it is lost by respiration; (ii) keeping the animals out of the agricultural

system, so that their excrement cannot contribute to improving the soil until the slurry is distributed in the fields; (iii) using large amounts of inputs in the form of **synthetic agrochemicals and fossil fuels** to run heavy machinery.

There are several **advantages of regenerative agriculture** over conventional agriculture in order to overcome the current environmental and climate crisis:

- **Positive balance of the conversion of atmospheric CO₂ into soil organic carbon.** With the regenerative model, considerably more CO₂ is removed from the atmosphere and stored in the soil, since soils do not lose carbon, they store it. In this way, the production system has a positive carbon sequestration balance, something that does not happen with the conventional model.
- **Reduction of CO₂ emissions by the productive sector.** Destroying the soil releases all the carbon it contains. The regenerative model, through not tilling and covering the soil with plants, reverses this process. Greenhouse gas emissions are also reduced by not requiring the manufacture of synthetic fertilisers and pesticides and by requiring much fewer fossil fuels for the use of heavy machinery.
- **No synthetic agrochemical inputs are required.** Regenerative agriculture does not require synthetic fertiliser and pesticide inputs to produce high-yield crops. These agrochemicals have a high cost to human health and the environment, so regenerative systems generate healthier environments.
- **Increase in the water retention capacity of soils.** With the regenerative method, soils are richer in organic matter, which increases their water retention capacity and helps plants to better resist climate change.