



EKOLOGISK
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Regenerative grazing – What? How? Why?

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Photo: Anna Hessel

Regenerative grazing is a concept that has become increasingly common in recent years. This literature review aims to describe the principles, methods and goals of regenerative grazing.

What is regenerative grazing?

In recent years, the use of the term regenerative agriculture has increased significantly both in academic literature and by organisations in the agricultural sector and food industry. However, there is no uniform definition of regenerative agriculture¹. It is also unclear whether regenerative agriculture is primarily about production methods or goals, but production methods that are often considered to characterise regenerative agriculture include integrating crop and livestock farming, minimising the use of inputs and tillage and more diverse

crop rotations^{2,3}. Important goals include improved soil health, increased carbon storage and improved water and ecosystem health².

Grazing according to regenerative principles is assumed to increase soil fertility for crop production^{3,4}, while also benefiting animal production. As with regenerative agriculture in general, it is difficult to define regenerative grazing in a uniform way, and adaptation to location, climate, season as well as considering the purpose of the measure is often emphasised as crucial to the grazing

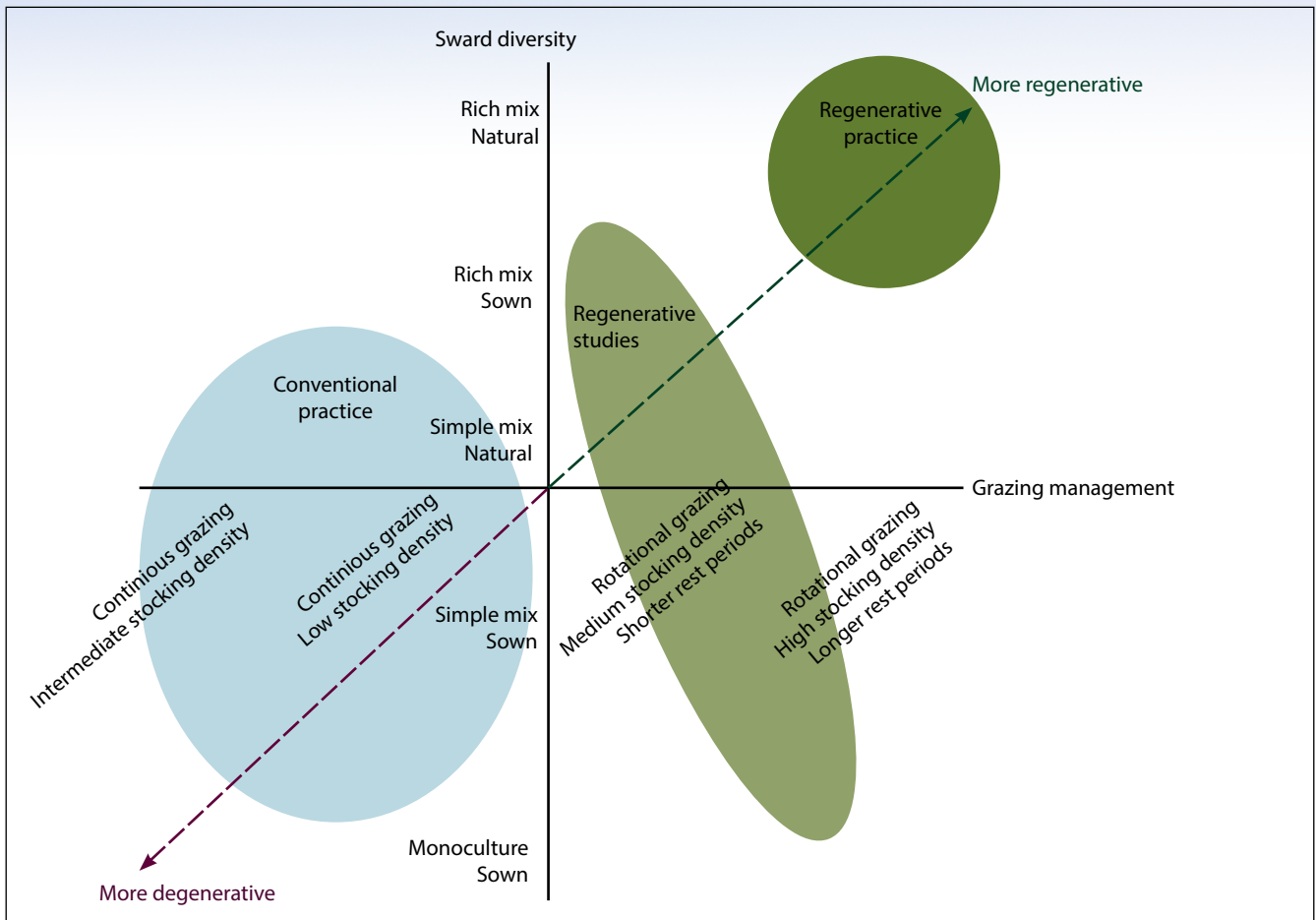


Figure 1. Schematic diagram of grazing along two axes of grazing control and diversity in grazing, according to Jordon et al. (2022)⁵. The x-axis shows different grazing management strategies and the y-axis shows different degrees of plant diversity in grazing. The figure illustrates the scale between more (upper right corner) or less regenerative grazing principles (lower left corner).

strategy. However, two important production methods for regenerative grazing are rotational grazing and the use of a high diversity of plant species in the pasture (Figure 1). Integrating crop production and animal husbandry and minimising tillage are important general principles of regenerative agriculture that also affect grazing practices.

Rotational grazing – nothing new

Some form of rotational grazing with paddock division of the grazing area has for long been the

most common grazing system in Sweden⁶. Rotational grazing is common because it is an effective way of dealing with the varying growth of the pasture over the growing season: under Swedish conditions, pasture growth is around double as high in early summer compared with mid- and late summer⁷. One consequence of slower growth during the season is that the rest period between grazing should be increased. Dividing pastures into smaller paddocks increases the opportunities to harvest



hay or silage during the rapid growth period in early summer. These paddocks can then be included in the grazing rotation in late summer. Paddock division also makes it possible to control the rest period in different paddocks in relation to how the pasture is growing and to reduce parasite pressure in the grazing paddocks. The main differences between common Swedish rotational grazing and regenerative grazing lie in the timing of when animals are released onto the pasture, and in the approach to pasture use and plant residues.

Rotational grazing according to regenerative principles

The application of rotational grazing in regenerative agriculture is often based on what is known as adaptive or holistic grazing management, developed by Alan Savory⁸. A key part of holistic grazing management is high stocking rates for short periods and long regrowth periods for the pasture in between. The aim is to counteract soil erosion and maximise regrowth, biomass production, carbon storage and economic profitability from grazing. Many of these positive effects are achieved by avoiding heavily grazed vegetation (Figure 2). Another possible benefit of rotational grazing based on regenerative principles is that the spread of parasites among animals can be counteracted by the extended rest period, the short intensive grazing period, the high plant diversity in the pasture and the fact that the animals do not come into close contact with manure when grazing in taller vegetation⁹. However, more research is needed to prove this conclusively.

The benefits of holistic grazing have been debated. While several of the alleged benefits are based on reasonable biological or ecological principles – such as that well-planned grazing can increase carbon sequestration – their significance has probably been exaggerated by its proponents¹⁰. It is also unclear whether the benefits of holistic grazing would be as great in Sweden as in Zimbabwe, where Savory originally developed his ideas, for example due to the large differences in the growth conditions for grassland plants depending on climate and soil.

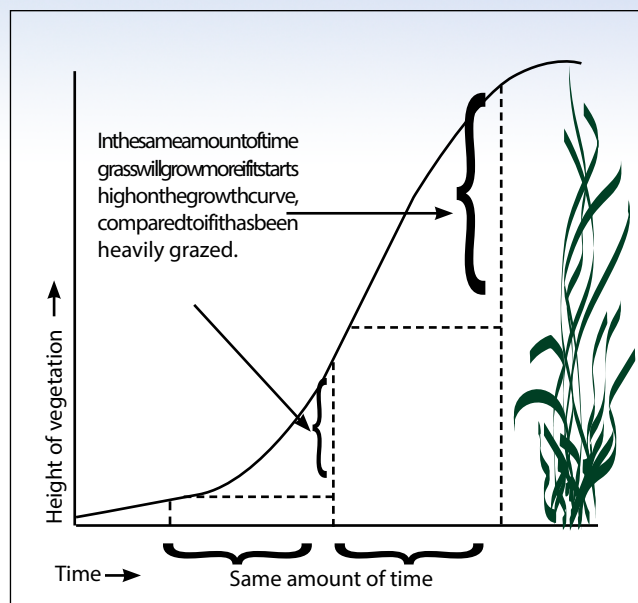


Figure 2. Avoiding heavily grazed vegetation counteracts soil erosion and also promotes regrowth. The figure is based on Butterfield et al. (2019)⁸.

Furthermore, there is the question of which animal categories are suitable; high-yielding dairy cows may not be suitable for these systems, but animals for meat production may show good productivity⁵. Regenerative and holistic grazing may also need to be adapted to Swedish semi-natural grasslands so that they are in line with the requirements for management under the environmental compensation scheme concerning grazing residues and continuous grazing pressure.

Plant species richness in the pasture

An increased diversity of plant species grown together has overall positive effects on total plant biomass production and production stability^{11,12}. The positive effects are due to the different functional characteristics of various plant species, which increase resource use and resistance to disturbances such as drought when growing together rather than individually¹³. Different plant species can have different root architectures or nutrient supply strategies. For example,



legumes can fix nitrogen from the air through a symbiotic relationship with bacteria, and this symbiosis can be maximised when legumes grow with, for example, grasses which compete with them for nitrogen in the soil. In Sweden, these advantages are often already exploited in grazed leys (improved grasslands), where it is common to grow a mixture of different species of grasses and legumes together, and in semi-natural grasslands that host a high plant species richness. However, ley seed mixtures need to be developed and adapted for regenerative grazing strategies. The greatest benefit to biomass production from adding more species occurs when the initial number of species is low, after which the benefit decreases or disappears as the number of species increases¹³. In a similar way that more plant species in the pasture are beneficial, different grazing animal species also show advantages for the sustainability of production¹⁴.

However, most research on the benefits of plant diversity for biomass production has been conducted without grazing animals^{15,16}. Therefore, there is less knowledge about the relationships between plant diversity in pastures, biomass production and effects on grazing animals. In grasslands with grazing animals, studies of ecological interactions are complicated because plant diversity can affect the animals, but the animals' grazing preferences can also change plant diversity. However, there are several potential benefits for grazing animals on a pasture with a higher plant species richness. Many herbs have a higher mineral content than common forage plants, which positively contribute to mineral supply⁶. Greater plant diversity in the pasture can also increase the animals' feeding opportunities, reduce parasite load and increase animal growth, but the risk of anti-nutritional substances in the pasture may also increase in semi-natural grasslands with a high diversity of plants or if undesirable species establish themselves in grazed leys¹⁷. The composition of fatty acids and the concentration of antioxidants can also be positively affected in meat from animals that have grazed on land with greater botanical diversity¹⁸. However, a practical

difficulty with having a diversity of plants in the pasture is that optimal management – for example, when to release animals, how long they should graze and how long the pasture needs to recover – may differ across plant species.

Integrating crop production and animal husbandry

Integrating crop production with animal husbandry at field, farm or regional level reduces the negative environmental impact of agriculture and increases the delivery of ecosystem services¹⁹. Importantly, integration leads to greater circulation of plant nutrients within the system, resulting in less loss of plant nutrients from animal husbandry. In crop production, an increased amount of temporary leys in the crop rotation leads to more fertile soil with a higher soil organic matter content, improved plant health and increased biodiversity¹⁹.

Integrated crop and livestock farming is a leading principle in regenerative agriculture in general. Perhaps the simplest method of integrating crop and livestock farming in line with regenerative principles is to have leys in rotation with other crops. Both leys that are harvested for fodder or grazed can lead to increased circulation of plant nutrients, but on grazed leys this return is faster and more direct through animal manure. However, there are also examples of further integration of grazing animals with crop production, such as early grazing of cash crops (so-called dual-purpose crops)²⁰. New technologies, such as virtual fencing²¹, can facilitate the integration of grazing into crop production. However, this should not be at the expense of fewer animals on semi-natural grasslands, as grazing plays an important role in preserving biodiversity in agricultural landscape²². Thus, the role of animals in agriculture can change from a passive function involving the conversion of feed into food to animal husbandry, to animal husbandry in which the various abilities of animals are used as a resource that contributes to various functions within the agricultural system²³.





Photo: Karin Ullvén

Reduced tillage

When pastures are integrated into crop rotation with arable farming or renewed on arable land, the regenerative farming principle of minimising tillage and pesticide use for soil and ecosystem health can be challenging to apply, as it can be difficult to break the ley without tillage or herbicides. The fact box on regenerative grazing at Sjövängen provides some examples of how leys can be renewed without herbicides and with no or minimal tillage. Another way to reduce tillage is to establish longer-lasting leys. However, more sustainable plants for leys need to be developed, and there is currently a lack of knowledge regarding how leys should be managed to achieve this in practice.

How does regenerative grazing relate to organic production?

The Rodale Institute was the organisation that began using the term regenerative agriculture in the 1980s. The founder of this institute, John Rodale, bases his ideas about regenerative agriculture on the premise that it is a development of organic agriculture²⁴. However, the term regenerative agriculture has evolved over time to encompass both conventional

and organic farming systems with or without the use of mineral fertilisers and pesticides, as well as stockless arable farms and farms with animals kept exclusively in stables. Active grazing for all animal species is one of the most important principles of organic production, and there are different rules for how much of the daily feed intake should come from grazing. In KRAV-approved production, at least 50 per cent of the feed should come from grazing for most ruminants, but for dairy cows, 6 kg of dry matter per day is sufficient, and for young bulls, grazing should constitute 50 per cent of the roughage intake²⁵. The principles of regenerative grazing can be a way to develop grazing on organic farms and an opportunity for organic farmers who want to stand out from the 'conventionalisation' that has happened over time in organic production. Grazing that reduces parasite pressure is valuable in organic production, where the preventive use of deworming agents is not permitted. However, one challenge for organic producers specialising in regenerative agriculture is that there is no common understanding of what regenerative agriculture means. They also compete with producers who do not have to comply with organic production regulations and certification.





Photo: Niels Andresen

a)



Photo: Ola Lundin

b)

Regenerative grazing at Sjövängen

At Sjövängen, east of Kristianstad, Jens Fjelkner has a KRAV-certified breeding and beef herd of 50 Black Angus cows. The farm also has around ten horses. There are 100 hectares of pasture on arable land with very light sandy soil, as well as 80 hectares of semi-natural grasslands and hay meadows. The cows graze in enclosed paddocks for short periods with long rest periods in between, which results in high vegetation when the animals are released onto the pasture (a). The animals are often moved to a new paddock every day.

The pasture on the arable land has a high diversity of plants and little or no disturbance in the form of tillage. Direct sowing, the seed bank, self-seeding, trampling and mixing seeds into



Photo: Ola Lundin

c)

the animals' mineral feed are used to rejuvenate the pasture.

"The aim of my production method is to increase soil fertility, health and its capacity for carbon storage, while also benefiting the cows and biodiversity," says Jens (c).

Sudangrass (b, light green grass stalks) is a drought-resistant plant species that Jens sowed on part of the pastures in early summer 2023.

"I see Sudan grass as insurance," says Jens. "If there is a drought, Sudan grass will grow well and help secure the pasture, but if there is no drought, it will probably be largely outcompeted by other plants."

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