

Practical guide for getting
the most out of grassland

Grassland signals



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Credits

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A practical guide for getting the most out of grassland

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Translation from Dutch

Noorderlicht

Editor English edition

Luppo Diepenbroek

Thanks to:

Robert Fakkert, Jan Hollander, Henk Jansen, Jos de Kleijne, Wichert Koopman, Praktijkcentrum Aver Heino, Henk Schilder, René Verhoeven, Jan Visscher, Marcel Vijn, Lex van der Weerd, Jan de Wit

Photography

Berrie Klein Swormink, Louis Bolk Instituut, Animal Sciences Group; also: Agrifirm (94), Marcel Batten (78 r), Marcel Bekken (75 br), Blgg (16), Dreamstime (33 br, 72 c and r, 73 l), Geometius (75 l), Google Earth (91 br), Grasdrogerij Hartog (91 tr), Silvia Hellingman (73 tr), Rowie Klein Swormink (19, 61 c, 93 bl), LaMi (30 tl), Lely (61l), Twan Wiermans (10 br, 24 br, 36 bl, 44 br), Wikipedia Commons, user 'Rasbak' (81 tc, tr and br); Cover photo: Twan Wiermans
t = top, b = bottom, l = left, r = right, c = centre

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ISBN: 978-90-8740-046-0

Table of Contents

Grassland Signals	4	4 First cut in sight	38	6 Late summer	70
1 Grass is the basis	6	Signal areas	39	Preventing crown rust	70
How grass grows	7	Estimating yields	40	Other fungi	71
Grasses	8	Watered-down yield	41	Mice	72
Clover for nitrogen	9	Take good care of new grassland	42	Grubs	73
Changing growth	10	Meadow birds	43	Examining a sod of soil	74
Feed the cycle	11	Grazing systems	44	Improving the soil	75
2 Winter rest	12	When should I turn out?	45	To sow or not to sow?	76
Care with Sheep	12	Rotational stocking	46	Mowing? Red clover!	78
Moles	13	Modern set stocking	47	Grazing? White clover	78
Drainage	14	The first cut silage	48	Grass-clover recipes	79
Soil analysis – worth doing	16	The correct time to cut	49	Fresh white roots	80
Plan your manuring	18	Manure according to plan	50	Signal plants	81
Long term or temporary?	20	Manure	51	Grazing during late summer	82
Crop rotation	21	5 After the first cut	52	Mowing during late summer	83
3 The pasture awakens	22	Growth and flowering	52	Manuring in late summer	84
Assessing root growth	23	Docks	53	Weed control	85
Assessing plant composition	24	Grasses in the flowering phase	54	7 Autumn turns to winter	86
Criteria for re-seeding	25	Grass-clover	56	Assessing quality	86
Extra attention	26	White clover	57	New grassland	87
White and red clover	27	Red clover	59	Grazing during autumn	88
Weeds and herbs	28	Grazing after the first cut	60	Young animals longer outside	89
Starting with manuring	30	Planning and record-keeping	61	Poaching	89
Improving utilisation	31	Cutting in summer	62	Mowing during autumn	90
Artificial fertiliser	32	High-fibre grass	63	Autumn grass-clover harvest	91
Grassland improvement	34	Manuring during summer	64	Preparing for the winter	92
Ploughing, digging and rotary cultivation	35	Cow pats and urine spots	65	Looking back	93
Seeding	36	Irrigate or not?	66	Handy aids	94
		Environmental grassland	68	Index	95



On livestock farms, grass is usually the main source of feed for the animals. Good grassland production hugely influences the business's economic performance.

Taking an interest in grassland can provide good returns.

Grassland production varies widely, ranging from about 6 to 16 tonnes of dry matter per hectare per year. The differences can be partly explained by variations in natural conditions such as soil type, soil fertility and water supply. However, with good grassland management, you can also influence the yield and quality of the grass. The economic results of a dairy farm are closely related to grassland yield.

The good thing about grassland is that it provides many signals that you can use to fine tune its management. The grassland make up is a strong indicator about growing conditions and use. Signal plants, for example, can help you take management decisions. They give an indication of the conditions in which they thrive – for example the presence of couch grass can indicate poor soil structure.

Other signals, which are often disregarded, can be found below the surface. The soil below grassland is of crucial importance for good production. In good soil, the soil particles, air and water are randomly, but intimately dispersed. It's teeming with life and roots have space to grow and utilise the nutrients they need. Taking a regular close look at your soil should be a frequent exercise in your grassland management.

Sometimes grassland needs to be treated a bit rough. But you have to know the limits. ▼



Grassland signals

Puzzler

Here and there in this book you'll find 'Puzzlers' – pictures that playfully challenge you to take a closer look at the situation pictured. Looking more conscientiously will give you information you might otherwise overlook. The Puzzlers will help you to think about what you see.

Grazing

Grassland signals is not a grassland handbook. You won't find elements of grassland management arranged by subject; the arrangement is based on the situation on grassland throughout the year. Some activities, like grazing, cutting or tackling weeds, take place at several points throughout the year. You'll come across these activities on several occasions in this book too, always from a theme that's important at that time of year.

Use this guide as a reference. Translate the information in the text and illustrations into your own grassland practice, and look at it as a challenge to observe grassland in a new perspective picking up new signals. The handy index at the back will make it easier to 'graze' through *Grassland signals*.

Observational book

Grassland signals is not a book to be read from front to back at one sitting. It's about observing and reflecting. Text, but above all the many photos and illustrations make it clear what can be seen in and below grassland. They'll help you to see the grassland from a different perspective.



Chapter 1



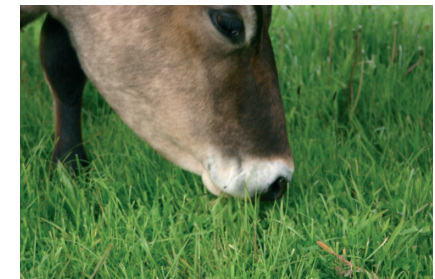
▲ In the course of its evolution, grassland has adapted to short, intensive periods of grazing. Bison, for example, come in as a herd, eat the grass short and move onto the next piece.

Grassland serves first and foremost to produce food for ruminants (cattle, sheep and goats). In nature, most ruminants live in herds to protect themselves from predators. They can eat large quantities of grass at a time, and ruminate it later in a safe place. Under natural conditions a herd will graze an area close to the ground and move on. The current sys-

tem of strip-grazing or short-rotation grazing most resembles their natural pattern: short and intensive. The shape of their jaws, tongues and lips enables ruminants to eat vegetation close to the ground. Grasses have adapted themselves superbly to this kind of grazing behaviour.

Grasses have adapted themselves to grazing over the ages. On the other hand, grazing animals have become better equipped over time at eating and digesting grass. Knowing how grasses and other grassland plants grow is useful for good pasture management and optimum grassland composition.

Grazing cows for a long time on grass shorter than 10 cm is unnatural and comes at the expense of growth (for example under set stocking). The plants have too little leaf surface to supplement the food reserves in their roots. The root systems develop less well, making the grass less resistant to drought and stress. ▼



Two qualities of grass prove that it has adapted to grazing:

- The growing point is low to the ground, so it is not easily damaged by grazing. Most other plants have the growing point at the top of the plant.
- Energy can be stored in the roots, and used later for re-growth.

Grass grows to death

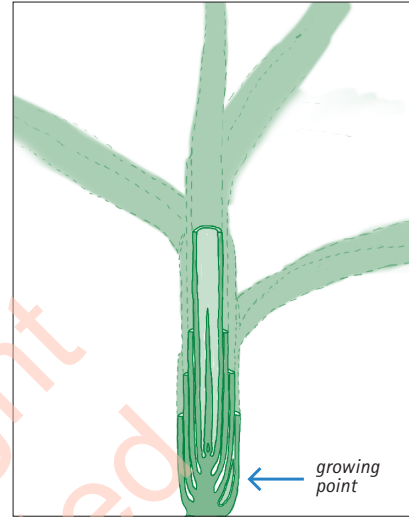
Grass plants get into trouble if they are not cut or grazed. A too tall or too dense crop will not allow enough sunlight to the young grass tillers down below, and these tillers will die. After flowering and forming seed-heads, the main tillers will also die. The sward will try to maintain itself by forming new tillers. There is no energy to replenish root reserves and the grass will start to die from the centre outwards. This phenomenon used to be seen often in conservation areas in Europe which were not grazed.

How grass grows

After grass has been grazed or cut it starts to grow after a few days, using the energy in its root reserves. Growth is at the expense of the root system, which partially dies back.

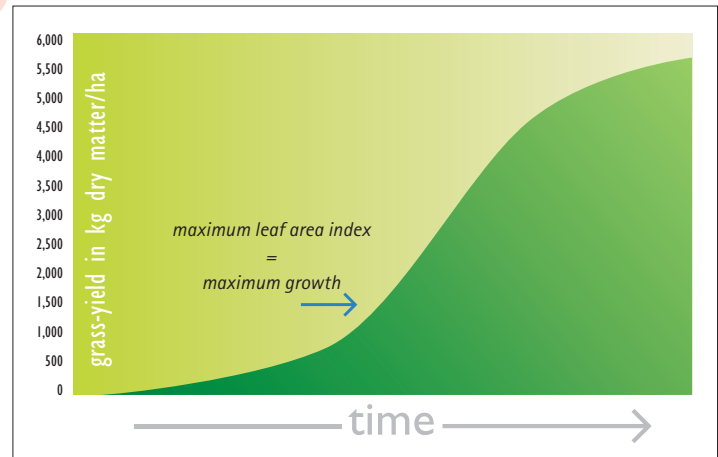
During the first week of this growth, the young leaf only has a small surface area, and it can absorb very little energy. Thus the first growth is slow and is fuelled mainly from the root reserves. As the leaf surface increases, the plant can collect more and more energy from the sun. The speed of growth increases and reaches a maximum, until the entire soil surface is covered with grass blades. This is generally the case if there is a grass dry matter yield of 1200 kg (2600 kg DM herbage mass (presence)) per hectare of land.

At a certain point, the plant is using so much solar energy that it is taking up more energy than it can use for leaf and stem growth above the soil surface. From that point on, it diverts energy to the roots, thereby continually developing a new balance between above-ground and below-ground biomass.



◀ Grass has its growing points low to the ground. They are not easily eaten during grazing and the plant can re-grow within a few days.

'You need grass to grow grass' is an old saying. As the surface area of a grass leaf increases, so does its rate of growth. It is at its greatest when it reaches its optimal 'leaf area index', or when every ray of sunlight ends up on a grass blade. ▼





Grass perfume

Cis-3-hexene-1-ol is an organic compound responsible for the smell of freshly mown grass. This 'leaf alcohol' is a colourless, oily liquid, and occurs in various green plants. This 'grass perfume' also produces the taste of green tea.

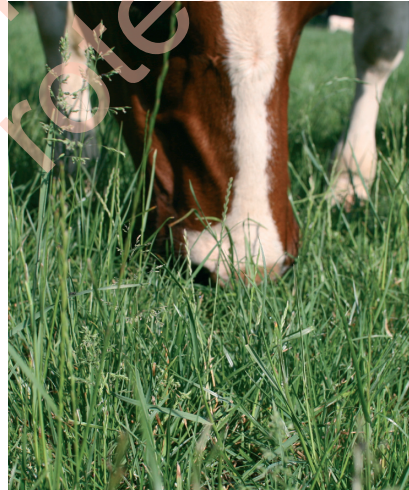
Spring treatment with a grass harrow will remove old leafy matter and introduce air into the soil. ▼



Grasses

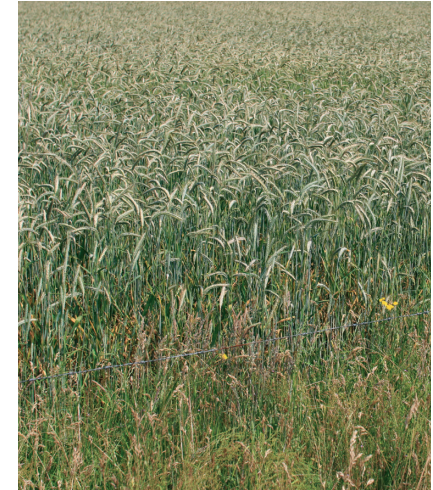
Worldwide, there are more than 8000 species of grasses. The smallest are only a few centimetres high, and the largest can reach about six metres. Livestock farmers in the UK and the Netherlands only have to deal with a few dozen species. The strength of grass is in numbers – grass plants are capable of crowding out other plants by forming a dense and extended carpet of vegetation. Grasses

Grasses and grazers cannot survive without each other. Grazers eat not only the grass but other plants as well, which would otherwise grow bigger than the grass and block their sunlight supply. And of course, grazers fertilise the grass too. ▼



can reproduce both vegetatively and by forming flowers from which seeds are produced. Vegetative or asexual reproduction takes place sometimes through formation of tillers and stolons, from which new plants grow. Mowing, but above all grazing, promotes vegetative reproduction. The grass sward is often denser where livestock are grazing.

Although cereals like triticale and maize are annuals, they also belong to the grass family. ▼



Clover for nitrogen

Grassland contains many other plants besides grasses. Sometimes these are species that are deliberately introduced into grassland, for example clovers. But there can also be less desirable species – the ones we usually call weeds.

Clover complements grass very well, because like other legumes it uses bacteria in its root nodules to fix atmospheric nitrogen. Grass benefits from the nitrogenous compounds produced by the clover to grow and produce plant protein.

As early as the fifteenth and sixteenth centuries, farmers were experienced in introducing clover into their sward. However, cultivating on poorer soils with low fertility was not so easy in those days. After artificial fertiliser was introduced in the late nineteenth century, interest in clover waned. At the end of the twentieth century it was mostly organic farmers who kept on working with clover in their grasslands. Because nitrogen applications are limited by legislation and fertilizer costs are continuing to rise, interest in clover is increasing again.



▲ There are several varieties of white clover: small-leaved (suitable for grazing), medium-leaved (suitable for grazing and cutting) and large-leaved (suitable for cutting, but also suitable in cutting-grazing systems).

Grassland usually contains plants other than those which were sown. For example, most livestock farmers are not happy to see docks appear in their pastures. ▼



▲ Grassland with red clover can yield more than 15 tonnes of dry matter per hectare per year without the use of nitrogen fertilisers.

With good grassland management you can influence the proportions of grass to clover. ▼



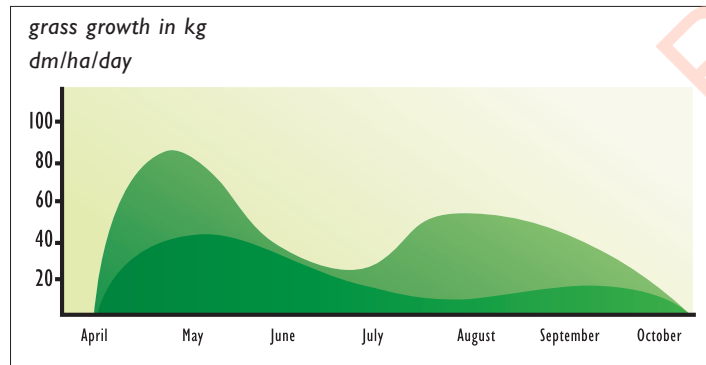


◀ *Sheep sorrel contains oxalic acid, which can cause diarrhoea in cattle and sheep. Eating a lot of oxalic acid can block an animal's calcium uptake. Sheep sorrel is an indicator for a low pH.*



◀ *Red clover contains phyto-oestrogen, which is similar to the animal hormone oestrogen. Grazing red clover with ewes during the breeding period can reduce fertility.*

The 'camel chart' (bi-modal chart) is a casual term for the representation of grass growth over the year. There is often a dip in June/July, making what looks like two 'humps'. The light green line shows grass growth in a year with a warm spring and a wet summer. The dark green line shows a year with a cold spring and a dry summer. ▼



Changing growth

The growth of grass changes quite a lot throughout the year, making it important to follow its development. After a winter rest, the grass starts to grow again once the soil warms up enough. Under ideal conditions, grass growth will mostly depend on light and temperature. In the spring there is a sharp increase in the growth rate, which reaches a peak in May. Thereafter it gradually slows down, virtually stopping in October-November. In practice, there often seems to be a

dip in growth in June-July (see graph). More than one factor seems to be at work: heavy first and second silage cuts delaying re-growth, botanical composition, lack of moisture or minerals and high temperatures. The point at which a summer decline occurs can thus also vary from year to year.

Perennial ryegrass is the most commonly used grass species. It produces high yields, responds well to nitrogen fertilisers and grows well in our climate. It is also readily eaten by grazing animals. ▼



Black-coloured red clover leaves in the silo are a good sign. The black comes from the enzyme polyphenol oxidase (PPO) in red clover. A positive effect of this enzyme is that it protects proteins in the silage from breaking down. PPO occurs in other areas of daily life, for example, causing the black colouring in bananas. ▼



Feed the cycle

Grass, root growth, soil organism and soil together form a cycle. Roots grow and die back again. This is a continuous process in which much organic matter ends up in the soil. The bacteria and other organisms in the soil convert this material into nutrients for plants and create room for the roots to grow. A good root layer can grow 4500 kg/hectare of root mass.

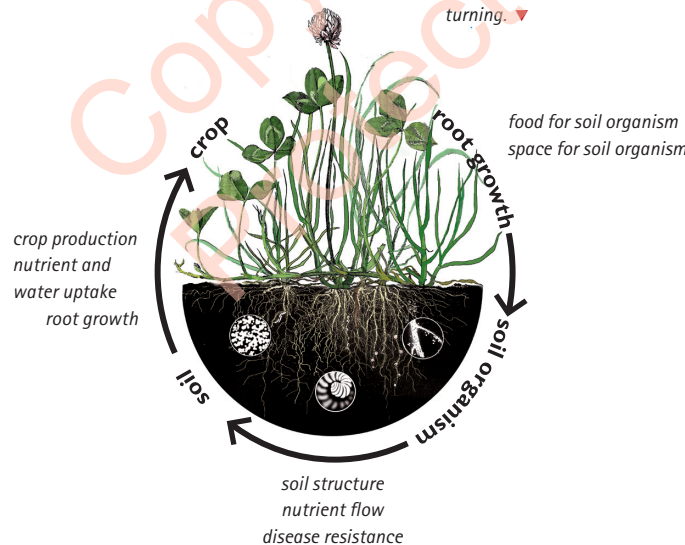
Work with machines that compact the soil as little as possible. A low tyre pressure is important. Using a pressure exchange system like the one on this self-driving grassland injector allows you to drop your tyre pressure on the grassland as far down as possible. ▼



A turf layer with a good root system is the most important tool a livestock farmer has to improve the soil. Grasses have many fine roots which penetrate everywhere.

So, stimulating root growth has a positive effect on the soil organisms and soil structure, which in turn promotes further root growth and better grass growth above as well as below ground.

Grass, root growth, soil organisms and soil form a self-reinforcing cycle. Ensuring good root growth from the time of sowing is one of the most important elements of pasture management. It will keep the flywheel behind the cycle turning. ▼



Fresh grass makes healthier milk

Grass influences the composition of the milk produced by the cows that eat it. Cows that eat a lot of fresh grass produce milk with a large number of healthy unsaturated fatty acids, also known as CLAs (or conjugated linoleic acids). These are mostly omega-3 fatty acids. In particular linoleic acid, which is present in large amounts in young grass, seems to be good for milk quality. It turns out that cows allowed to graze produce healthier milk than cows being served a summer diet indoors. This is because grazing cows are mostly eating the tips of grass plants, where most linoleic acid is found.

*“Grass is high-quality feed made by the sun’s energy for free.
Optimum utilisation from your grassland
means instantly earning money.”*

Grassland is the feed supplier for livestock farmers. But not all grassland is alike. Sometimes the grass is really greener on the other side of the fence. Crop production and quality can vary widely. Why do these differences arise? Read in **Grassland signals** how to optimise grassland management for your purposes.

Grassland is a complex plant population dominated by grass. How do you stimulate various types of grass, clover and other plants? And don't forget: how do you manage the soil for better grass growth? After all, healthy grassland immediately turns into healthy milk.

Grassland signals is a unique practical guide that will support you to utilise your grassland even better. The book goes through the year, season by season, with the aid of three basic questions: What do I see? What does it mean? What do I do? Is the temperature sum the signal to start fertilising? The disadvantage is that this is measured above ground. It's better to measure the soil temperature, to look at the root tips or other signs in nature. Other plants often can be used as indicators. For example, the presence of a lot of meadow grass can indicate too much grazing pressure.



Grassland signals delivers new insights into improving the growth and quality of your grass. Make sure your grassland gathers no moss! Read this book right away, and get better returns from your grassland.

Grassland signals

**Practical guide for
getting the most
out of grassland**

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PUBLISHERS

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LIVESTOCK RESEARCH
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LOUIS BOLK
INSTITUUT

www.louisbolk.nl

ISBN 978-90-8740-046-0



9 789087 400460