Maximising grazing in ruminant production systems

Proceedings 6th Meeting EGF Working Group "Grazing" in Cork

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Report 1140

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This report presents the main outcomes of the sixth meeting of the EGF Working Group "Grazing" which was held in Cork, Ireland on 17 June 2018. The aim of the Working Group "Grazing" is to exchange knowledge on all aspects of grazing research and to provide a forum for networking. The theme of the meeting in Cork was "Maximising grazing in ruminant production systems".

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Foreword

The sixth meeting of the Working Group "Grazing" of the European Grassland Federation (EGF) was held in Cork, Ireland, in June 2018 prior to the 27th General Meeting of the European Grassland Federation and had a record number of participants (approximately 100). The theme of the meeting was "Maximising grazing in ruminant production systems". We worked with sub-themes that were introduced by plenary speakers followed by discussion sessions in small groups of around 10 persons. In the afternoon, Irish experiences with infrastructure, pre- and post-grazing covers, and grassland measurement and management tools were discussed in small groups of around 10 persons during an in-field workshop. Short summaries of the presentations and the discussion sessions can be found in this report. It is available, together with pdf's of the presentations, on the internet at www.europeangrassland.org/working-groups/grazing.

The coordination team of the Working Group (editors of this report) would like to thank all the participants, and especially the speakers, the chairs and reporters of the discussion sessions, for their active participation in the meeting and the lively discussions during and after the meeting. A special word of thanks goes to the Irish colleagues who led the workshops in the afternoon. These workshops were very much appreciated by the participants. The objective of this Working Group, i.e. to exchange knowledge on all aspects of grazing and networking, has, as in previous meetings, been fully achieved.

On behalf of the coordination team of the EGF Working Group "Grazing",
Dr. Agnes van den Pol-van Dasselaar, the Netherlands (Chair)

Summary

This report presents the main outcomes of the sixth meeting of the EGF Working Group "Grazing" which was held in Cork, Ireland, on 17 June 2018. The aim of this Working Group is to exchange knowledge on all aspects of grazing research and to provide a forum for networking.

The theme of the meeting in Cork was "Maximising grazing in ruminant production systems". There were three sessions:

- Support of grazing
- Methods to maximise grazing
- In-field: estimating pre- and post-grazing covers, feed wedge, pasture allowance and infrastructure

The participants shared many research results, ideas and thoughts on these topics, which are summarised in this report.

1 Introduction

Grazing is seen as a positive management option for both farmers and society, but it can be complicated. Therefore, several support programmes have been set up to stimulate grazing and to support farmers in their daily management. The progress in this area was discussed during the sixth meeting of the EGF Working Group "Grazing" in Cork, Ireland, 2018. The theme of this meeting was "Maximising grazing in ruminant production systems".

The Working Group "Grazing" ensures detailed knowledge exchange and discussion on grazing. The group was established in Uppsala, Sweden at the General Meeting of the EGF in 2008. Subsequent meetings were held in:

- Kiel, Germany, 2010: Research methodology of grazing
- Lublin, Poland, 2012: Innovations in grazing
- Aberystwyth, UK, 2014: The future of grazing
- Wageningen, the Netherlands, 2015: Grazing and automation
- Trondheim, Norway, 2016: Grazing in a high-tech world

Proceedings of all meetings can be found at www.europeangrassland.org/working-groups/grazing.

In Cork, there were 100 participants from 18 nationalities present during the meeting. The countries with a high number of participants (at least more than 5) were Belgium, France, Germany, Ireland, the Netherlands, Switzerland and the UK. The majority of the participants were from research, but there were also other stakeholders present, e.g. from industry. There were three sessions during the meeting:

- Support of grazing
- Methods to maximise grazing
- In-field: estimating pre- and post-grazing covers, feed wedge, pasture allowance and infrastructure

The first two sessions consisted of plenary presentations followed by a short discussion. Thereafter, the theme was thoroughly discussed in groups of about ten persons each. In the third session, Irish experiences with infrastructure, pre- and post-grazing covers and tools were discussed in small groups of around 10 persons in an in-field workshop.

Both the plenary presentations and the group discussions are summarized in this report. Support of grazing is described in Chapter 2. Chapter 3 reports on methods to maximise grazing and chapter 4 reports on the in-field workshop. Finally, some concluding remarks can be found in Chapter 5. Both this report and pdf-files of the presentations of the meeting can be found at the EGF website under the pages of the Working Group "Grazing" (www.europeangrassland.org/working-groups/grazing). The program of the meeting can be found in Appendix 2 of this report.

Figure 1 *EGF Working Group "Grazing" in Cork in 2018.*

2 Support of grazing

2.1 Grazing in Europe - 2018

Agnes van den Pol-van Dasselaar, Aeres University of Applied Sciences / Wageningen Livestock Research, the Netherlands

Since the first meeting of the EGF Working Group "Grazing" in 2010, surveys on the extent of grazing in different countries have been conducted among members of this Working Group. Results have been variable and there is no complete overview, but these results do provide some insight in to the state of the art with respect to grazing in Europe. Sometimes statistical data are available, but usually the numbers provided are only an educated guess. Furthermore, in these surveys the amount of grazing is not defined. It can range from full grazing to very limited grazing. These observations should be kept in mind when reading the information on grazing below; they are mainly educated guesses.

In 2018, the annual survey on opinions, thoughts and facts with respect to grazing was carried out among the members of the Working Group using the on-line survey program SurveyMonkey. The total number of respondents was 96, but only 92 respondents completed the full questionnaire. About two-thirds of the respondents said that their estimate of grazing in their country was an educated guess. The other one-third based their answer on data, e.g. statistical surveys, projects, etc.

The respondents considered grazing important for different stakeholders: farmers, government, scientists, teachers, students. On a scale of 1 to 10 (where 1 is unimportant and 10 is important), they rated the importance of grazing between 6 and 7 for these groups. The importance of grazing for the members of the Working Group themselves was 8.41 (in 2016 this was 8.33). The members thought that the importance of grazing for the general public was 7.85 (in 2016 this was 7.46).

Of all respondents to the survey, 26% thought that the percentage of grazing was stable and 32% thought that the percentage was slightly increasing. The majority (42%) thought that the percentage of grazing was decreasing, either slightly decreasing (37%) or quickly decreasing (5%). The most remarkable difference with the results from the survey of 2016 was that the percentage of respondents that thought that the percentage of grazing was increasing increased from 20% in 2016 to 32% in 2018. For some countries, there was a slight increase in grazing after a long period of decrease.

It was concluded that the extent of grazing is country specific and that there is less grazing in the East and the South than in the North and the West of Europe. Even though the data are often only an educated guess, it can be concluded that in general the popularity of grazing in Europe is declining, with less cows grazing less days per year and less hours per day. However, in the year 2018, for the first time in years, a few exceptions can be seen.

Finally, respondents looked forward. They were positive about grazing. They agreed with the proposition that grazing contributes to the image of the dairy sector and they agreed that grazing is profitable. Many promoting or stimulating measures for grazing are active in Europe: laws, regulations, subsidies, labelling, grazing research, innovation and advice. The four biggest challenges for grazing in the next decade were identified as:

- Growing farms / growing herd size
- Climate change / weather
- Costs / labour
- Market mechanisms

2.2 ProWeideland: Supporting grazing using the value-add chain by labelling

Arno Krause, Centre for Grassland, Germany

Grazing provides a positive image for dairy farming. 80% of society expects cows to be in the pasture, at least in summer, and 77% cannot imagine agriculture without grazing cows. However, the reality in dairy farming is different with many cows in Germany, and other countries, not grazing at all. Therefore, a 4-year project to support grazing through the introduction of a pasture milk label was initiated in Germany, with the aim of maintaining grazing by using the value add-chain. The long-term goal is a premium of 5 ct/ltr meadow milk. 27 organisations signed a common covenant "Charta" to commit themselves to supporting grazing. This multi-stakeholder community has agreed on common accepted criteria for production and processing of meadow milk, which are meaningful for consumers and producible for farmers. A new (dedicated) organisation (legal entity) "ProWeideland GmbH" has been founded as the managing organisation to work with industry and to manage procedures and contracts. Procedures to control production compliance are conducted by external independent organisations. A label has been introduced: ProWeideland. ProWeideland was evaluated as highly recommendable by a German organisation that evaluates labels. Furthermore, the quantity of sales of meadow milk in retail increased in the last 2-3 years and continues to increase in the current year. In conclusion: ProWeideland is based on expert knowledge. It is balanced between meaningfulness for consumers and producibility for relatively large quantities of farmers. It aims to support the competitiveness of grazing at farm level and it is available on the German market through the biggest retailers. The greater the acceptance will be among consumers, the greater will be the effectiveness in maintaining grazing.

2.3 Agri-environment-climate measure to support grazing with dairy cows

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In Luxembourg, more than half of the agricultural land is permanent grassland. Cattle farming is the most important agricultural sector. The efficiency of pasture, in producing high yields of well-balanced and high-quality forage in terms of energy and protein, is however often underestimated by the primary sector. Furthermore, technological progress and political decisions have changed the traditional grassland-based milk production to a more indoor dairy production with the use of high amounts of non-grass-based diets. The introduction of an agri-environment-climate measure (AEC) to support grazing with dairy cows aims to reduce, or even reverse, this trend through financial support and technical advice to farmers.

From an environmental perspective, the presence of livestock accompanied by insects will ensure the survival of different bird-types. Heterogeneous grazing guarantees structured meadows and refuges to many species, a late mulching and mowing date allows nesting of birds breeding on grassland.

In order to assure these ecological benefits, the participating farms have to have sufficient pastures within a perimeter of 1000 m to the milking-unit ensuring a maximum load of 7 LU/ha. Under the local conditions, this corresponds to a feed intake of 7-8 kg DM/day and thus a well-managed half-day grazing system. The dairy herd has to be registered in the official milk control and the minimum grazing area is defined on the basis of the annual average number of registered dairy cows.

Grazing is obligatory with the vegetation start in spring (at the latest on May 1st) and till the end of the vegetation period (November 15th). In order to assure efficient grazing, mowing and mulching are forbidden during the main growing season. The farmer is however free to choose different management options:

- Option a: no forage harvest before July 15th, mulching residues from May 15th (250€/ha)
- Option b: no forage harvest before August 30th, mulching residues from May 15th (300€/ha)
- Complement to option a+b: mulching date = forage harvest date (+50€/ha)

The financial compensation is public founded (EU: 25%; LU: 75%) and calculated on the basis of FADN-data, considering reduced milk yield, complex management and necessary grazing infrastructures.

Three years after its introduction, the AEC is well established in practice. A main reason for its success is the efficient organisation based on administrative data that makes controlling easy and induces no additional administrative work for the participating farmers.

As a lot of grazing tradition, know-how and infrastructures have been lost in recent decades, it is important to reinforce grassland advice and consultancy in our country in order to further increase the development of modern grazing systems.

2.4 Agroforestry: a tool to increase grazing resources

María Rosa Mosquera Losada, Universidad de Santiago de Compostela, Spain

Agroforestry integrates woody perennials and an agricultural product from the lower storey (arable or animal production). It increases production by optimising spatial and temporal resources use (eco-intensification). In many European areas, particularly in North and South Europe, it leads to better use of grazing resources and increased biomass production per unit of land. Agroforestry is a land use option to enhance productive, environmental and social benefits.
Agroforestry is an excellent tool to extend the grazing season in both agriculture and forests lands. There is a good opportunity to mitigate and adapt to climate change and to make grazing systems more resilient by using agroforestry. Adequate design of policies (research, learning, innovation) should be delivered in order to take advantage of agroforestry practices to combat climate change for grazing systems.

2.5 Summary of group discussions

Discussion items
Ten groups of about 10 persons discussed the following items:

- Do we actually need support for grazing since grazing is an economic activity?
- Should we seek financial support for grazing or should we search for solutions to make grazing more profitable at farm level? In what way could this best be organised?

Reported items

- In the case of Switzerland, Germany, The Netherlands or Spain there is some kind of support and these were compared with the Luxemburg system (similar to Agri-environment measures of EU). The French colleagues explained that in France there aren´t different labels for pasture milk, because people can already see the cows in the grasslands. Another comment was that consumers want or demand animal welfare, biodiversity, etc., but they don´t want to pay for it.
- Based on the results of the survey on grazing activities in Europe, the proportion of pasture in the diet of dairy cows greatly differs between countries and even within countries. The general conditions, e.g. price relations, length of the vegetation period, topography, proportion of grassland, incentives, culture, etc. are very different. Yes, grazing should be supported, but the set of measures should be adapted to the region or country level.

- There is a high risk that if grazing is not supported the proportion of grazing dairy cows will further decline, so support is needed. Reasons for supporting grazing:
  - the knowledge on how to graze might vanish completely;
  - the value add chain benefits more from housed systems and is not providing support;
  - a diversity of production systems should be pursued;
  - the society wants to see more cows grazing and grazing dairy cows will help the acceptance of the dairy sector.
- Support for grazing is necessary, as it helps conserve agroforestry systems. Some agree to support extensive grazing to conserve biodiversity, and not intensive grazing. Some talk about the need to invest to improve the image for the consumer, in research for grazing and in technology. Some talk about support to improve communication between farmer and institution so that there is a plan for grazing farmers, which in many places does currently not exist.
- In the Netherlands, Germany, France, Luxembourg and Sweden the situation is similar: a development towards intensive milk production with the focus on high yields per cow with indoor feeding while neglecting intensive grazing systems. This led to a knowledge-gap by farmers and advisors regarding the best practice and management of grazing systems. The aim should be therefore, to renew the advisory-services towards a holistic and system-oriented service rather than focusing on independent parts on farm level. Farmer group meetings and/or farm-walks were discussed as suitable and beneficial models with a bigger impact than the existing advisory systems. Quote: "*In our educational systems, we learned to be securely in control of our environment. By practicing the grazing system, we are out of control. Dynamic adaptation to varying environmental conditions is needed. This needs to be considered and accepted, before applying this system.*"
- There are different forms of support, like labelling, legislation, subsidies, and premiums.
- With respect to post-Brexit UK: a new framework is needed for grazing post-CAP.
- Is there too much emphasis on grazing? Does this give the impression that all other grassland farmers are bad?
- Grazing is not only an economic activity, but also has social and ecological aspects. We do have to support it with respect to local conditions. Financial support should come from the market. First, we have to address the advantages to stakeholders involved, like industry, consumers, (local) government, research, nature conservation, retail, etc. Maybe we also have to help them to find solutions for support.
- We do not need support for grazing. It is difficult to ask the consumer to pay more money for a product when 80% of consumers believe the milk they are consuming is derived from pasture-based production anyway. This consumer belief that all milk produced is from grazing animals is why pasture labels on milk bottles tend to confuse the consumer and do not always result in increased sales. Additionally, in areas such as Denmark and Sweden, the price of organic milk is similar to pasture based milk, therefore consumers alternatively buy organic milk instead of the pasture-based milk.
- Support for grazing would result in further regulation and administration, which many farmers are not keen to implement.
- Possibly support but not in the form of direct payments to farmers. Develop support to farmers adopting and embracing grazing systems assisting them in optimising the economic, environmental and social benefits of grazing.
- Support in the form of training or advisors. If farmers and students are better educated on both plant *and* animal science rather than focusing solely on one area, they can better understand and optimise the potential benefit of grazing systems. It is essential that advisors have this complex knowledge.
- Grazing is not just about economics, there are also environmental impacts. It needs to be supported for that purpose.
- Indoor systems mean control on everything, which is better for cow's welfare. Indoor systems equal land sparing which could mean more space preserved for nature because of more intensified arable land. But how would it be perceived by citizens and consumers? Having very intensified agriculture next to « untouched » nature. This implies a global approach with a special look at environmental hotspots and therefore particular support.

- Paying farmers who already graze (AEM) has little effect on their grazing techniques. Government financial support has failed to enhance grazing. For example, in Germany they have stopped subsidising for difficult areas (mountain) where grazing was common practice.
- Market is the driver, and the consumer defines the production system. Therefore consumers need to be educated. However, consumers also need purchase power, since fewer euros are spend on food.
- Grazing is the cheapest milk production system, so financial support isn´t the solution. Grazing comes with some problems:
  - Some farmers want to maximise milk production, without good cost control;
  - Some farms don´t have enough grasslands near the barn;
  - Communication problems, people think that grazing is complicated to do;
  - Difficulty adapting high production cows to grazing;
  - Many people around farmers earn money.
- But there are also some solutions:
  - More advise instead of money directly;
  - If farmers increase grazing for their own decision and not for money, they will be more motivated;
  - More education, the easiest way to change the mind-set of farmers;
  - Be more active in changing the mind-set of consumers.
- Where the majority of milk comes from grazing cows, there is little chance for a premium label for "pasture milk" (e.g. UK, Ireland). In this case grazing is mainly supported through intensive research and active knowledge transfer in relation to grazing management. In other countries like Belgium or the Netherlands, where the share of grazing dairy cows is lower or a decrease in grazing is observed, a label or a premium may motivate producers to graze with dairy cows. Incentives such as subsidies, however, could be considered as rather unfair, although it allows countries like Switzerland to maintain the high proportion of grazing dairy cows. It is questionable whether grazing should be pushed if other production or feeding strategies are more interesting in a certain region – for example maize silage in northern Germany.
- A majority of customers expect that during summer, milk is produced by grazing cows, but are unaware that it is not the case in some regions. Under such circumstances, consumers should be informed and the confusing advertising minimized.
- The consumers might pay a bit more for milk or milk products from grazing dairy cows, but improvement of grazing management should not be neglected.
- The support for grazing can be approached from two sides. In general more knowledge is needed.
  a. Society: should not only demand but actively support the sector with willingness to pay for products. Also society needs to be further educated on why grazing is beneficial.
  b. Production side: Farmers need expert knowledge and support from advisors. The farmer needs to understand the benefits of grazing and needs to be provided with data so that the farmer can decide whether grazing is beneficial for the farming enterprise. Quote: "*The society needs to know why and the farmer needs to know how"*
- For a resilient support of grazing, different production systems should not be ranked to put one above the other. There should be no good or bad in farming systems based on grazing or no grazing. The assessment of a system should rather be based on the resource efficiency to identify the best system for a specific area and context. This will lead to more diversity in the entire system and acceptance of dairy farming in general. However, this leads to the question why a grazing system should then be financially supported if it is not superior. The environmental benefits of a grazing system must be clearly identified to justify payment and different aspects have to be included in the evaluation of a grazing system.
- Communication was identified as key in the organisation of support in terms of knowledge transfer to farm level and to society. Production and society have never been so divided and this gap needs to be reduced. Financial support for research and promotion could be organised following different strategies in different countries (examples: 'check off dollars' in the US and 'levy boards' in the UK and Ireland). The promotion of a single product, like milk, should be transformed into the promotion of a production system, like pasture-based milk produced with grazing dairy cows. The signals contradicting the consumption of animal products should also be addressed.
- The most important is to convince and educate the consumer so that he chooses the products coming from the practice of grazing. This should be financially supported. Furthermore, it is

necessary to invest more in research that favours grazing and to train the advisors that help in the decision making at the farm level. The advisors need to be educated, since at the moment there are many people who earn money around the farmers and who are advising poorly.

- Because of its low-cost nature, the farmer is the winner by applying an efficient grazing system. From the customers point of view, the demand for pasture-based milk products will increase. To make grazing more profitable and to generate an appropriate income at farm level, the system needs to be managed correctly and efficiently. Easily applicable grazing systems are needed and should be discussed in discussion groups or farm walks. Quote: *"The confidence towards the application of grazing systems need to be increased at farm level".*
- Both financial support for grazing and solutions to make grazing more profitable at farm level are needed. The continued support of subsidies is necessary as intensification of grazing is only profitable to a certain extent.
- Profitability can be increased through increasing performance on both the animal and grass scales: i.e., improved animal genetics and increasing grass DM yields. It is important to both involve and inform farmers in this process.
- The advocation of increased support for grazing systems is up to the political establishment to decide. This is not the role of the scientist. Scientists have a dual role: devising techniques and technologies to increase the profitability of grazing systems and to provide the data to inform political decisions.
- Support grazing with knowledge, 'systems-view', technology, precision-agriculture (i.e., optimizing soil type through forage selection).
- Having a premium price for grazing products may increase profitability, but we must provide evidence of the benefits of the system. Can we put health benefits on labels, how far can we play this card with the consumer? Can an informed consumer drive this? Greater need to engage with the consumer about the food production process.
- Economists are demonizing ruminant grazing systems for being inefficient (difficult to advocate a grazing system over a housed system, from GHG emissions and from efficiency matrices). There is a role for the EGF here in advocating for these systems.
- Stimulate grazing with a higher milk price. Consumers expect that dairy cows are grazing (D, NL, Irl, F) or that grazing is mandatory (e.g. Sweden), or that there is no alternative for grazing based systems (NZ, Irl). Therefore, grazing dairy farming systems are considered as the standard. Consumers will probably not pay a higher price for dairy products that meet their minimum expectations for grazing. Therefore, a financial support for grazing (i.e. a bonus for grazing based milk) should be organized by the dairy industry. The dairy industry should develop marketing strategies that justify higher retail prices for grazing based dairy products. For example, by emphasising the dietary benefits (improved concentrations of CLA and PUFA's) and environmental impact (low carbon footprint, greater biodiversity, more wildlife) of dairy products from grazing based production systems. However, grazing may also have some trade-offs that need our attention like nitrate leaching.
- Financial support to stimulate grazing by removing the barriers that discourage grazing. Grazed grass is often considered as the cheapest feed, and grass based systems have in general lower feeding costs than confinement dairy farming systems. However, grazing is not always possible. In the (east part of) the UK many dairy farms have increased their number of cattle but did not purchase farmland. These farms rely on short term farmland rent contracts (e.g. for one or two years grass leys or silage maize cropping). In the Netherlands and France, farms may have sufficient farm land, however with only a relatively small area of grassland in the vicinity of the milking facilities. A part of the EU subsidies could be re-allocated to land consolidation, and improved farm layout (e.g. roadways, water systems, fencing and paddock layout).
- Support with technology. The perception is that grazing is laborious. Grazing could be stimulated by the introduction of new technologies: drones to fetch the cows, virtual fencing, technologies for effective grazing with an AMS.
- Support grazing systems that combine grazing with a high milk production. In Germany and the Netherlands (and some other regions and countries as well) farmers appreciate high milk productions per cow rather than a high bioconversion. Less cows for the same total milk yield means smaller investments for housing and equipment. The dry matter and energy intake in full grazing systems is insufficient to support peak milk yields beyond 32 kg milk/day. The challenge is

to improve the management system (e.g. by improving breeding strategies in order to maximise grazing with high milk production).

- Socio-economic factors and skills of the farmer. Competition among farmers is another reason to strive for a high milk yield per cow. Farmers can show off with the official milk recordings. A high milk yield per cow shows that a good cow-manager is skilled and able to manage the cows in a proper way. However, a good grass manager who is able, not necessarily with a high yield per cow, to achieve the best conversion of biomass into milk has no possibilities to show-off. Therefore we should develop some kind of benchmarking, so farmers can compare their technical performances (grassland utilization, milk yield per cow, milk yield per hectare) and economic performances. Grazing can be promoted by improving the grassland and grazing skills of farmers via education and learning projects for farmers. This will lead to improved grazing techniques and knowledge exchange.
- Grazing needs support, albeit not necessarily by means of a higher milk price or subsidies. We can improve grazing by means of:
    1. Improvement of farm layout and land consolidation;
    2. Support farmers with new technologies;
    3. Develop grazing systems for high output farms;
    4. Give farmers the opportunity to compare and compete by benchmarking of technical and economic performance;
    5. Improve the knowledge of farmers.

3 Methods to maximise grazing

3.1 Six years of mobile milking at experimental farm Trévarez in France

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Trévarez experimental farm is located in western France in an area with an oceanic climate and good grass growth. Similar to many dairy farms, it has a fragmented land base with little grazeable area around the main cowshed. The choice was made in 2012 to invest in an AMS to decrease working time. To increase the milk price, the conversion of the system to organic farming was also implemented in 2013. But how is it possible to maximize the use of grazed grass, compulsory in an organic dairy farming system, and to efficiently use an AMS, in particular when you lack grazeable area? The choice was made to purchase one AMS and to move it from a new winter barn to a block of 23 ha of grass located 4.5 km away. The robot was purchased in 2012 together with two trailers, one for the robot and one for the milk tank. During the winter, the trailer with the robot is located inside the shed; the trailer with the tank remains outside. Cows have access to grazing on the winter site during spring and autumn. From May to October, the trailers, the drafting gate and the cows are moved to the summer site; the 50-60 Holstein cows stay on a 100% grazed grass based system, with 0.5 kg of concentrate per milking. On the summer site, a platform was built to welcome the trailers; the drafting gate directs cows either towards night or day paddocks, either towards an isolation box. A concentrate silo, a small technical room, a survey camera and a waiting area with slatted floor above a slurry pit were added. 11 transfers have been performed until now (June 2018). Thanks to a precise preparation, no technical problems occurred. The total working time required for all participants to move animals, robot, tank and gate is around 15 hours (3 to 4 persons during 3 to 4 hours each, including the transfer of the drafting gate the day before). No help from the retailer's team is required. It takes less than 4 hours between the stopping of the robot on the winter site, and the first milking on the summer site. Since 2013 the cows remained each year between 140 and 190 days 100% grazing on the summer site with an average production of 18 kg of milk per day, 0.7 kg of concentrate per day and a milking frequency of 1.6. During the summer period the feeding cost is reduced by 75% compared to winter time and the working time is reduced by 2 hours per day.
Our conclusions after 6 years of use are the following:

- The mobile robot is robust, no technical issues have occurred in relation to mobility;
- The transfers are not a problem and can easily be implemented by farmers;
- Our targets in terms of feeding cost and grass use are reached (cows are grazing over 3.3 t DM of grazed grass per year altogether, far more than the regional averages for AMS farms or even average farms);
- The herd performance is satisfactory for such a low input organic system.

One of the key factors of the success was the right stabilization of the waiting area of the cows (slatted floor over a slurry pit) to avoid dirtiness in wet conditions.
The video of the transfer can be seen at https://www.youtube.com/watch?v=JJodgDWGBvU (French version).

3.2 A comparison of three grassland-based milk production systems in Switzerland

Beat Reidy, Bern University of Applied Sciences, Switzerland

Partial grazing with indoor feeding of fresh grass – an alternative to full-grazing in Switzerland?

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[2] Berufsbildungszentrum Natur und Ernährung (BBZN)
[3] Agroscope

In Switzerland, most of the dairy farms combine indoor feeding of fresh grass with partial grazing. In order to develop a scientifically sound basis for the development of practical recommendations and optimizations for farms with partial grazing and indoor feeding of fresh grass, from 2014 to 2016 a system comparison of three different grassland-based milk production systems was conducted. Partial grazing with indoor feeding of fresh grass with reduced (IF; 430 kg/cow and year) and increased (IF_{plus}; 1160 kg/cow and year) concentrate supplementation was compared to the full grazing system with seasonal calving and reduced concentrate supplementation (FG; 90 kg/cow and year). The system comparison was implemented on the experimental farm (EF) of the Vocational Education and Training Centre for Nature and Nutrition in Hohenrain and complemented by investigations on 36 pilot farms (PF) located in the central lowland, practicing one of the systems. The average grass yield at the EF over the three years was 11.7 t DM/ha and year. The energy and protein content of the herbage from the semi continuous pastures of the FG herd was constantly high throughout the vegetation period (6.6 MJ NEL/kg DM, 246 g CP/kg DM), whereas the indoor fed fresh grass showed considerable variations of the nutrient contents on the experimental farm as well as on the pilot farms. At the PFs the average milk production over the three-year period was 7218, 8457 and 6268 kg ECM/cow and year for IF, IF_{plus} and FG, respectively. With respect to energy efficiency, cows on IF_{plus} farms were more efficient than in the two other systems. The percentage share of the feeding`s labour input was for the systems IF (22%) and IF_{plus} (23%) higher as compared to the full grazing farms (9%). In comparison with official reference dairy farms the PF farms realized an above average earned income per working hour (19.1 vs. 23.4 €/h) and an above average agriculture income per year and agricultural hectare (1699 vs. 2192 €); especially the FG farms achieved the highest results. The highest nitrogen efficiency was found on the IF farms with 53.4 %, followed by IF_{plus} (45.7 %) and FG (44.2 %). An appropriate cow bred, optimal grazing management with high quality swards, efficient work processes and adequate work load were mentioned to be the most important factors for the success of the systems by the farmers participating in exchange groups.

3.3 Amazing Grazing in the Netherlands

Bert Philipsen, Wageningen Livestock Research, the Netherlands

The Amazing Grazing project (www.amazinggrazing.eu) addresses the challenges that Dutch farmers face in grazing systems with high feed supplementation and high stocking rates on the available grazing area. The project framework (Figure 2) consists of six interlinked components (soil, grass growth, grass supply, grass intake, feed supplementation and cow behaviour). These components are studied into three activities.

1. Two grazing experiments with contrasting grazing systems. On a clay soil, a Holstein herd grazed during day-time at a stocking rate of 7.5 cows ha^{-1}, either under Strip Grazing (SG) or Compartmented Continuous Grazing (CCG). On peat soil, a mixed Holstein and Jersey herd grazed at the same stocking rate, either under SG or Kurzrasen (KR). In SG, cows were offered a fresh strip of grass each day. Compartmented Continuous Grazing is an adapted set-stocking system in which the cows rotate on a daily basis between six compartments in one paddock. Kurzrasen is a set-stocking system with a target sward height of 3 to 5 cm. The non-exhaustive list of measurements comprised soil compaction measurements, sward height and density, *n*-alkane grass DM intake and cow behaviour using electronic sensors.

2. Cutting trials on clay, sand and peat soil with a combination of nitrogen levels and growth intervals. Grass growth was measured with several nearby and remote sensing techniques based on spectral images. Short term growth predictions based on modelling and meteorological forecasts were compared to observed growth.
3. Three working groups of farmers, consultants and researchers, each focused on developing planning rules and tools for a different grassland management system.

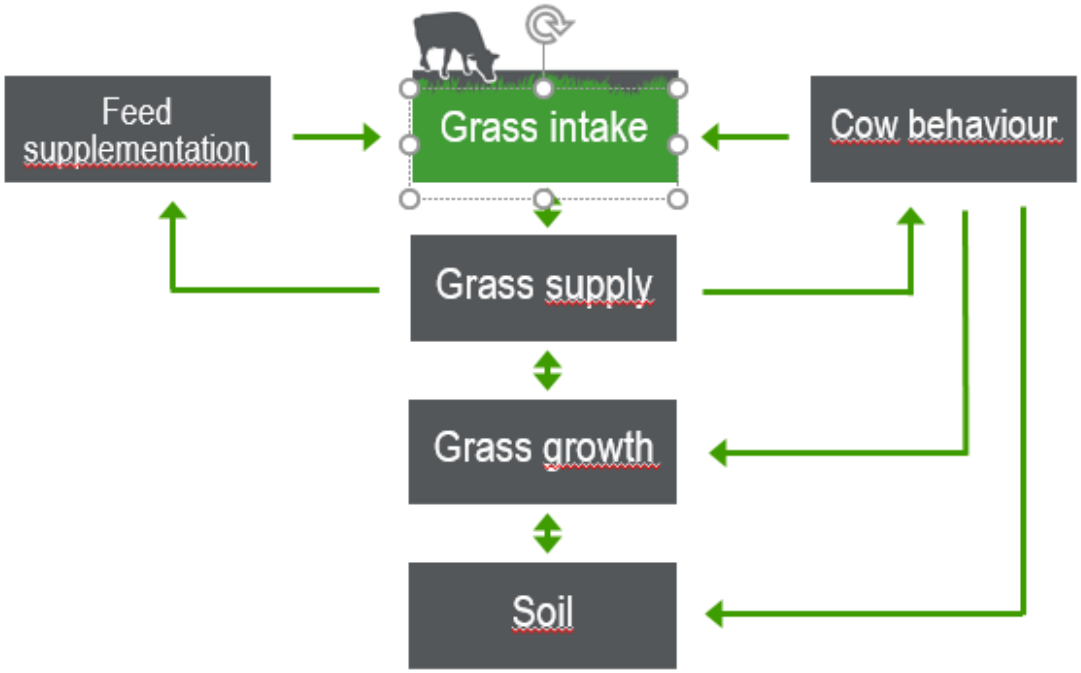

Figure 2 *Framework of Amazing Grazing.*

The grazing experiment showed that fresh grass intakes of approximately 6 kg DM cow^{-1} d^{-1} are feasible in intensive grazing systems with high feed supplementation levels. Tools for grass monitoring and planning, as well as cow behaviour monitoring, are being developed to support farmer decisions.

3.4 Systems Analysis Milk in Germany

Dairy production: grazing versus indoors, a systems analysis in Lower-Saxony / Germany

Johannes Isselstein, University Göttingen, Germany

The percentage of fresh grass in the ration of dairy cows is decreasing, both in Germany and in other countries. Land prices for arable land are also higher than for grassland. This led to the project SAM: Systems Analysis Milk. It has a fully transdisciplinary approach with science (multidisciplinary), extension/administration and farmers as partners. There were eight research areas: animal welfare and animal health in general, udder diseases, dairy nutrition, pasture parasites, forage production / nutrient management, resource efficiency (LCA), farm economy, consumer behaviour / marketing. Each area was studied in four groups of farms: farms with no grazing, less than 6 hours grazing, 6-10 hours grazing and more than 10 hours grazing. First results indicate the following effects of grazing:

- Animal health: mainly beneficial
- Udder diseases: general management more important
- Dairy nutrition: awareness of transition indoor / pasture
- Pasture parasites: less than expected
- Forage production: potential of underutilized grasses
- Resource efficiency: depends
- Consumers: potential for marketing of pasture milk
- Economy: depends

Apart from these findings, it must be noted that results are limited due to variability among farms. The preparedness of farmers was also variable. Transformative science was found not to be easy.

3.5 Summary of group discussions

Discussion items
Ten groups of about 10 persons discussed the following items:

- What are the main barriers to maximise grazing and how to overcome these barriers?
- How to optimise grazing whilst supporting other ecosystem services that grasslands provide?

Reported items on "What are the main barriers to maximise grazing and how to overcome these barriers?"
Barriers mentioned most often:

- Farmers' mind-set / farmers perceptions. Farmers perception of what actually is possible may often be too pessimistic. This is related to lack of both practical knowledge in grazing and knowledge about available tools. It can be addressed through decision support, discussion groups and knowledge transfer and diffusion. In many regions, grazing also suffers from a negative image as being old-fashioned and unproductive. New technologies in grazing, apart from their direct impacts on the performance of grazing systems, might help to improve the image of grazing, particularly among younger farmers. Additionally, competitions and prizes for grazing-related targets (e.g. milk from grass, milk quality, rather than milk per cow), could also raise the prestige of grazing. We could also consider partnering with psychological institutes to consider the best ways to go about this. Positive frontrunners/role models are needed.
- Farmer knowledge. Characteristically, countries with a large proportion of grazing tend to be those with leading centres of grazing research and knowledge transfer. In many regions such as Sweden, Belgium, Germany and the Netherlands, the farmer is very good at making silages. Farmers have forgotten how grazing should be organized. Furthermore, there is a lack of farm advisors that can help with grazing, and more than enough farm advisors that are good in silage feeds and selling concentrates. The farmer doesn't know how to handle with seasonal variations in yield and quality. Advice on grass and cows is split and done by different advisors. An advisor in grassland needs to know how cows graze. And an advisor in animal management should know how grass grows. To overcome those barriers, consequently and first of all, gaps in knowledge and knowledge transfer should be closed. Since grazing comes along with more challenges, as well as complex decision making, than mowing regimes, better knowledge and education will give farmers more confidence towards grazing. Education, workshops and extension services will need to help farmers to tackle those daily and future challenges and to optimize grazing.
- Farm infrastructure and availability and accessibility of pasture. The lack of a suitable grazing area is a main barrier to dairy cow grazing: simply not having enough grassland in the vicinity of barns / milking parlours / AMS. This can be caused by fragmented land, but also unsuitable topography for intensive grazing. The necessary resources are not always available on farms. Infrastructure is often based on feeding in stables. Support can be provided for appropriate infrastructure, e.g. starting small (jogging pastures), technical solutions like mobile milking robots, agroforestry and more/better tools to control grazing (technical/digital).
- Large herd sizes of dairy cows. The example of New Zealand shows that this may be partly a perceived barrier: while in Central Europe, grazing with herds of more than 100 dairy cows is often seen as impossible, grazing is successfully implemented with herds of 300-500 dairy cows in New Zealand when sufficient non-fragmented land is available. It may be true, however, that a growing herd size leads to not enough grassland in the vicinity of barns. This was identified as a particular issue in Denmark, where the average herd size has increased with the same limited grassland area.
- Weather variability. Grazing is not possible if it is too wet or too dry. Forage conservation is a possibility for dealing with this. Climate can be a big barrier for grazing: strong seasonality of climate, with long winters or summer drought leading to less grass growth, makes grazing more difficult compared to, e.g., Irish conditions. Even under a generally favourable climate, weather extremes, such as prolonged wet or drought conditions, are more difficult to deal with under

grazing than under barn-feeding systems. Managing grazing systems in extreme weather conditions can be challenging. This difficulty, however, might be alleviated by better weather forecasts and better preparedness (e.g. forage reserves). Given the (future) challenges of climate change, new breeds or other grass species than ryegrass, or mixtures might help to improve resilience. An alternative solution might be to graze other crops that can cope with droughts and fill gaps in available forage.

Other barriers:

- Farmers' position in the supply chain. Farmers are very dependent on other supply chain actors, particularly retailers. If retailers are heavily profit-focused and don't put value on grazing then there is no incentive for farmers to graze. There is a need for increased pressure on the industry to promote grazed products at point-of-sale (some retailers are already good about valuing grazed products). Milk companies want to standardise milk production and give bonuses for production during winter months, this is not stimulating for grazing.
- Policies in favour of mowing systems. Some legislation acts like a barrier for grazing. For example in Belgium and the Netherlands, fertilizer legislations are in favour of mowing. More fertilizer can be applied since the manure/slurry is homogeneously spread on the grassland. A better risk management in politics with respect to grazing is needed.
- Breeding/genetics. Modern cows are not adapted to grazing. We need "the right cow" for grazing. Dairy cows should be adapted to grazing. Therefore, lighter cross breeds with more suitable anatomy might be one strategy. However, the adaptability of high-yield cows to their ration should be mentioned as well.
- Grassland production and intake is not known. Therefore the feed supplementation is not well adapted to grazing.
- Stable ration. With grazing it is more difficult to have a stable ration throughout the year. An inconsistent diet is seen as problematic.
- Perception and quality of work. "*Some people like to walk the cows to a paddock, some rather use the tractor*"
- Environmental impact. Grazing leads to lower nutrient use efficiency.
- Costs. Appropriate grazing infrastructure can be expensive. Land prices are usually high, and the annual gross grass yield per ha is higher for cutting only than for grazing.
- Measuring performance in litres/cow. It is difficult to achieve this 'high level of performance' when animals are in grazing systems.
- Consequently, the apparent ease of managing an indoor system rather than grazing, and a focus on maintaining high milk yields per cow are barriers to grazing. To overcome these barriers, researchers or extension services could demonstrate practical and 'intermediate' systems that would show the farmer how they might take a gradual transition to grazing, rather than being presented with an 'ideal' grazing system that they cannot imagine realising. For example, if farmers are focussed on milk yield per cow, a small amount of grazing could be presented as a means of reducing feed costs while the farmer continues some concentrate feeding when cows are housed at night. Demonstrating small steps may show farmers that grazing is more achievable than they realised.

Resources and farming systems are variable throughout Europe: farm structure, herd sizes, pasture area around farms, infrastructure, topography and pedoclimatic conditions. For all barriers to grazing and solutions, the regional aspects and regional pros and cons of grazing need to be considered.

Reported items on "How to optimise grazing whilst supporting other ecosystem services that grasslands provide?"

- This is highly location-specific, different areas have different issues to be aware of, e.g. soil compaction, water quality, etc. The local situation needs to be considered when considering how grazing can be a part of the ecosystem. Compensation to provide biodiversity and ecosystem services → is also a question of scale!
- A clear definition of ecosystem services is needed.
- Cooperative thinking. Local action plans can be developed with a range of stakeholders, including farmers. Then the level of grazing can be synchronised with regional development plans. For

example, in peat areas water management is key. Grazing can be optimised to the ecosystem by considering soil water carrying capacity.

- Optimise livestock breeds, e.g. where compaction is an issue then less heavy cows could be used.
- Grazing can promote biodiversity, thinking about land-sharing versus land-sparing.
- Grazing is not always compatible with supporting ecosystem services, sometimes housing is more appropriate. There may be a conflict between intensive grazing systems and the provision of some ecosystem services, i.e., bird nesting.
- Grazing has the potential of enhancing biodiversity, although this is dependent on context and overall farming system. For example, stronger reliance on concentrates may lead to less intensive utilization of grassland and consequently higher biodiversity than under highly intensive grazing. In some regions, the introduction of multi-species swards or even of multi-species grazing may be options to both optimize grazing and maintain or improve biodiversity.
- Nutrient management might be more problematic under intensive grazing than under cutting systems, due to heterogeneous and concentrated nutrient input by the grazing animal, compared to the technological options to reduce nutrient losses from slurry storage and spreading.
- Potential environmental disservices of grazing are an increased risk of erosion through open soils after animal trampling, and reduced water quality of open waters that grazing animals can access. Fencing open waters and minimizing trampling damage are important measures to avoid these problems.
- Both grazing and other ecosystem services can be optimised using multifunctional swards. We need plants that deliver e.g. Se, Cu, I, improve root growth and soil life and improve animal health. We may improve the sward by adding more species (more than crop yield alone). There are more interesting species than grass and clover only. Maybe we could set 10% of 'milking herbs' in the swards as a goal. A sward with more species than grass and clover can be useful, but will usually also give a lower feeding value of the silage, so it is also an option to use them on specific paddocks only.
- Grazing and ecosystem services can be optimised by undersowing of crop. Example: grass clover in spring cereals → grass clover can be grazed after the cereal is harvested.
- Grazing and ecosystem services can be optimised by mixing different agricultural sectors.
- For supporting ecosystem services, it is important to work with a sustainable farming system. More extensive pastures are often more biodiverse. Diversity in management can also support a more diverse landscape which is good for ecosystem services.
- In specific regions abiotic site conditions restrict economic (and ecological) possibilities of grazing. Given the complexity and multi-functionality of grasslands, there cannot be only one way, one strategy for grassland management and grazing. Therefore, feasible areas should be identified and targeted where grazing can be maximized and in areas which are not suitable for grazing, other type of land-use should be considered sustainable.
- Subsidies and CAP 2020 could play an important role in enhancing sustainable grassland utilization and multi-functionality. Another option is to cover the extra costs by consumers.
- New methods and technologies will help to improve the monitoring, profitability and sustainability of grassland management.
- Less reseeding is necessary to lower the C and N losses (so more permanent grassland) and to prevent erosion.
- Clear communication to the general public is important to create a realistic image. Show both the advantages and disadvantages of grazing to make the public discussion more fact based.
- A system with 100% grazing is not the solution. Probably it will give the same negative effects of a 100% mowing system.
- Holistic thinking is needed from all actors: farmers, extension services and researchers. Moving from a focus on production per cow towards a whole system approach could highlight the benefits of grazing. To achieve this, science and extension must also be more coordinated, in order to give broader and more joined up advice. A consistent message is needed in combination with a focus on grass from all relevant advisors: the farm economist, agronomist and nutritionist; or even better, a whole system advisor.
- System-wide thinking is an important component of optimising the combination of grazing and other ecosystem services. Demonstrating the linkages between grassland production and ecosystem services is important in order to encourage appropriate management: for example, highlighting the role of more diverse swards in nutrient cycling and animal nutrition. However,

these linkages may need to be system or location specific, as optimum management and the types of wider ecosystem services that can be provided can differ between farms.

- Incentives to provide ecosystem services are important to make sure farmers are encouraged to provide them. Ideally this might be a market-based mechanism, where appropriate management and provision of specific ecosystem services are linked with a price premium.
- It is difficult to generalize. We need to locally find solutions, especially when focusing on both maximizing grazing and ecosystem services. Maximizing grazing might be conflicting with improving certain ecosystem services in one region but it might work well in another region. It is important to focus on climate adaptive grazing (water management) in some regions. Knowledge need to be improved on the interplay between grazing and ecosystem services. We can provide facts and knowledge, but the farmer needs to have a choice based on the personal situation, so a basket of fact based options is needed.

4 In-field: estimating pre- and post-grazing covers, feed wedge, pasture allowance and infrastructure

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********** **Grazing Working Group Practical** **********

********** **Sunday, June 17th 2018** **********

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Learning Outcomes

- Able to use a quadrat and shears to determine DM yield
- Start to use visual determination of DM yield
- Identify target pre-grazing yield and complete farm cover
- Create a mid-season grazing wedge
- Make decisions based on the wedge
- Correctly allocate herbage to improve grass utilisation
- Identify correct infrastructure to improve grass utilisation

1. Use a quadrat (0.5 m x 0.5 m) and shears to determine DM yield

- **Weight (kg) x DM (%) x 40,000 (40,000 quadrats/ ha)**
- **Example: weight = 120g (0.12 kg)**
  DM = 16% (0.16)

  0.12 x 0.16 x 40,000 = 768 kg DM/ha

2. Complete a mini cover

3. Target pre-grazing yield

- Target pre-grazing yield = 1300 – 1600 kg DM/ha
- The following work forms some of the basis why this is the target
- Work completed by Gonzalo Tuñon

Pre-Grazing Herbage Mass

What is the effect of grazing different levels of HM on animal and sward performance

900 kg DM/ha

1,500 kg DM/ha

2,300 kg DM/ha

Grazed to 4 – 4.5cm

Grazing Management

	Low mass	Med Mass	High Mass
Number of rotations	11	9	6
Mean grazing interval (days)	16	20	30

Stocking rate = 2.7 cows/ha

Daily herbage allowance = 17 kg DM/cow/day

Herbage measurements Leaf, Stem and Dead proportions <3.5cm and >3.5cm

	Low	Med	High	Sig
DM yield (<3.5cm)	2106	2233	2251	
Leaf %	0.04	0.02	0.01	***
Stem %	0.42	0.40	0.43	NS
Dead %	54	58	56	NS
>3.5cm	978	1521	2330	***
Leaf %	0.70	0.67	0.60	***
Stem %	0.17	0.19	0.26	***
Dead %	0.13	0.141	0.17	NS

Grazing season - Period II (Aug to Oct)

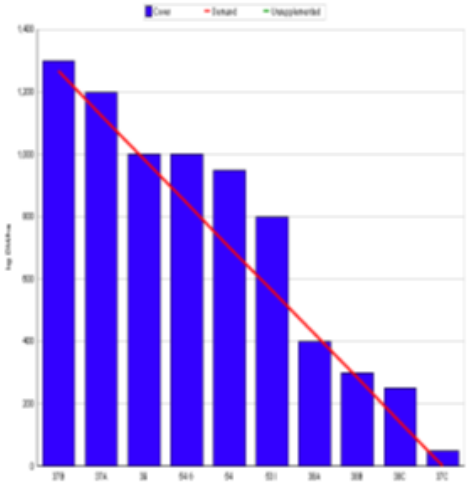
Period 25/7-17/10	Low	Med	High	Sed	Sig
Milk Yield	17.7	17.1	16.2	0.839	0.222
Milk Solids	1.34	1.36	1.24	0.055	0.075
Milk Fat	4.16	4.46	4.29	0.186	0.2374
Milk protein	3.57	3.65	3.55	0.079	0.4777
BW	504	525	515	7.43	0.032

Grass dry matter intake and grazing behaviour

	Low mass	Med mass	High Mass	s. e. d.	P value
Dry matter intake I (kg/day) June	15.4	16.0	16.6	0.62	0.231
Dry matter intake II (kg/day) August	15.2	16.5	15.7	0.53	0.090
Rumination time (hours/day) August	8.4	9.0	9.9	0.50	0.001
Grazing time (hours/day) August	10.8	9.3	9.3	0.43	0.030

4. Create a wedge (manual wedge)

What is the Grazing Wedge



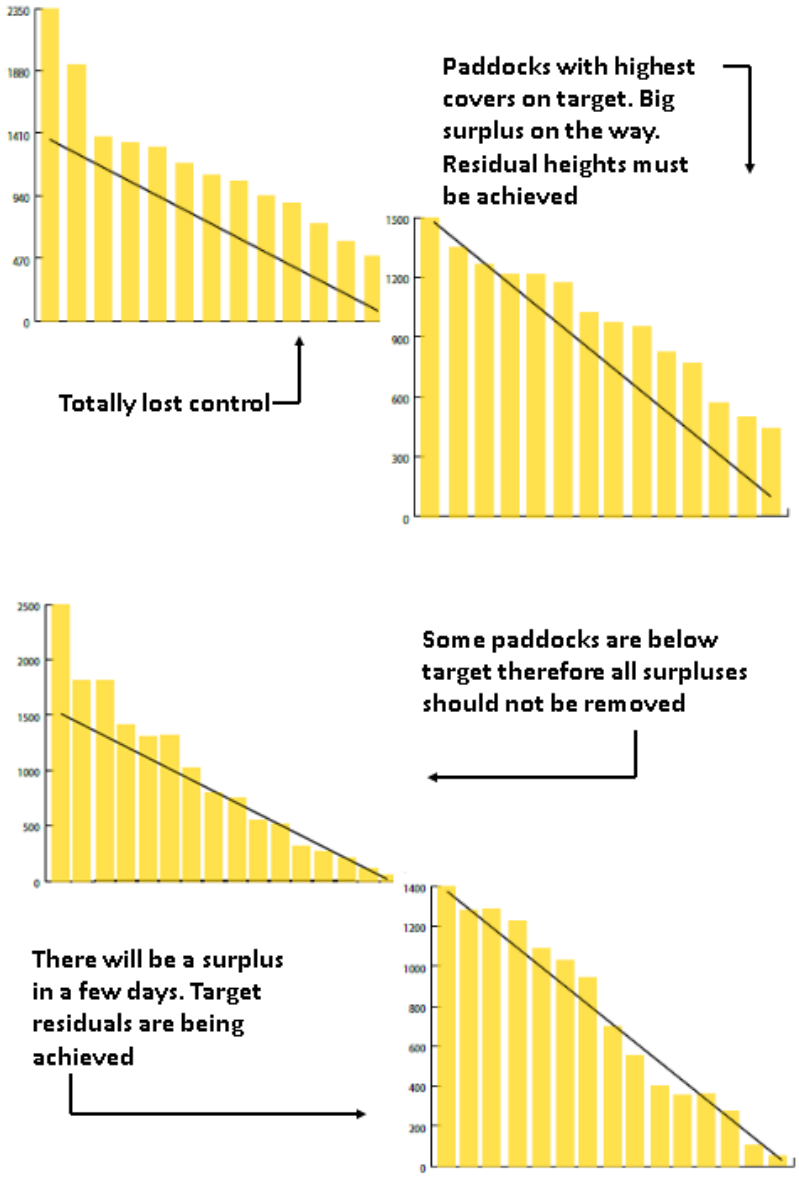
- Visual representation of the grass on the farm
- Line drawn from the ideal pre-grazing yield to the desired post-grazing residual
- Completed weekly during main grazing season

How to construct the wedge…

- Complete a farm walk
- Rank paddocks in order from the highest to the lowest cover
- Draw onto a graph
- Draw a line from 1400 - 1600 kg DM/ha (target PGY) to 0 - 100 kg DM/ha (residual)
- Interpret graph
- Make and implement decisions

5. Make decisions based on the wedge

Surplus Wedge



Dealing with a Surplus

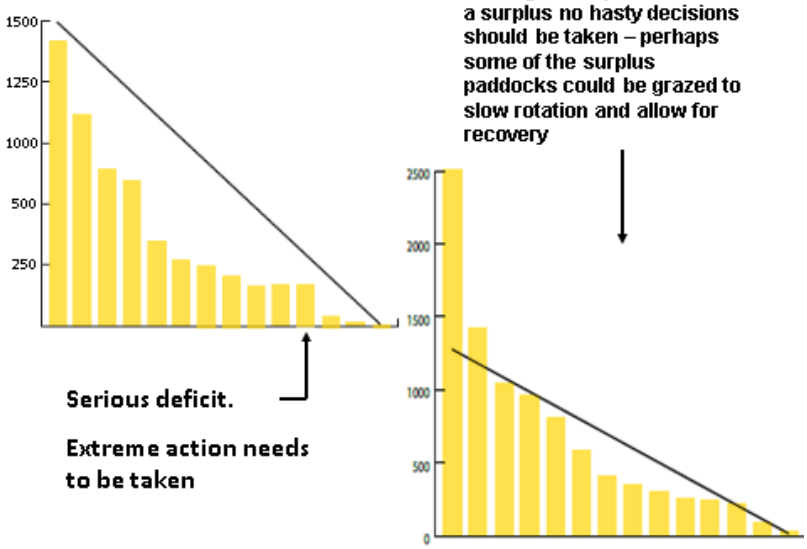
• Remove surplus as soon as possible (or once the paddock reaches 2,500 kg DM/ha) so that the paddocks will be back in the grazing rotation as quickly as possible

o If the grass in the paddock is not too 'strong' get other animals to graze it e.g. replacement heifers

o Caution should be exercised so that excessive grass is not removed resulting in a deficit

o Removing surplus grass as soon as it is identified will result in the area being included in the grazing round and therefore making it available to cope with a slowing of pasture growth

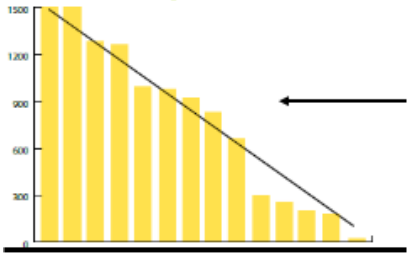
Deficit Wedge



Dealing with a Deficit

- In all cases before 'magic day' do not speed up the round
- After 'magic day' consider increasing the grazing area/day during the deficit period if soil temperatures have continued to rise and pasture growth is increasing
- Supplement with concentrate or grass silage (preferably high quality baled silage that was previously removed as surplus as it will be of better quality than pit silage)
- Increase the grazing area – if there are replacement heifers/beef cattle on the grazing platform remove them if possible
- Re-graze area closed for silage once the pre-grazing yield is not excessive

Cold snap or moisture deficit



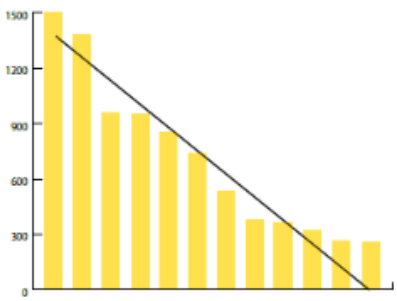
Last paddock overgrazed may affect re-growth

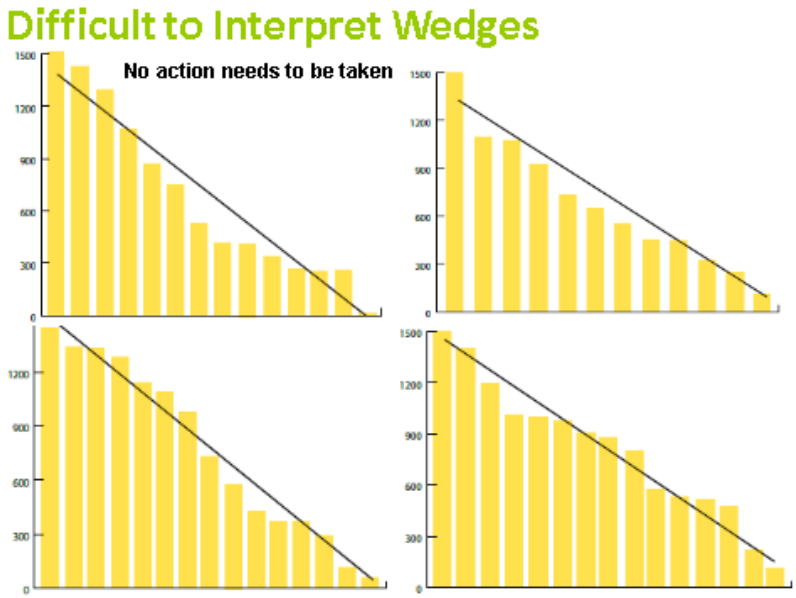
Should be mindful of possible deficit on the way

Wet weather

Target residuals not achieved to avoid poaching damage

Risk of poorer sward quality in subsequent rotations





6. Correct herbage allocation to improve utilisation – making 24 hr break and putting up temporary fences

- how many days will cows get in a certain paddock
  Example:
  - Paddock = 1.2 ha
  - Paddock pre-grazing DM yield = 1450 kg DM/ha
  - 50 cows in the herd
  - Pasture allowance 18 kg DM/ha

    - 1.2 ha x 1450 kg DM/ha = 1740 kg DM in total available
    - 1740 kg DM ÷ 50 cows = 34.8 kg DM/cow available
    - Only want to allocate 18 kg/cow/day
    - 34.8 ÷ 18 = 1.93 days
    - To allocate grass based on 24 hour allocations need to divide paddock in half (growth will ensure 2 days grazing)

Another approach

- Identify animals dry matter intake or requirement e.g. 18 kg DM/cow/day
- Measure DM yield in the paddock e.g. 1,400 kg DM/ha
- Paddock = 2.1 ha (21000 m^2)
- No. of animals in the herd e.g. 50

$\frac{18 \text{ kg/cow/day} \times 50 \text{ cows} \times 10{,}000 \text{ m}^2}{1400 \text{ kg DM/ha}}$ = 6,426 m^2/day

- Measure width of paddock e.g. 91.2 m

- Divide width into required area = 6,426 ÷ 91.2
- = 70.5 m; measure this length from the start of the paddock, the same on the other side and put up a wire = this is sufficient for a 24 hour grazing

7. Correct infrastructure to improve utilisation (roadways/water/access point etc.)

5 Concluding remarks

Theme of the meeting
At the end of the day, it was concluded that maximising grazing in ruminant production systems has many benefits and contributes to the delivery of many ecosystem services. There are, however, also barriers and challenges to overcome. The exchange of knowledge, methods and innovations within the EGF Working Group "Grazing" was inspiring and will lead to new ideas and research. Further exchange between participants was encouraged.

Reporting
The proceedings (this report) and the pdf's of the presentations are available on the EGF website (www.europeangrassland.org/working-groups/grazing).

Appendix 1 Proceedings of Meetings of the Working Group “Grazing”

Van den Pol-van Dasselaar A., de Vliegher A., Hennessy D., Peyraud J.L., Pinxterhuis J.B. (2011) Research methodology of grazing. Proceedings EGF Working Group Grazing. Report 405. Lelystad, Wageningen UR Livestock Research, 19 pp.

Van den Pol-van Dasselaar A., de Vliegher A., Hennessy D., Peyraud J.L. (2012) Innovations in grazing. Proceedings 2nd meeting EGF Working Group Grazing. Report 644. Lelystad, Wageningen UR Livestock Research, 15 pp.

Van den Pol-van Dasselaar A., de Vliegher A., Hennessy D., Isselstein J., Peyraud J.L. (2015) The future of grazing. Proceedings third meeting of the EGF Working Group "Grazing". Report 906. Wageningen, Wageningen UR Livestock Research, 39 pp.

Van den Pol-van Dasselaar A., de Vliegher A., Hennessy D., Isselstein J., Peyraud J.L. (2016) Grazing and automation. Proceedings 4th Meeting EGF Working Group "Grazing". Livestock Research Report 1003. Wageningen, Wageningen Livestock Research, 24 pp.

Van den Pol-van Dasselaar A., de Vliegher A., Hennessy D., Isselstein J. (2017) Grazing in a high-tech world. Proceedings 5th Meeting EGF Working Group "Grazing". Livestock Research Report 1079. Wageningen, Wageningen Livestock Research, 30 pp.

Appendix 2 Agenda 6th Meeting of the EGF Working Group "Grazing"

AGENDA 6th meeting of the EGF Working Group "Grazing"
Maximising grazing in ruminant production systems
Cork, 17 June 2018

8.00 Buses leave from EGF 2018 Conference Venue (Rochestown Park Hotel)

Arrival at Moorepark, registration

Morning
Welcome, introduction of the day and the theme (Agnes van den Pol-van Dasselaar)

Support of grazing (chaired by Johannes Isselstein)
Short plenary presentations
- Agnes van den Pol-van Dasselaar: Grazing in Europe in 2018, results survey
- Arno Krause: ProWeideland: Supporting grazing using the value-add chain by labelling
- Gérard Conter: Agri-environment-climate measure to support grazing with dairy cows
- María Rosa Mosquera Losada: Agroforestry: a tool to increase grazing resources

Discussions in small groups and plenary feedback

Methods to maximise grazing (chaired by Alex De Vliegher)
Short plenary presentations
- Valérie Brocard: Six years of mobile milking at experimental farm Trévarez in France
- Beat Reidy: A comparison of three grassland-based milk production systems in Switzerland
- Bert Philipsen: Amazing Grazing in the Netherlands
- Johannes Isselstein: System analysis milk in Germany

Discussions in small groups and plenary feedback

Plenary introduction afternoon program (Emer Kennedy)

Lunch and group picture

Afternoon
Group will be divided in small groups for in-field experience of estimating pre- and post-grazing covers, feed wedge, pasture allowance and infrastructure
Plenary closure of the meeting

15.45 buses leave for Cork

To explore the potential of nature to improve the quality of life

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www.wur.nl/livestock-research

Wageningen Livestock Research creates science based solutions for a sustainable and profitable livestock sector. Together with our clients, we integrate scientific knowledge and practical experience to develop livestock concepts for future generations.

Wageningen Livestock Research is part of Wageningen University & Research. Together we work on the mission: 'To explore the potential of nature to improve the quality of life'. A staff of 6,500 and 10,000 students from over 100 countries are working worldwide in the domain of healthy food and living environment for governments and the business community-at-large. The strength of Wageningen University & Research lies in its ability to join the forces of specialised research institutes and the university. It also lies in the combined efforts of the various fields of natural and social sciences. This union of expertise leads to scientific breakthroughs that can quickly be put into practice and be incorporated into education. This is the Wageningen Approach.