Grazing and animal welfare of dairy cows in Europe, what do we know?

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Abstract
Grazing systems are important components of the landscape in almost all European countries. Grazing is inherently close to the nature of herbivores, but no longer applied everywhere in Europe. This paper discusses the extent of dairy cow grazing in Europe and the effect of grazing on animal welfare. The study builds on results of surveys from the European Grassland Federation (EGF) Working Group "Grazing" (WGG) in the period 2010–2022 and a focus group meeting in 2022. Data on the extent of grazing of dairy cows in Europe are provided. Europe can be divided into six distinctive regions with respect to the extent of grazing. The extent of grazing is country specific and there is less grazing in the East and the South than in the North and the West of Europe. In general, the popularity of grazing in Europe is declining, but there are a few exceptions. The main positive effects of grazing on animal welfare and animal health identified are that grazing provides much more scope for natural behaviour, may reduce the risk of udder health problems and may benefit claw health. The main negative effects are that in the field cows are exposed to weather conditions, especially sun, and fluctuations in diet composition. The WGG members concluded that grazing has, in general, a positive effect on animal welfare and animal health. A changing climate and associated changing weather conditions are seen as the biggest challenges for grazing in the next decade.

Introduction
Grazing systems are important components of the landscape in almost all European countries. Grazing is inherently close to the nature of herbivores, but no longer applied everywhere in Europe (Van den Pol-van Dasselaar et al. 2020). The extent of grazing is not monitored explicitly at a European level, but it has been estimated by the EGF WGG since 2010. Society associates grazing with animal welfare (Boogaard et al. 2011), so less grazing in Europe may be of concern. The topic 'grazing and animal welfare' was therefore discussed at the EGF WGG in June 2022. Animal welfare includes aspects that are relatively easy to measure, such as health, as well as intangible aspects such as emotions and feelings. An important aspect of animal welfare is natural behaviour. Grazing literally provides the space for natural behaviour. However, in terms of health, there may be both positive effects of grazing and negative effects of grazing. This paper discusses the extent of grazing in Europe and the effect of grazing on animal welfare.

Methods
In the EGF WGG, perceptions of grassland experts (mainly scientists, but also advisors, industry partners and farmers) on the occurrence, importance, constraints, solutions and future of grazing are studied using surveys and focus group meetings. This paper builds on the following results from the WGG:

- Extent of grazing in Europe, obtained by surveying from 2010 to 2022 (results 2010-2019 previously reported by Van den Pol-van Dasselaar et al. (2020));
- Grazing and animal welfare, obtained from i) survey 2022, ii) literature, and iii) focus group meeting 2022.

In the online surveys from 2010 onwards, members of the WGG were asked what percentage of dairy cows graze in their country and what the biggest challenges for grazing in the next decade would be. Typical numbers of respondents were 52-92. The survey in 2022 contained additional questions on grazing and animal health and animal welfare. The number of respondents in 2022 was 91. In June 2022, a focus group meeting was held on the topic 'Grazing and animal welfare' prior to the General Meeting of EGF. The meeting started with a short oral presentation on literature results and results of the 2022-survey, followed by a discussion session. In this session, six groups of about 10 persons each discussed a number of pre-defined technical and ethical/socio-economic aspects of grazing in relation to animal welfare and animal health in a European setting; i.e. i) impact of innovations in grazing systems, ii) effect of grazing on stress levels of the animal, iii) heat stress, and iv) predators. The original reports of the individual groups were studied using a qualitative content analysis to find emerging themes.

Results and Discussion

Extent of grazing in Europe

Grazing of dairy cows is not monitored explicitly at a European level. However, results form the surveys among EGF WGG members provide insight into grazing in Europe (Table 1). The extent of grazing is country specific and there is less grazing in the East and the South than in the North and the West of Europe. Based on the results, Europe can be divided into six distinctive regions with respect to the extent of grazing. In general, the popularity of grazing in Europe is declining, but a few exceptions can be seen.

Table 1. Grazing dairy cows (%) for different years and different countries in Europe, data are from surveys among EGF WGG members; grazing can range from full grazing to very limited grazing.

		2010	2014	2016	2019	2022
North	Norway			90	80	80 (75-95)
	Sweden	100	100	100	100	100 (100-100)
	Finland			70	80	70 (60-80)
West	Ireland	99	98	95-100	95-100	96 (90-100)
	UK		92	80-90	70-80	82.5 (70-90)
Central; Grazing > 50%	The Netherlands		70	65	73	75-80
	Belgium*	85-95	75-80	60-85	30-95	40-90
	Luxembourg	75-85	73	75		30-50
	France	90-95	90	75-95	90	50-90
	Switzerland	85-100	75-90	80-97	70-90	94 (88-96)
Central; Grazing < 50%	Denmark	35-45	25-30	25	20-25	30
	Germany	42		10-50	15-40	30 (20-50)
	Austria	25		40	44	45
East	Poland			20	30	30
	Czech Republic	20		3		4
	Slovenia	25		20	20-40	20
	Hungary			2-3	3-5	5-10
South	Spain	20		10-30	20-30	10-50
	Greece	15		10	10	5
	Italy			10-20		2-70

*Flanders (low), Wallonia (high)

Grazing and animal welfare – results of literature and survey

The results of the literature review and the survey amongst members of the EGF WGG in 2022 provide the following main positive effects of grazing on animal welfare and animal health:

1. Grazing gives much more scope for natural behaviour of livestock
2. Grazing may reduce risk of udder health problems in lactating livestock
3. Grazing may benefit claw health

Furthermore, the supply of vitamins and carotinoids to the grazing animal through consumption of fresh pasture, clean air, more positive interactions, ability of low ranking cows to eat undisturbed/with less competition were mentioned as positive effects of grazing.

The main negative effects of grazing on animal welfare and animal health included:

1. In the field, cows can sometimes be exposed to harsh weather conditions, especially sun

2. Lack of balanced ration in grazed pasture results in large fluctuations in diet composition and nutrient intake

Furthermore, other conditions and factors (freezing/snow, wet and rainy, not enough grass), poisonous plants, insects (ticks and mosquitoes), ruminal imbalance and resulting (subacute) metabolic disorders, risk of disease introduction due to infection with specific pathogens (e.g. worms, liver fluke), attacks by predators and bloat if grazing high clover swards were mentioned as negative effects of grazing on animal welfare and animal health. Remarkably, there were also five group members that could not think of any health or welfare disadvantages of grazing.

Literature shows that, in general, grazing has a positive effect on animal health and animal welfare (e.g. Arnott et al. 2017, Burow et al. 2013, Charlton and Rutter, 2017). The WGG agreed with this, but pointed out that there are exceptions. Some examples of these exceptions are:

- A high producing dairy cow is unlikely to have adequate feed intake through grazing to satisfy welfare at 24-h grazing without supplementation
- The benefits of grazing depend on how well it is managed/only occur if it is well executed
- If temperatures become too high
- If farm walkways/roadways are in bad condition/have a poor quality surface or if the distance to the pastures is too long

Grazing and animal welfare – results of focus group discussions

The main results of the focus group discussions per theme are presented hereunder:

Theme i): *What is the impact of innovations in grazing systems on health and welfare?* Transponders/GPS sensors can be used to track animal movements and can be beneficial for managing grazing cows. It may also be possible to link data to grazed vegetation. The data collected from the sensors/transponders can be used to monitor health, reproductive performance, etc., and provide knowledge of the welfare of cows to farmers. Remote sensing could monitor important health data to improve animal health, e.g. allocation of herbage, supplementation allocation, or presence of poisonous plants. Virtual fencing can be very useful for grazing management. In general, cows first get an acoustic signal and later on a little electric shock as they approach a virtual fence. Cow health and welfare have been the trigger for the introduction of regulations in some European countries, but according to the WGG, a comparison should be made with normal electric fencing when evaluating the effect of virtual fencing technologies on animal welfare. In general, it was concluded that if innovations result in an increase in animals outside, it means an improvement in animal welfare.

Theme ii) *Does grazing affect stress levels of the animal? If so, in what way, how do you know and how can this be managed?* Grazing is natural behaviour. However, most groups provided examples of grazing affecting stress levels of cows. Examples of stress factors were mosquitoes, worms, and flies when wind speed is low. The grassland itself was also considered to be a potential stress source (not enough grass supply, inadequate grass quality to meet nutrient intake requirements, not enough grassland species diversity). Furthermore, animals can be under stress when the topography does not suit the breed of cows (e.g. Holstein Friesians in mountainous area). Animals can also be stressed due to the presence of humans, for example tourists. The farmer him or herself can also be a stress factor. Cows give signals if a farmer is stressed. Stressless farmers mean stressless cows. In general, the grazing experience of the cows is important and the conditions should not change too much (feed supply, terrain, etc.). Changes can induce stress.

Theme iii) *Heat stress is often mentioned as a negative for grazing. As a result of climate change, more regions cope with this problem. What can we learn from each other?* When temperatures are above 23-25°C, heat stress can be problematic for livestock. Water and shade should be available. Climate change can result in additional heat stress. Climate change also provides additional problems, like changes in insect pests, and it becomes necessary to idendify more persistant forage species. Many farmers are not aware of heat stress and are not prepared to deal with it or manage it. To inform them, farmers should be provided with indicators. This could be done, for example, via the use of technologies such as activity monitors or accelerometers to measure animal activity with some devices now measuring the animal's body temperature as a tool to indicate heat stress. A number of tips and tricks were provided to reduce heat stress:

- Provide fresh pasture at noon.
- Siesta grazing - avoiding exposure to sun and heat at midday.
- Work with breeds that are more adapted to the heat (e.g. cows with a lower body weight, dual purpose cows).
- Graze during night time in warm periods and feed the animals indoors during the day.

- Plant trees or introduce agroforestry systems to provide shelter for animals during high temperatures.
- Reconsider forage species, e.g species like chicory and plantain are more drought/heat tolerant.

Theme iv) *Predators are more and more a problem. What can we learn from each other?* Wolves are seen as the biggest predator problem, and bears were also mentioned. The number of wolves is increasing in most European countries. In some countries, the introduction and management of the wolf population is a political issue. It is not clear who will pay for prevention and loss. Wolves kill or injure grazing animals. Protection of livestock costs a lot of money. A number of methods to control the dangers of predators to grazing livestock were exchanged:

- Hunting (not allowed in many regions of Europe)
- Collars on wolves – track, virtual fencing?
- Use other animals to prevent wolves from attacking livestock, e.g. donkeys, aggressive cows or dogs. There were, however, some experiences where dogs have also been attacked.
- Improve fencing in areas that suffer from large predators like wolves and bears.

Challenges for grazing

Finally, the 2022-survey provided insights into what the members of the WGG considered as the biggest challenges for grazing in Europe in the next decade:

- Climate change, weather
- Costs, economy
- Policy, judgement of people with no connection to agriculture
- Balancing/managing different ecosystem services
- Farmers understanding the benefits of grazing

Climate change and weather were by far the most frequently mentioned.

Conclusions and/or Implications

The EGF WGG members concluded that grazing has, in general, a positive effect on animal welfare and animal health. The generally declining percentages of animals grazing in Europe are therefore a negative development. Despite the many benefits of grazing, it can also provide challenges for animal health and animal welfare, e.g. heat stress and predators. A changing climate and associated changing weather conditions are seen as the biggest challenges for grazing in the next decade.

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