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[A successful pasture management in spring and autumn in the Netherlands]

A successful pasture management in spring and autumn in the Netherlands.

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Foreword

This research to the possibilities of successful grazing in spring and autumn in the Netherlands is made on the request of ‘’amazing grazing’’ who wanted more knowledge about grazing in Ireland and the possibilities of it in the Netherlands. Thereby it focuses on optimizing the profitability of grazing. I would like to thank Marcia Stienezen from Wageningen Livestock Research on the process of developing this research. Further I would like to thank the research group ‘Dynamisch Weiden’ for making available of the data for this research. Finally I would like to thank Cor Kwakernaak from the Van Hall Larenstein University for his help and cooperation to make this research possible.

I hope this research will give farmers smart guidelines to be more successful in grazing during spring and autumn.

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Summary

This research investigated the possibilities of a more successful grazing period during spring and autumn. This research focused on the indictors 'Cover and Magic Day' like used on Irish farms. Irish farmers use the indicators to plan and manage grazing. Ireland characterizes itself as having a mild climate, mild temperatures, with a colder summer and warmer winter the period where grass grows exceeds the period in the Netherlands. This along with the lower milk prices in Ireland makes them focus on low cost grazing. This means grazing for 22 hours a day, 265 days in a year with a spring calving herd that get a 100% grass diet that is on a low supplement base. The Irish are mainly focused on their fields where the Dutch farmers are focused on their dairy herd. They have a more high input high output focus with less grazing, a year-round calving herd and more kilograms of supplements per cow per year.

The research focuses on how to implement the much used indicators in the Netherlands without having to change the management characters of the farms. This means still focus on year-round calving, high supplementing etc.

Irish farmers use the indicator Magic Day mainly during spring and the indicator Cover mainly during spring and autumn. During spring they use Magic Day to determine when they should move from the spring rotation planner towards the Feedwedge. This mainly occurs in the first 3 weeks of April. Cover is used during Spring and Autumn. It stands for the herbal mass. This can be set per hectare, per field and per farm. During spring Irish farmers use the Spring rotation planner. This planners starts on February 1st with a slow rotation length of 100 days towards a fast rotation of 19 days during the first week of April. This is to optimize intake along with growth. During Autumn Irish farmers use the Autumn grazing planner and the Autumn budget planner to manage the Autumn grazing The autumn grazing uses the 60-40 rule. 60% of the fields get grazed before a certain date depending on soil type. This way the 60% has time to regrow and make a Cover that can be grazed during early spring. For the late autumn where growth is deficient to intake the Autumn budget planner has been developed. This planner budgets the grass Cover on the fields during late summer where growth is still surplus to have a reserve during late autumn.

The selected farm in this research has been chosen because of its data collection of the grazing history. Other farmers had not enough data to have a good data collection. This farm has 41.8hectare peat soil and was milking a 85 cows in 2013 and 100 cows in 2014 who were year-round calving. The farm was handling a daily rotating grazing system where the cows got a new field every day. The farm never used Irish indicators and planners.

Dutch farmers can use the Irish Spring rotation planner along with the Irish Magic Day if they start grazing early in February. Otherwise the Magic Day can't be determined because the growth will already be above the intake. An different way of using the Magic Day is developed in this research and is set when the target/optimal field Cover is established. This is just like in the Irish Magic Day the time to switch from the Spring rotation planner towards the Feedwedge.
An alternative Spring rotation planner, developed in this research focuses on the growth of the fields. The difference with the Irish Spring rotation planner is that before grazing starts there is a grazing platform determined. This is done by estimating the maximum growth and the maximum intake. This needs to be levelled to prevent a surplus growth. This way a farmer can plan the amount of hectares that will get pasture and the amount of hectares that will be cut before grazing. After this is set the Dutch Spring rotation planner can be used. The spring rotation planner plans towards a certain target Cover. This Cover is divided by the growth of the last 14 days. This rotation length is divided in the calculated grazing platform. This makes the amount of hectares that should be grazed.

The Irish Autumn grazing planner along with the Irish Autumn budget planner can be used on Dutch farms with high fresh grass intake and a high stocking rate of the cows. This is only a small percentage of the farms in the Netherlands. For the other farms there is a Dutch Autumn grazing planner developed. This planner focuses on grazing a certain amount of grass before de day of

housing. This way a farmer can plan what fields to graze and what fields to cut for the last time. This is done by calculating the amount of fresh grass the cows will eat every day. And what their will on Cover in that period before housing.

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Introduction

Cows and pasture are as old as mankind. Also in the Netherlands pasture is a common thing. Even though pasture has a lot of good points, the trend goes to 0 grazing. This means the cows are kept inside for the entire year. The management skills of pasture are forgotten and quotes like 'Melkveehouders zijn niet goed in beweiden'(Dutch farmers are not good in grazing) (Burgers, 2013) are getting more common. In 2012 70% of Dutch cows still got pasture (Horst, 2013), these cows got an average between 1000 and 2000 hours of pasture every year.(Project kringloopwijzer,2013) Even though 70% seems a lot the trend of 0 grazing dairies is going up (Keuper, 2013). As shown in figure 1 the % of cows who got pasture went down with 20% in the last 11 years. (Blue is 0 grazing) The reason of this trend seems to be the lack of management skills, the low costs of fertilizer and supplemental feed for the past 20 years (Verhoeven, 12)

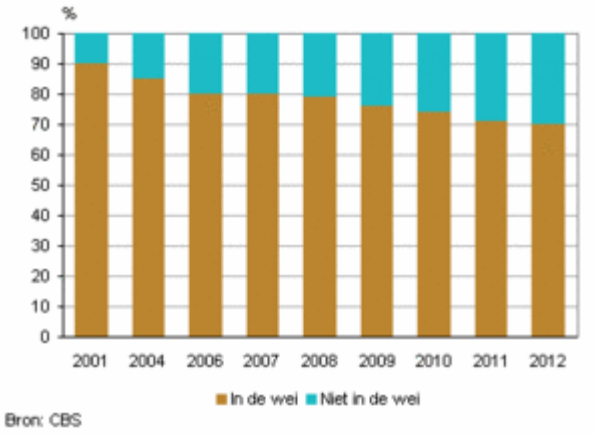

Figure 1 Amount of cows grazing (Mons, 2013)

As shown in figure 1 the amount of cows grazing declines from 90% in 2001 towards 70% in 2012. To stop this declining along with the increasing demand of grazing milk the dairy sector signed a 'grazing covenant'. The goal of this covenant is to turn the zero grazing trend and get more farmers in pasturing again. The covenant focuses on getting the amount of farmers grazing towards 80% again. On one hand with a bonus system for dairy farmers who graze their cows at least 120 days 6 hours per day, on the other hand with management training and management tools.

In other countries like Ireland and New Zealand pasturing is still a common management skill and dairymen get trained for it too. They use several management tools for different conditions. In the spring they use the 'spring rotation planner' and for the autumn the 'autumn grazing planner' is a common used tool. Along with these planners, farmers use indicators like 'cover' and 'Magic Day'. (Dillon P. , 2009).

Cover is the average herbal mass per: hectare, field or farm. This shows how much grass you got stored on it. Magic Day stands for the moment where the grass growth equals the demand. The focus of the data research will be on Magic Day and Cover, if the Dutch farmers can copy them or if these indicators need an 'update' to Dutch standards.

Goal

The goal of this study is to give Dutch dairy farmers a tool based on Cover and Magic Day to improve grazing during spring and autumn when grass growth doesn't exceed grass demand.

Main question

how to successfully start and end grazing with the use of the Irish indicators 'Cover' and 'Magic Day' in the Netherlands.

Sub questions

The sub questions which have to be answered are:

1. The Irish and Dutch climate and how does it affect grazing and grass growth?
2. What is ''Cover'' and how do Irish farmers use this?
3. What is ''Magic Day'' and how do Irish farmers use this?
4. How do Irish farmers pasture during spring?
5. How do Irish farmers pasture during autumn?
6. How can Dutch dairy farmers use the indicator Cover?
7. How can Dutch dairy farmers use the indicator Magic-Day?

This research paper will show in chapter 1 the methodology of this research. Chapter 2 will show the differences and similarities of Irish and Dutch farmers. . Chapter 3 will show which Indicators Irish farmers use and how the indicators are been used by them. Chapter 4 shows the profile of the Dutch farm. Chapter 5 and 6 will show the possibilities of implementing the indicators by Dutch farmers. This will be discussed in Chapter 7. The paper will end with the conclusions(Chapter8).

1. Method

To get everything clear without missing important information and to prevent running ahead of the literature when doing the research three steps can be distinguished (figure 2). In step 1 Dutch and Irish climate and grass growth will be explained, just as Cover and Magic Day. In step 2 the possibilities of implementing Cover and Magic Day in the Netherlands will be discussed. Step 3 will explain and discuss how to implement Cover and Magic Day in the Netherlands to help farmer graze more successfully.

Figure 2: The three steps of the research

Step 1

This step will start with explaining the similarities and differences between the Dutch and Irish Climate and grass growth. This will mainly focus on the 'grazing climate' with temperature and rainfall. All this information is collected through literature research .Shown is average year-round weather of Ireland and the Netherlands, the extremes during summer and winter and grass growth (Chapter 2).
Next it will explain what Cover and Magic Day mean and how the Irish farmers use them. Research done by Irish institutes will help to find and explain these indicators. This information will also be collected through collecting literature (Chapter 3)

This step will answer the following sub questions:

1. The Irish and Dutch climate and how it does affect grazing and grass growth?
2. What is ''Cover'' and how do Irish farmers use this?
3. What is ''Magic Day'' and how do Irish farmers use this?
4. How do Irish farmers pasture during spring?
5. How do Irish farmers pasture during autumn?

Step 2

Step 2 explored the possibilities of applying the indicators and schedules used by Irish farmers and how to implement this in the Netherlands. This step explored whether Dutch farmers can apply Cover and magic Day with or without changes of the Irish schedules.

In the project 'Dynamisch Beweiden' detailed information on grassland management was collected from three farmers. From one farmer the data were suitable to implement the Irish indicators and Irish schedules to put several hypotheses that have been tested in step 3.

Several schedules for grazing during early and late spring will be created and the best option for early and late spring will be chosen. This early and late spring has occurred at 2013 (late) and 2014 (early).

The following data is collected and processed:

- **Grass height:** grass height is collected through a weekly farm walk. Every week the farmer measured the grass height on the paddocks with a rising plate meter.
- **The amount of refeeding:**. This is done to calculate the fresh grass intake. This is done through the VEM method. The VEM method is demand on energy level minus the energy level of the silage and concentrate the cows got. The gap between these two levels parted by the VEM per kilogram dry matter of the fresh grass is the fresh grass intake. (Verantwoorde veehouderij, 2010)
- **Paddocks cut**: this is collected to know what paddocks a farmer uses to graze, how often he grazes a field before cutting along with the amount of grass cut before grazing it the first cut. This is also used to determine the grazing platform. The grazing platform is a name for the fields that are included in grazing.

Step 3

Step 3 tested and implemented the hypothesis that has been made in **step 2** at the selected farm. The found problems in step 2 have been solved, new grazing indicators and schedules have been developed and an advice for practical implementation has been given.

This step along with **step 2** will answer the following sub questions:

1. How can Dutch dairy farmers use the indicator Cover?
2. How can Dutch dairy farmers use the indicator Magic-Day?

2. The Irish and Dutch climate and how it affects grass growth and grazing

With the help of researches this information was collected. Information about growth, weather, grazing, mowing, tillage and strong and weak points of the management are collected and summarized in this chapter. The difference in conditions that affect grass growth like temperature and rainfall is shown in chapter 2.1, Chapter 2.2 shows the difference in grass growth and the current management of the farms in the Netherlands and Ireland.

2.1 Climate Ireland and Netherlands

2.1.1 Temperature

The average Irish temperature curve (figure 3) is comparable with the Netherlands (figure 4). With the highest temperature in July and August, and lowest in December and January. Dutch summers are a bit warmer with a maximum of 22°C compared to 18°C in Ireland and winters are a little colder with a minimum of 0°C compared to 2°C in Ireland. Grass grows best when soil temperature is between 5°C and 15°C. Above this temperature it takes more energy for the plant to cool down. (Akkerman, 2014) Above 25°C grass growth completely stops (Raalte, 2014). The surface temperature is highly associated with the soil temperature (Daolan Zheng, 1993). The milder winters makes the soil temperature drop less and the milder summers makes the soil temperature increase less. This means Ireland has more days between 5°C and 15°C, (soil) temperature where grass growth is optimal.

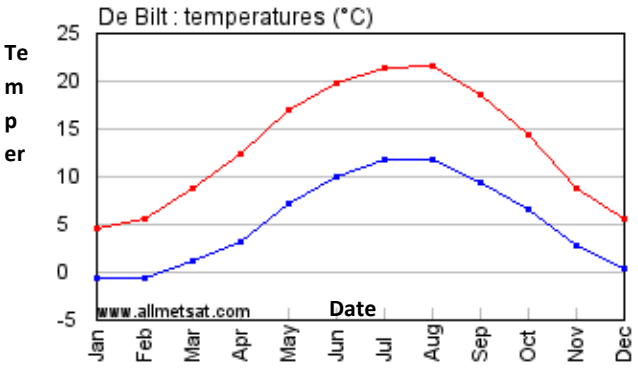

Figure 4 Yearly temperature Netherlands (El Dorado weather, 2014)

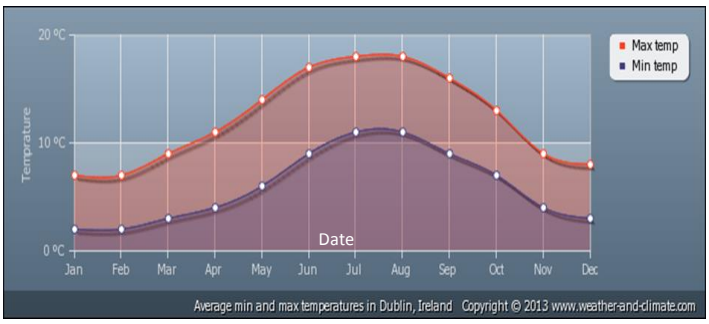

Figure 3 Yearly temperature Ireland (world weather and Climate Information, 2013)

2.1.2 Yearly rainfall

It's widely known that a plant needs moisture to grow. The cheapest way is nature's way, this along with a highly usable source of water for the soil and plants makes enough rain really important for grass growth. The difference between the two countries is smaller than the difference in the countries itself. Figure 6 shows that the middle of Ireland is similar to the Netherlands. It rains between 800 mm to a 1000 mm per year. If you go further towards the west coast and south coast rainfall rapidly goes up and doubles easily at the coast. In the Netherlands (figure 5) rainfall doesn't differ as much as in Ireland but still has a difference of 200 mm. mainly the south part has less rain. Also around Zeeland (southwest) and close to the lakes (northwest) rainfall goes down. Rainfall differs from year to year and even within small areas the difference can be huge (Pennings, 2014).

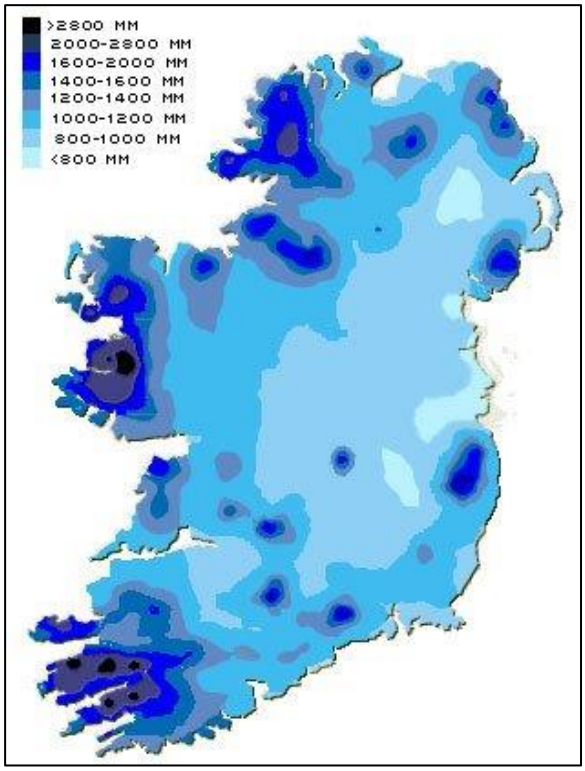

Figure 6 Yearly rainfall Ireland

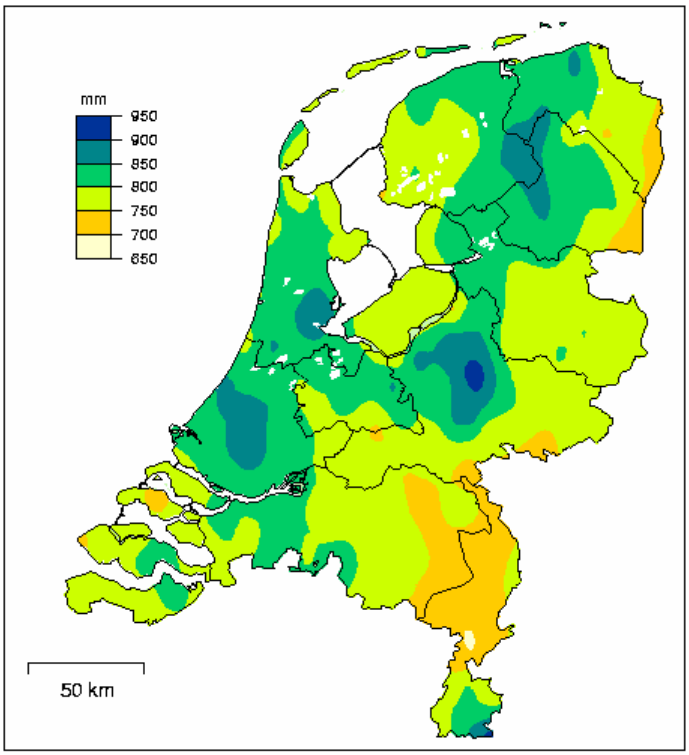

Figure 5 Yearly rainfall Netherlands

2.1.3 Monthly rainfall

The yearly rainfall is a good indicator for the potential growth but the monthly rainfall is even more important. When it rains a lot during winter but it doesn't rain in the summer drought can still occur. Figure 7 and figure 8 show that rain in the Netherlands (de Bilt) and Ireland (Dublin) are quite similar. Ireland gets a little more rain in the autumn but not a lot more. During summer there is even less rain in Dublin (Ireland).

Figure 8 Yearly average rainfall de Bilt (Netherlands) (Adri Buishand, 2010)

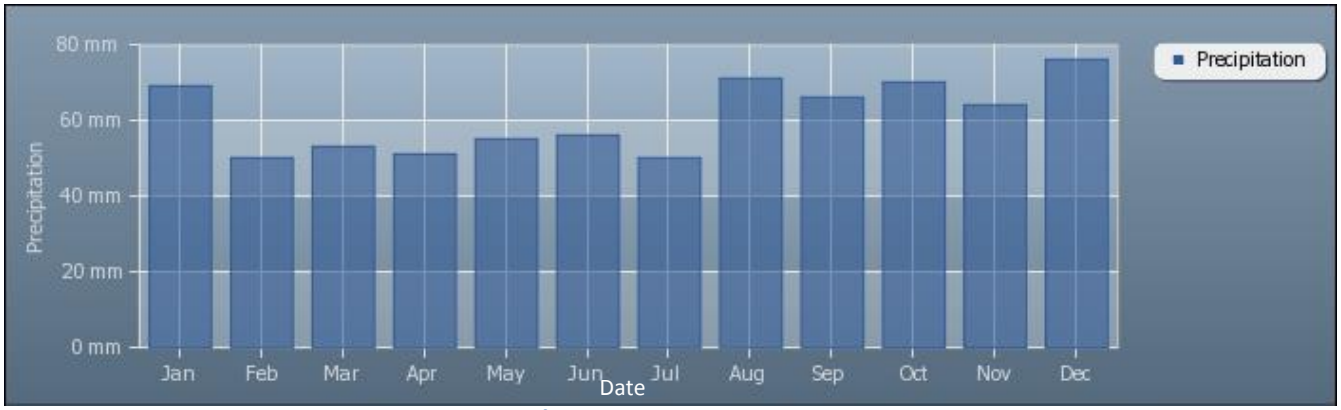

Figure 7 Yearly average rainfall Dublin (Ireland) (MET ÉIREANN, 2010)

2.2 Grass growth in Ireland and the Netherlands

How fast grass grows depends on different things. The thing that affects it the most is climate. Things like temperature and moisture (chapter 2.1) are the main variation factors . the biggest difference between Ireland and the Netherlands are during early-spring, mid-summer and late autumn. Those periods Ireland's grass growth exceeds the Dutch one. Grass starts growing earlier, has a more consistent growth during summer and the growth stops later in the season. Where grass growth stays high in Ireland and then slowly goes down. In the Netherlands it peaks in May and then the widely known summer drop occurs. The reason of this drop is shown at chapter 2.1 where Ireland doesn't go above the 20 degrees, the Netherlands does. This means a decrease of 10 to 20 kg dry matter per Hectare per day for the months June, July and August.

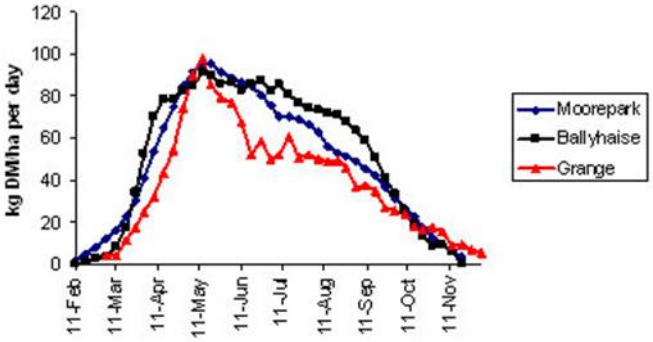

Figure 8 grass growth Curves for 3 locations in Ireland (Mayne, 2005)

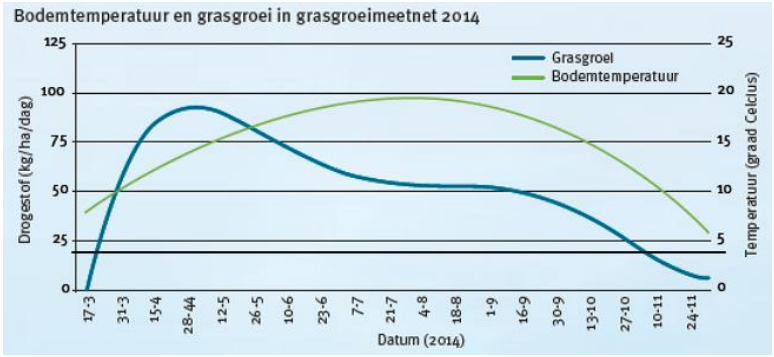

Figure 9 grass growth and soil temperature Netherlands (2014)

2.2.1 Grazing in Dutch farm management

An average farm in the Netherlands has 85 cows producing an average of 8500 litres a cow a year on almost 50 hectares . Like discussed in the introduction the amount of cows grazing in the Netherlands is declining. In 2012 around 70% of cows still got pasture. The reason for not grazing is more cows per farm, small home plots and farmers think zero grazing is easier. Grazing in the Netherlands characterize themselves with: normal grazing periods of about 200 days, grazing for 8 hours a day, paddock grazing for 4 days, a spread calving herd, feeding high amounts of concentrate, 70 to 100% grass in the crop rotation and a high output strategy. (CBS, 2014) (Zijlstra J., 2013) This is seen in high production, high costs and expensive buildings. Farmers pay close attention monitoring the cattle but have a lack of knowledge for pasture monitoring and management.

2.2.2 Grazing in Irish farm management

An average farm in Ireland has 60 cows and 30 hectares. Almost a 100% of the farms graze and an average cow produce about 5000 litres. The characteristics of the Irish grazing systems are the following: a long grazing period of 265 days, grazing for 22 hours per day, strip and paddock grazing, a spring calving herd, feeding low amounts of concentrate, 100% grass in the crop rotation and a consistently implemented low-cost strategy. This is also apparent in the low investments in machinery and buildings. The Irish dairy farmers pay close attention to grassland management, with an emphasis on monitoring grass growth on all paddocks and the grass intake of the cattle. The best farmers mark themselves as the best pasture managers. Where the farmers focus on the fields instead of the cows. high grass production and high grass intake are the factors they focus on. (Zijlstra J., 2013)

3. Planned grazing in Ireland

As seen in the previous chapter Irish farmers are focused on grazing. This resulted in planners and indicators for an optimal grazing management during spring and autumn. Chapter 3.1 will show what indicators are used and what link they have with a successful grazing planner. Chapter 3.2 shows planners used during spring and autumn. How Irish farmers manage those periods during a deficit in grass growth and how they get an optimal intake without running out of pasture.

3.1 Indicators Cover and Magic day

3.1.1 Cover and the use

Cover stands for the grass herbal mass yield expressed in kg dry matter, either on hectare, paddock or farm level. The most common way to estimate the Cover is through grass height. Grass height estimated and transferred to dry matter yield using factors for grass type, weather type and grass density (Dillon P. , 2009)

Cover and the use of it on Irish farms

During spring, summer and autumn a farmer can measure Cover the same way, but use the indicator differently. In all the seasons a farmer uses Cover to know the growth, the needed grazing area per day and if and how much reefed is needed. For those purposes Cover is defined in the three ways:

1. Cover per hectare
2. Cover per field
3. Cover of the farm

A farmer can use it to determine the growth, the needed refeeding and if the Magic Day(chapter 3.1.2) occurred. A farmer can plan what field to graze and what fields he should mow for silage. Cover can also indicate if fields are too high on herbal mass for grazing and needs be to mown.

Calculate farm Cover

Textbox 1 shows how to calculate the farm Cover. In spring the farm Cover is used to indicate how much grass there is available for the animals to graze. In the autumn farm Cover is used to estimate how much refeeding is needed to achieve the right Cover for different periods.

How to calculate Cover

- Measure/estimate the quantity of grass in each paddock – DM yield
  e.g., 1,400 kg DM/ha
- Multiply the DM yield of each paddock by the area of the paddock in ha
  1,400 kg DM/ha x 1.8 ha = 2,520 kg DM in the whole paddock
- Repeat this for all the paddocks on the farm
- Sum all the paddock yields together
- Sum all the paddock areas together (i.e., get total area of grazing platform) in hectares

To calculate farm cover
Divide the sum of the quantity of grass on the farm by the total area
e.g., 10,000 kg(A) ÷ 20 ha(B) = 500 kg DM/ha

Textbox 1 Calculating Cover

3.1.2 Magic Day and the use of it on Irish farms

Magic Day, it sounds like a day where everything is perfect. If you plan it right it can be.
Magic day is the day that the growth of grass per hectare per day is the same as the intake of the cows per hectare per day. Looking at figure 11 this is when the green line (grass growth) crosses the blue line(intake) during spring (figure 11) (Dillon P. , 2009). Before the Magic Day grass growth is deficit to cover the fresh grass demand of the cows, after the Magic Day grass growth exceeds the demand for fresh grass of the cows. When the Magic Day arrives in spring you move from the 'spring rotation planner (chapter 3.2) towards the 'Feedwedge' (Dillon P. , 2009) Usually the Magic Day is in the first three weeks of April, depending on amount of cows grazing and how early spring arrives because these things affect growth and intake (Kinston, 2011).

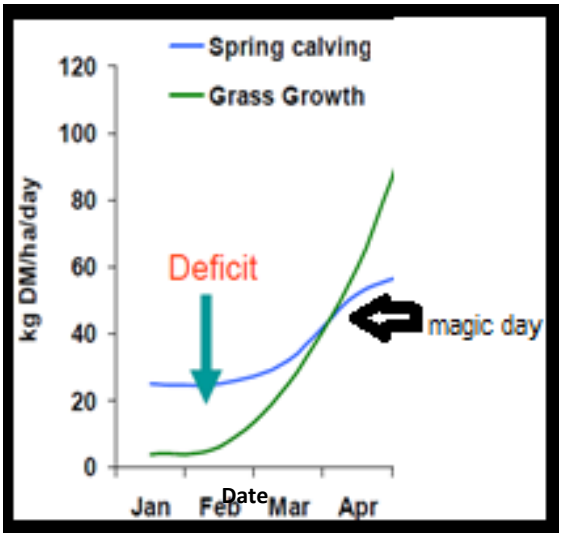

Figure 10 The Magic day

The indicator is developed because researchers wanted to tackle the problem farmers had during early spring. The biggest challenge was the small line between grazing too much, and running out of grass and not grazing enough and having a too high Cover on the fields to graze. A too high Cover gives trampling of grass and a lot of pasture losses.

3.2 Planned spring grazing

Grazing in Ireland always starts before grass really starts growing. Most farmers have a spring calving herd and start as soon as the cows start calving (Teagasc, 2014). The cows who calved go out grazing. This way not the whole herd goes out at once. This is to tune nutrient demand and availability towards each other. Figure 12 shows how demand grows when cows start calving in February. To bridge the deficit period during the first months of grazing the spring rotation planner has been developed. This will be explained in the oncoming chapters.

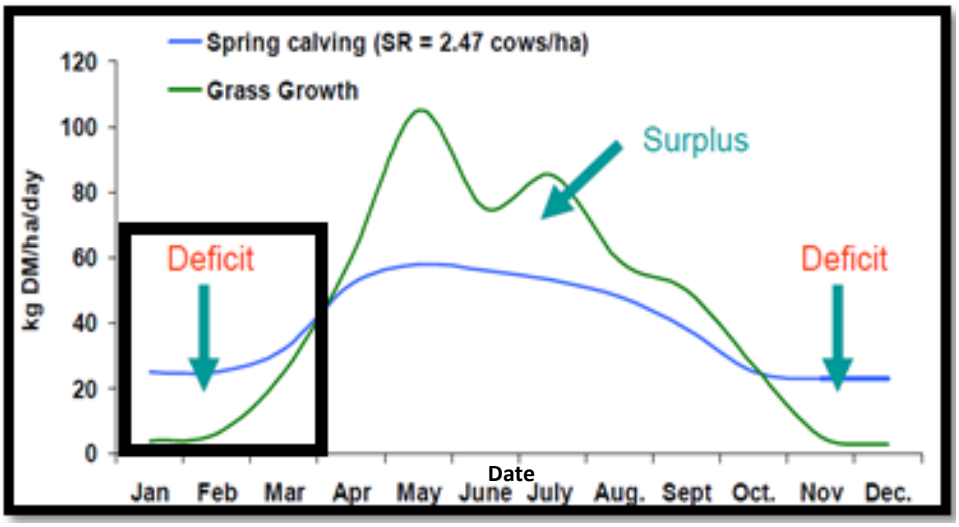

Figure 11

There are two main assumptions with grazing during spring. Not only getting as much fresh grass in the cow as possible, but at the same time having a Cover of 850kgDM/ha (goal in summer) at the end of April to ensure a good pre-grazing height (Dillon M. O., 1999).This pre-grazing height will be achieved when you stick to the plan. Irish farmers aim for a grass Cover of 550/600 DM/ha when cows go out to pasture for the first time. These Covers are set up with the spring rotation planner, mostly established during the Autumn grazing and the slow growth during winter when cows are not grazing (Kinston, 2011).

3.2.1 Spring rotation planner

In grazing during the early spring when grass demand is not covered by grass growth, farmers always had to guess how much they could graze and how much they had to reserve for later grazing. The spring rotation planner optimises intake along with growth. The spring rotation planner starts with a slow rotation (1% of your grazing area is offered to the cows every day) and then goes towards a fast rotation (5% of your grazing area is offered every day).this way the whole area is grazed once in the period from February 1st till the first week of April.

Irish farmers start pasturing cows as soon as the cow calf. This means that the farmer starts grazing with a small amount of cows in the beginning and this group grows during time. As soon as the first cow goes out to pasture he starts planning towards the Magic Day. Ireland developed a schedule named the 'spring rotation planner'. It plans the amount of Hectares you should give every day. This way you go from a slow rotation with a rotation length of 100 days towards a fast rotation with a rotation length of 19 days (figure 13) (Kinston, 2011)

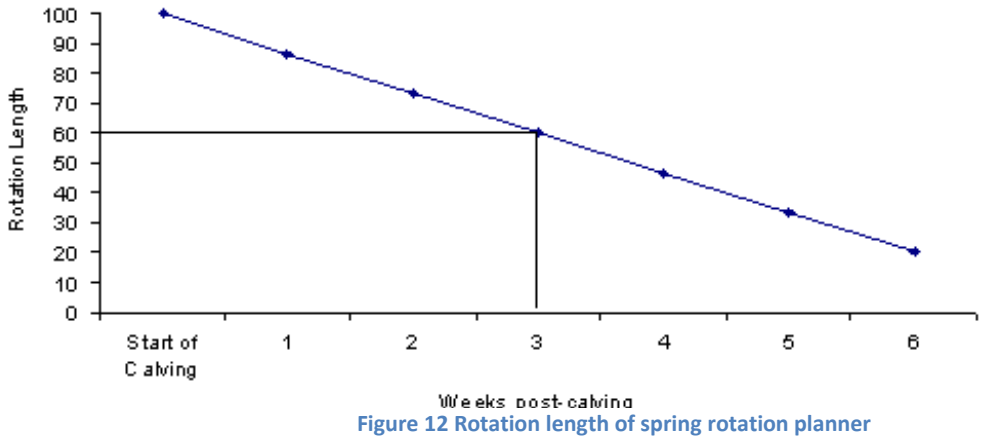

Figure 12 Rotation length of spring rotation planner

Figure 14 shows how the spring rotation planner changes the area offered per day. When farmers start grazing later in spring they need to adapt the starting rotation length. For every 7 days past February 1st decrease the length by 10 days. For example when cows go out February 8 instead of February 1 reduce your starting rotation length from 1/100 by 10 days towards 1/90. You do this for every seven days shorter in this period. (Dillon M. O., 1999). It also shows the amount of hectares the cows get per day.

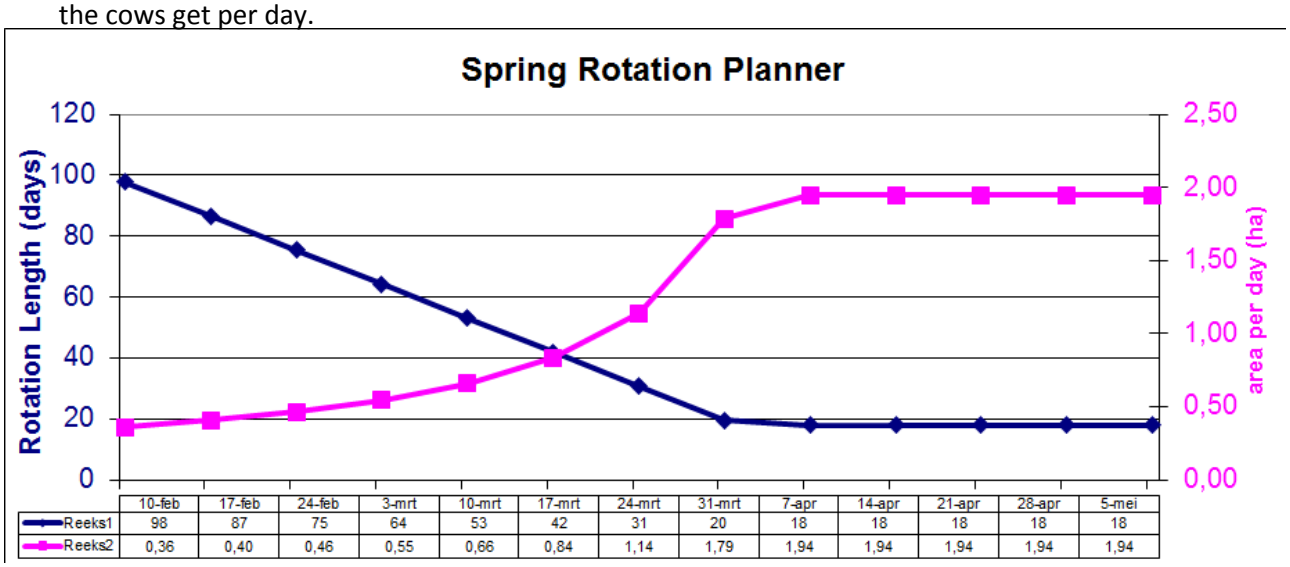

Figure 13 Spring rotation planner

3.3 Planned autumn grazing

Autumn, the period of declining grass quality, more watery grass and high protein content. Dry matter of the grass drops because of more rainfall and grass growth goes down. This all makes it less balanced and harder to graze in the right pre-grazing cover. Irish farmers have the most cows in a late state of lactation. This means most of the cows are low in production. This lowers the demand of good quality grass. Still the cows need to get enough intake to keep up the production and have enough energy for the calf and herself. The rain also makes the soil more vulnerable to trampling. This all makes it hard to keep fresh grass intakes high. At the same time grass growth goes down. Growth start crawling down towards demand and this period the deficit will occur again (figure 15). To prevent the deficit it is important to increase the farm Cover. Chapter 3.3.1 will show the autumn budget planner. Chapter 3.3.2 will show the Autumn Grazing Planner. This will show how a farmer can plan the autumn grazing and prepare for spring.

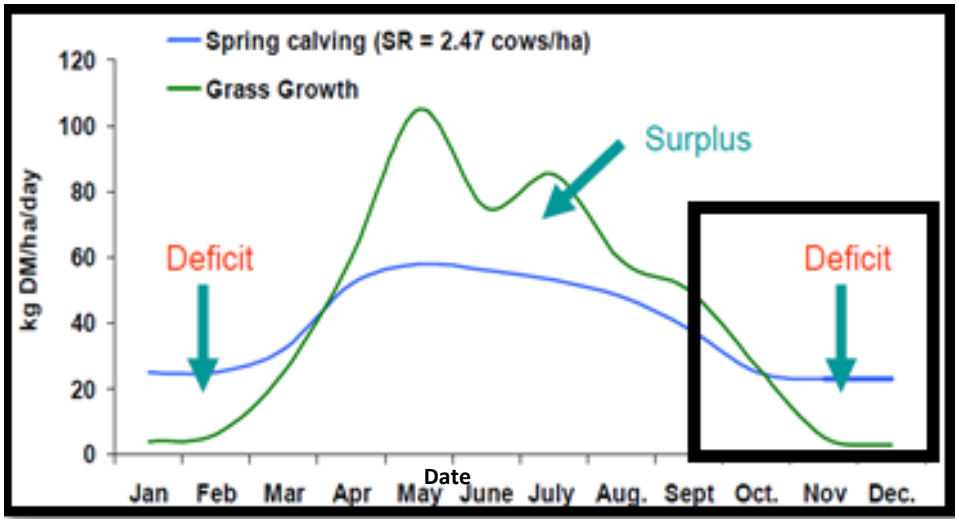

Figure 14 Deficit period during autumn.

3.3.1 Autumn Budget Planner

The Autumn Budget Planner is developed to support the farmers in the autumn grazing. The planner helps in the decision if and how much silage is needed for the cows, if and how much grass is needed to be removed for silage. As shown in figure 16 the Cover in the autumn goes up again around august. This can be achieved by extending the rotation length from 25 towards 30 days from mid-August to mid-September. This way the fields have a longer time to grow and they will achieve a higher cover along with starting to reefed silage if needed. This all is used to maximise the amount of fresh grass in the diet of a lactating cow. The higher cover is a form of stock piling grass on the field. This means making a little reserve for days where growth goes down. But not only for the reserve but also for the spring this budget planner is important. It has to be tracked and planned to finish with the desired 500kg DM/ha Cover for the next spring. (Teagasc, 2014) figure 16 shows the target for the average farm Cover. When the Covers are too heavy (2500kg/HA) it's the best to remove the surpluses as silage (Teagasc, 2013). After this the Cover goes down towards the target farm-Cover of 500kg DM/ha (with a range of 200-800) when the farm closes. This to have enough herbal mass when spring arrives (Teagasc, 2014).

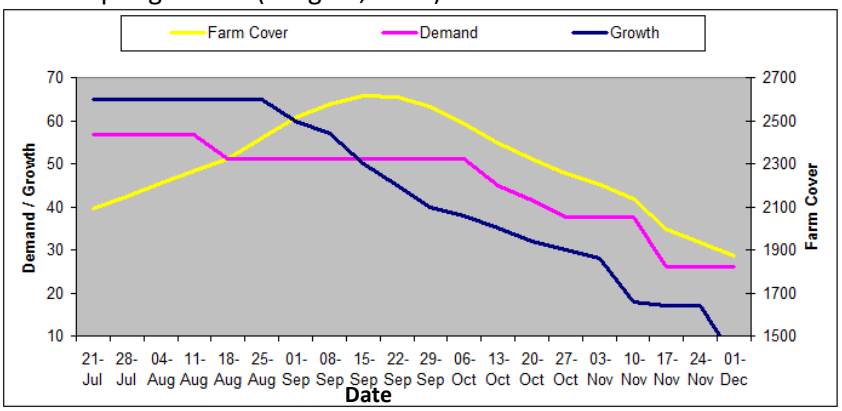

Figure 15 Target farm Cover (Teagasc, 2011)

Figure 17 shows an example of an Autumn budget planner. This farmer starts growing the farm Cover at the end of July. In mid-September the Cover shows a dip. This is because grass growth gone down towards 45kgdm/ha/day and the demand was around 48kgdm/ha/day. To achieve the target cover this farmer start feeding 6kgdm silage per cow. This lowers the demand with 18kgdm towards 30kgdm. When grow stays at 45kgs/ha/day the Cover grows 210kgs within 2 weeks. This way farmers can stick to their target and have a good Cover when spring arrives along with a good growth of the pre-grazing fields. Because everyone knows grass makes grass grow.

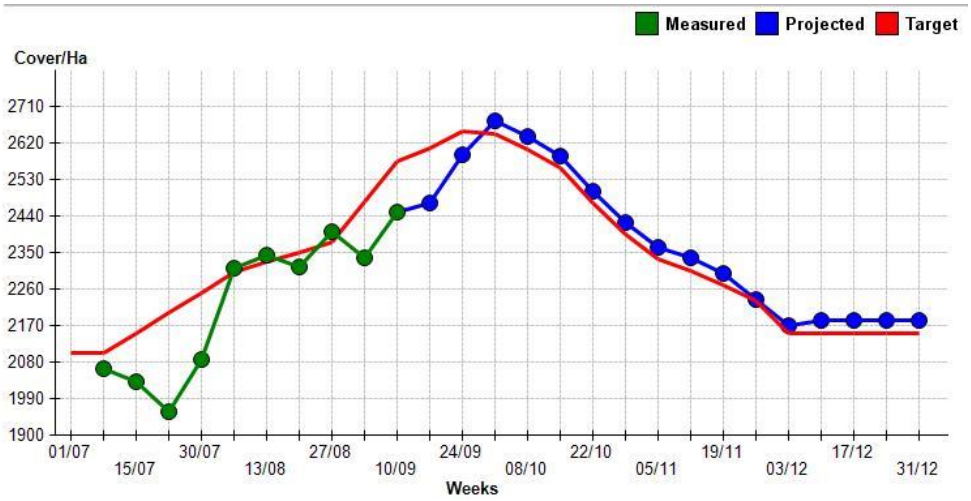

Figure 16 Example Cover of a farm during autumn

3.3.2 Autumn Grazing Planner

The autumn grazing planner is a schedule where they use the 60:40 rule. The 60:40 rule stands for the percentage of hectares that has to be closed for grazing by a certain date (picture 19). Closing means not grazing on those fields till the next spring.

Sticking to the 60:40 rule is important because of 2 things:

The first one is to get good quality grass in spring. The 60% of the farm that gets closed at 20 October (heavy soils) or 1st of November (light soils) is able to grow and achieve a cover between 200 and 800 before spring arrives. Figure 19 shows the first block (60%) and the second block (40%). When the first field has been grazed, it has about 40 days to grow (October 1st till November 10th). 40 days times the daily growth of 20 kg DM makes a Cover of 800 kg DM. Every day a field gets grazed later it will make the Cover of that field about 20kgdm lower (depending on growth). (Teagasc, 2011) The second reason is to maintain a higher pre-grazing Cover during the second period even though grass growth slows down. (Teagasc, 2014). This will help to maintain good rumen activity along with the right Crude protein. It will also affect the grass growth positively because grass grows grass. (Aleer, 2013). This will also be done through the Autumn budget planner (chapter 3.3.1). the reason for a 60/40 and not for example 70/30 is to have a better spring Cover. Grass needs time to regrowth. The reason for not having a 50/50 is to give more time for grass to grow into the right Cover. As temperatures decline so does grass growth. This ensures grass at a good Cover until the last day.

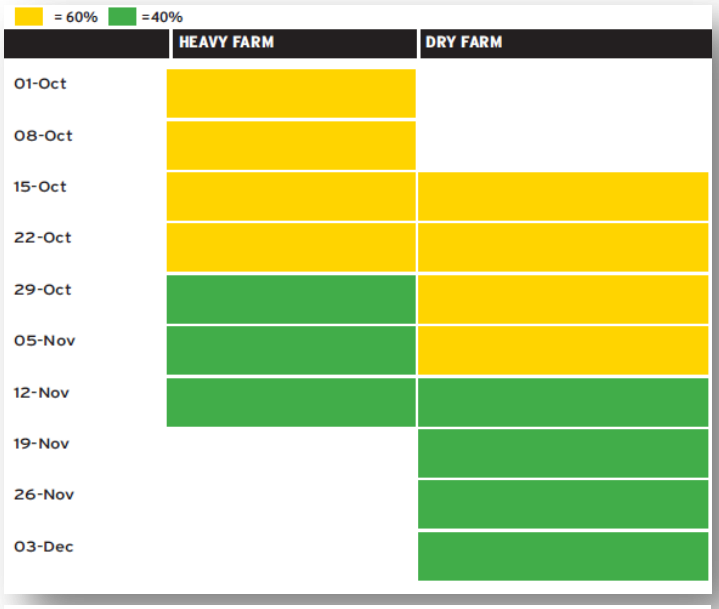

Figure 18 example 60-40 rule on heavy and dry farms

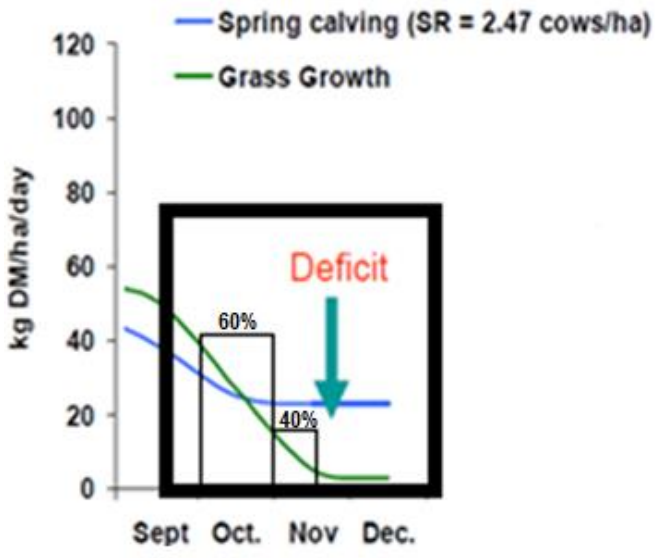

Figure 17 60-40 rule build into autumn growth figure.

Example

For example if you have 100 hectares and you stick to the heavy soil target, graze 60 hectare between 1 October and 29 October. The other 40 hectares have to be grazed between 29 October and 18 November (figure 20). This picture nicely shows that from October 1 and October 28 60% gets grazed. This will assure the 60 hectares has enough time for a good pre grazing Cover for the spring rotation.

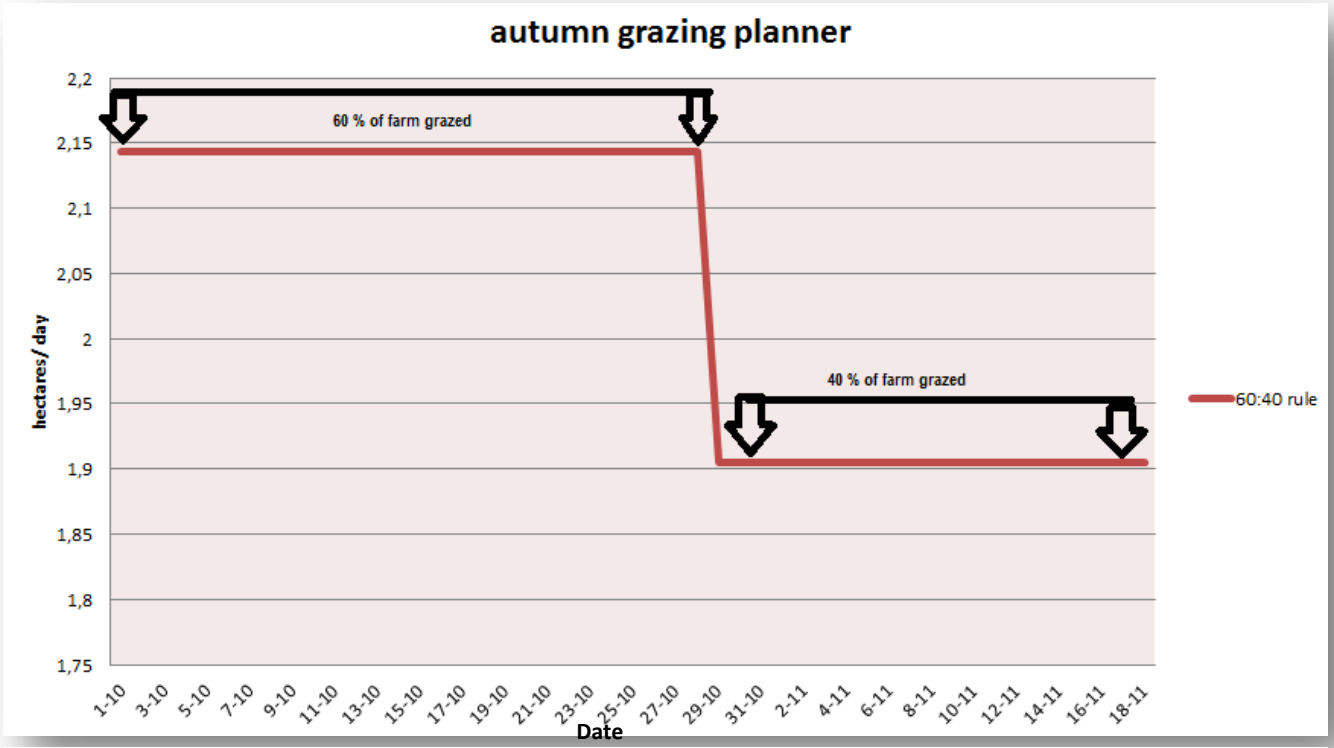

Figure 19 Autumn grazing planner

4. Selected Dutch farm

From the one selected Dutch farmer the data have been used to estimate the Irish indicators Cover and Magic Day to use the schedules Spring Rotation Planner and Autumn Budget Planner. This way this chapter will explore the possibilities of implementing the indicators Cover and Magic Day along with the Spring Rotation Planner and the Autumn Budget Planner on a Dutch farm. These results show the strong and weak points of the Irish schedules for the Dutch grassland management and what the best implementation would be for Dutch standards. An important key note is that this farmer isn't using any kind of these grassland management tools. The farmer is measuring grass height and tries to graze as much as possible.

4.1 Farm profile

The farm is located on a peat soil with 100 spread calving cows. Where an Irish spring calving herd has an increasing demand for feed when cows become high producing, this farm has a spread calving herd and therefore a constant demand for feed. The farmer feeds his cows corn silage and supplements year-round. This makes the demand for fresh grass lower and constant. The refeeding of corn-silage and supplements makes the maximum intake of fresh grass per cow towards 12kgdm off fresh grass and the maximum demand 20kgdm /hectare (Verlaan, 2013). The farm has 41,8 hectares accessible for grazing for milking cows. This number is used to calculate the Cover and possibilities for more grazing. Paddocks of about 1 hectare are created to ensure the animals can be offered a new paddock every day. His pre-grazing Cover target is between 1500 and 2000kgdm.

Table 2 Number of cows, starting date grazing, grazing system in spring, autumn and size of grazing Platform from a Dutch farmer in 2013 and 2014.

Year	2013	2014
Number of cows	85	100
Start grazing	April 14	March 27
Type grazing spring	Moving every 1 to 2 days	Daily moving
Type grazing autumn	Daily moving	Daily moving
Grazing platform	41.8 HA	41.8 HA
Cover start (kg DM/ha)	448	224

Table 1 Farm profile

In table 2 Number of cows, starting date grazing, grazing system in spring, autumn and size of grazing Platform from the farm in 2013 and 2014 are presented. The number of cows increased from 85 in 2013 towards 100 in 2014. This increased the demand of the farm. The farmer started grazing earlier in 2014 even though the Cover was lower. This indicates that the farmer doesn't focus on the Cover on the field but rather on the soil strength. It could also be that the farmer was more focused and eager to graze. This could be because the farmer is a 'learning' farmer if it comes to grazing management. The reason for choosing this farm is because he is measuring height and that's rather unique in the Netherlands.

5 Possibilities of Spring grazing in the Netherlands

This chapter will analyse grazing during spring at the selected Dutch farm taking into account the Irish indicators. This farm will be screened on the Magic Day and the Irish spring rotation planner. This will be taking into account on to the intake, growth and if the farm can graze through these planner. Chapter 5.3.3 and 5.3.4 discuss a different approach of the Magic Day and Spring rotation planner focused on grazing a certain amount of hectares instead of the entire farm.

5.1 Magic Day in the Netherlands

5.1.1 Grazing spring 2013

Spring 2013 can be characterized as a late, cold and wet spring. February was a dry and cold period, followed with a rainy march. This made wet fields and slowed down grass growth. Not only growth started late, the grazing started later too. The wetter soils along with no growth made the farmer decide not graze until the 14th of April. Within his grazing system the farmer runs upon his farm, offering his cows a new paddock of one hectare each day. As seen in the previous chapter the farmer has a graze able platform of 41,8 hectares. This means he could rotate his platform in 42 days when grazing 1 hectare per day. As seen in the table below, the farmer actual grazed 7,9 hectares before entering back on the first grazed paddock again. He grazed the first paddock again after 15 days. Growth was about 50kgdm a day. This results in a grazing Cover of that field of 750kgdm/hectare.

5.1.2 Grass growth, demand and Magic Day 2013

Grass growth and grass demand are the two things which need to be measured to determine the Magic Day. Figure 22 shows the grass growth per hectare per day (blue) and the kgdm intake per hectare (red). Because the cows had their maximum intake from fresh grass we can say the intake is equal to the demand. At the first measurement grass was already growing at a rate of 41,9 kg dry matter per hectare. In annex 2 and showed in figure 22 growth compared to demand never crossed. This means the Magic Day can't be identified. Demand is calculated through the demand per cow times the amount of cows per hectare. This means the demand went towards 20 kg dm per hectare per day and stayed constant. The arrows in the graph are the moment the farm measured the farm.

The reason of not having the Magic Day is because of several things

1. This farmer started grazing in April instead of February like most Irish farmers do.
2. Demand per hectare per day (20kgdm) was low if you compare it with Irish farmers

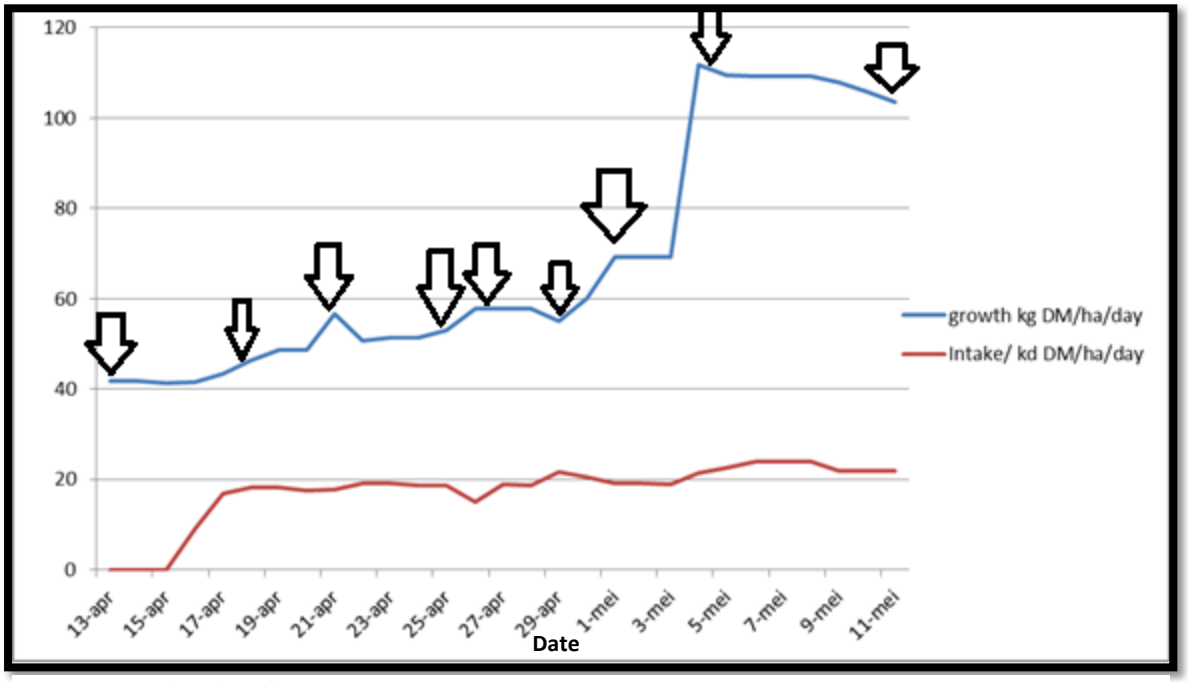

Figure 20 growth and intake 2013

(40/60kgdm).

5.1.3 Grass growth, demand and Magic Day 2014

As shown in Figure 23 Measuring growth started a month earlier in 2014 compared to 2013, even two weeks before the turn-out. Growth rate kept at 30kgdm/ha during that period. March 27th, the turn-out intake went up towards 20 kg dm/hectare rapidly. Growth and intake came closer towards each other than in 2013 but didn't touch. This means the Magic Day cannot be identified.

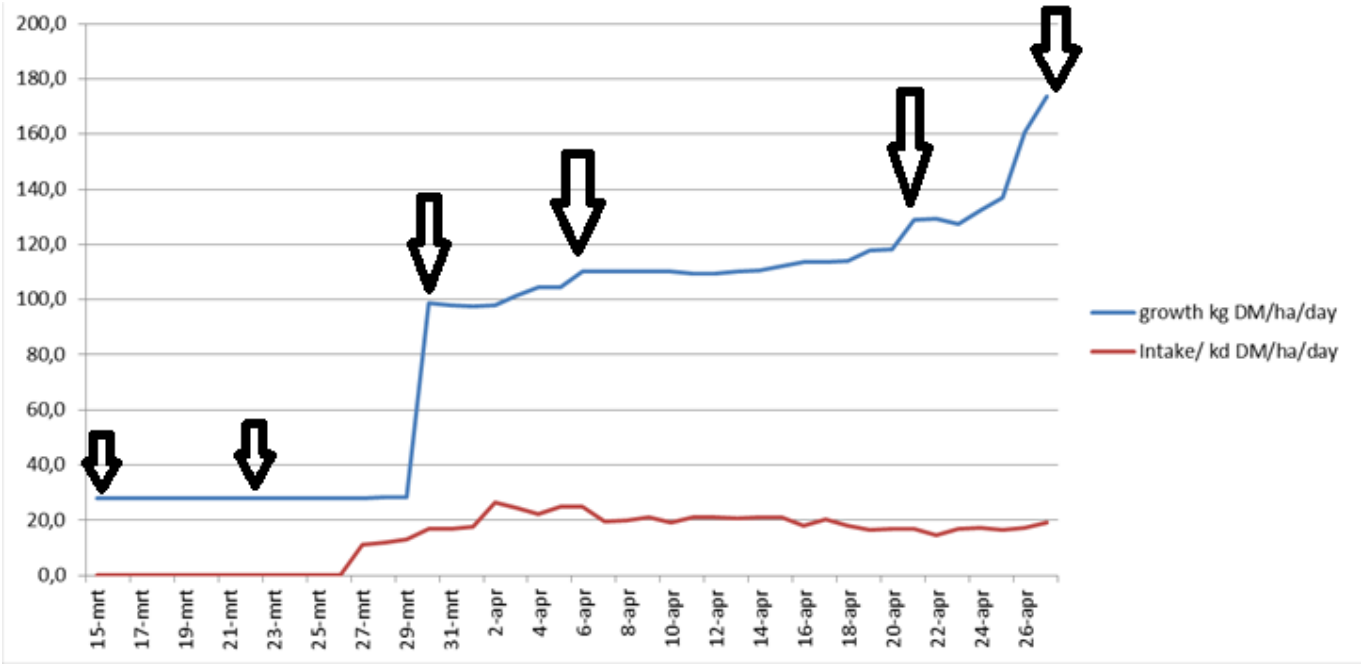

Figure 21 Growth and intake 2014

5.2 Dutch Magic Day

The results from the previous Chapter doesn't mean there are no possibilities for the Dutch farmers. Farmers can use the Irish Magic Day if they can and want to start grazing in February. This way the cows have time to graze the fields once before the Magic Day.
If farmers start grazing around the beginning of April Irish Magic Day doesn't work anymore. Mostly because it already appeared.

5.2.1 Grass growth, Demand and Magic Day Netherlands

The figure (figure 24) below nicely illustrates the growth and demand for an average farmer. An average farmer in the Netherlands has a year-round calving herd, which is mostly supplemented with silage and concentrate during the grazing period. (Zijlstra J., 2013) This makes the demand stay stable on the same line year-round. For example in the graph below the farmer has 100 cows with a demand per cow of 12kg dry matter and 50 Hectares that can be grazed. This makes the demand per hectare around 24kg dry matter. As you can see in the beginning the growth is lower than the demand. As soon as the grass starts growing and becomes above the 24kg DM per hectare of growth it crosses the demand. This means the Magic Day arrived. On the picture this is around the end of March. This is variable depending on stocking-rate and amount of supplement per cow. A higher stocking rate along with lower supplementing would make the demand higher and make the Magic Day arrive at a later date.

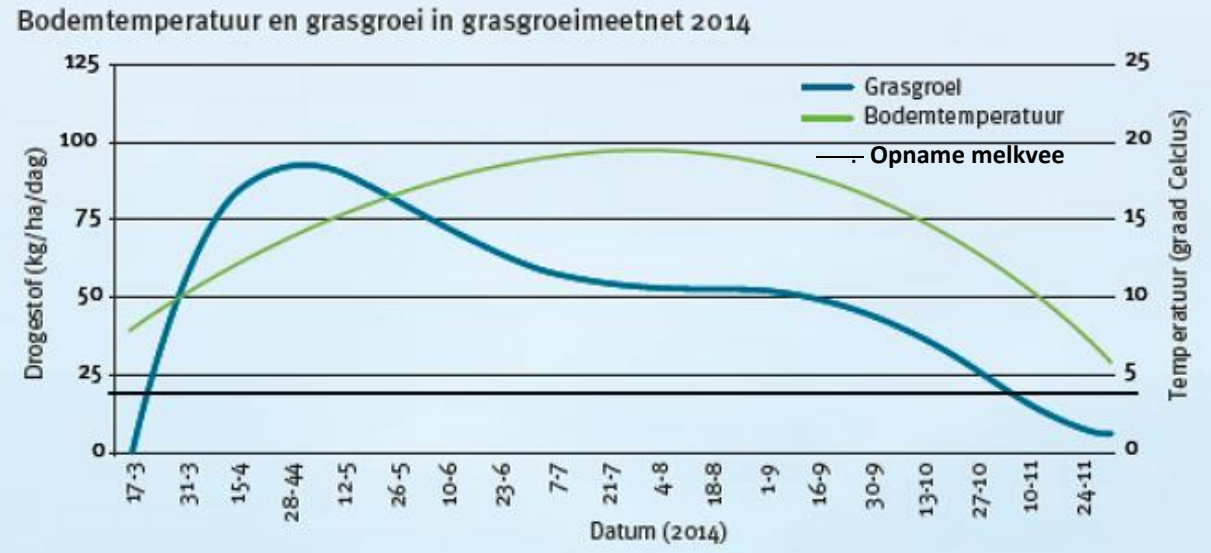

Figure 22 growth, soil temperature and intake of Dutch farms 2014

Dutch Magic Day

However Dutch farmers can use a different way of the Indicator. They still use it to switch from the Spring Rotation Planner towards the Feedwedge (Kinston, 2011). The difference lays in what to measure and record. Neither the intake nor the growth is important but the pre-grazing Cover is the data where the focus should be one. Working to the right pre-grazing Cover can result in higher productions. As soon as the farmer is at the target pre-grazing Cover he can switch towards the Feedwedge. The Feedwedge also focuses on the right pre-grazing Cover. This way the Feedwedge is a really nice follow up of the spring rotation planner. The reason of working towards the right pre-grazing Cover and not start grazing at the right pre-grazing Cover is to get different growth stages in your platform. This way there will already be different heights you can use for the Feedwedge. A positive sideway is the effect of tillering of the grass.

If a farmer successfully wants to determine the Magic Day he needs the following data:

1. Pre-grazing Cover. This is the only thing that needs to be measured when the magic day needs to be determined. When it is on the right height you move towards the Feedwedge.

This means as soon as the farmer starts grazing his cows in targeted Cover his Magic Day arrived and he should switch to the Feedwedge.

5.3 Spring rotation planner in the Netherlands

This chapter shows how the Irish spring rotation planner compares to the current grazing of the farmer. The spring rotation planner as explained in chapter 3.2 starts and ends just like in Ireland. Chapter 5.1.7 will show an alternative for grazing during spring. This will focus on a more flexible spring rotation planner based on pre grazing Cover target and growth of the fields along with the intake of the cows.

5.3.1 Irish spring rotation planner 2013

Spring rotation planner. The spring rotation planner plans grazing towards a rotation of 19 days(April 5th). This is about 20 days before cows got out to pasture. This results in a spring rotation planner that is already towards the fastest rotation(19 days) at April 24. This made the rotation planner not useable at the spring of 2013. This planner can only be used when cows go out grazing before the end of March. Otherwise the planner is already on his fastest rotation.

Current grazing. The blue line in figure 25 below is based on how the farmer grazed this spring. This farmer started grazing April 24. He continuously grazed about 0,9 Hectare per day. This made the rotation length 48 days (total hectares divided by 0,9) continuously during the entire spring. The reason of grazing this way is the size of the paddocks. chapter 3.1.2 shows the average paddock size is about 0.9 hectare, this means the farmer gave a new paddock every day. This rotation was about 2,5 times slower than the spring rotation planner.

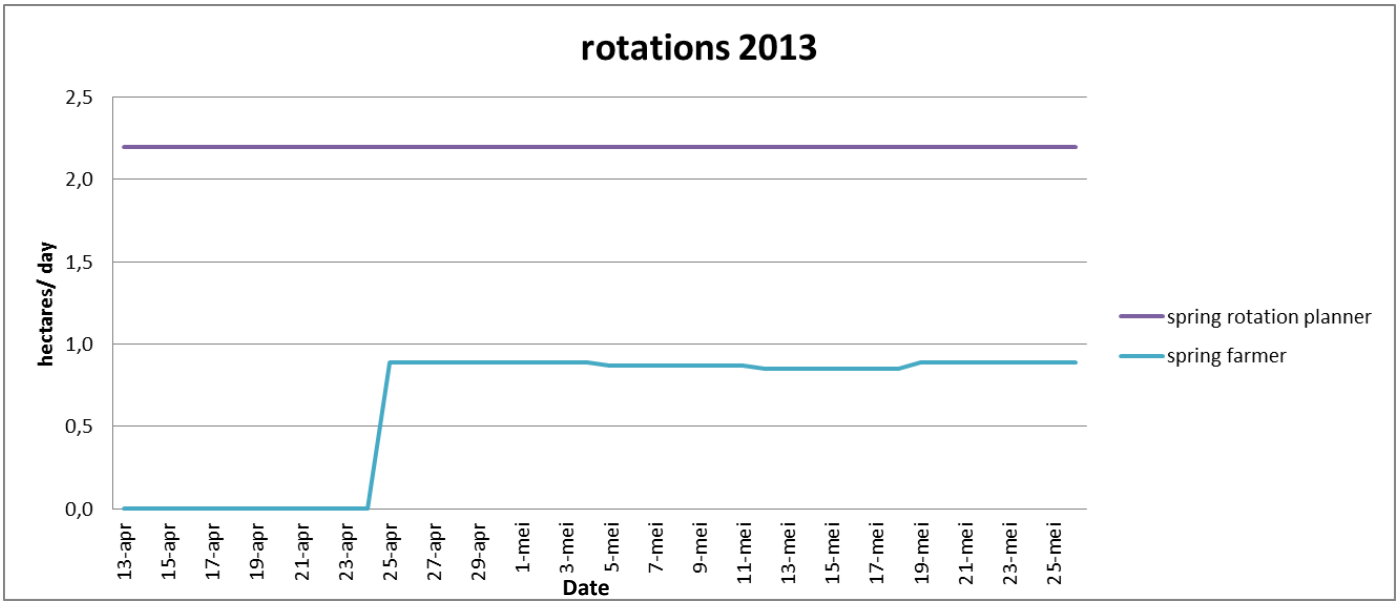

Figure 23 Rotations (2013)

5.3.2 Irish spring rotation planner 2014

Spring rotation planner. The spring rotation planner plans grazing from 100 days(February 1st) till 19 days(April 5th) . The farmer started measuring growth 6 weeks after February 1. In the graph below there is an example if the farmer would have started grazing march 15th. Like showed in chapter 2.5.2 every week later means 10 days shorter rotation planner. 100-60= 40 days rotation at start. This goes towards 19 days at April 5. When there would be calculated with the actual starting date (March 27) it would go to 20 days at start. This would make the spring rotation planner unnecessary in this example.

Current grazing. The blue line in figure 26 below is based on how the farmer grazed this spring. This farmer started grazing March 27. The rotation length was build up same as 2013 namely continuously about 0,9 Hectare per day. This made the rotation length go towards 48 days.

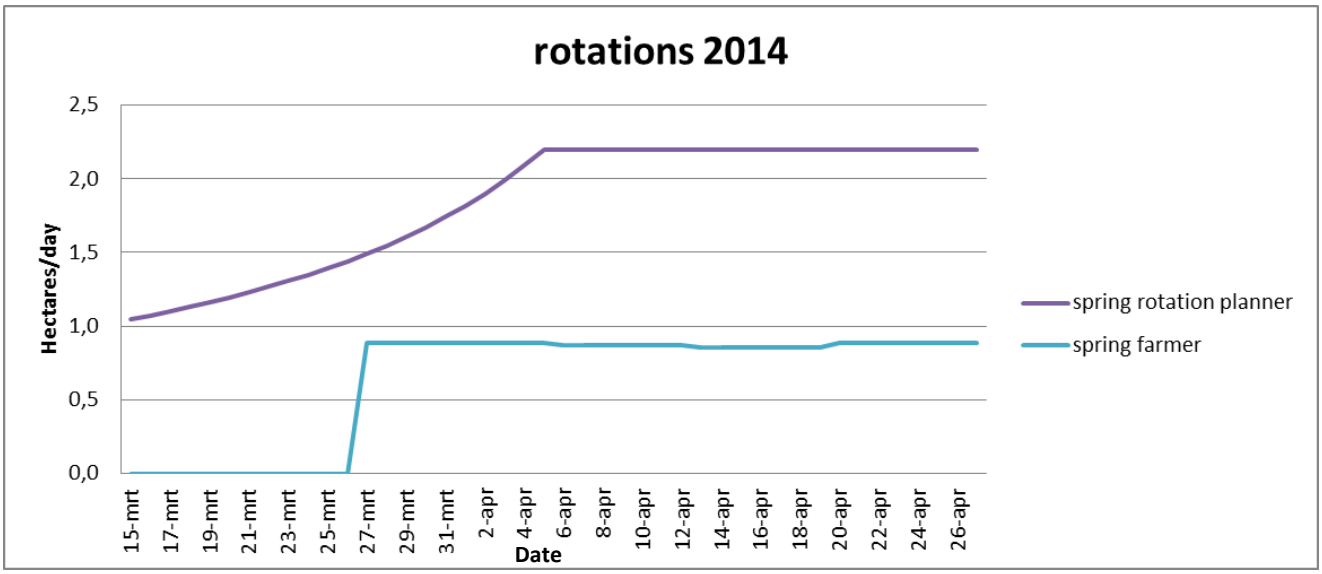

Figure 24 Rotations (2014)

5.3.3 Possibilities spring rotation planner

The previous graphs showed the Irish spring rotation planner versus the current grazing results. As you could see the Irish grazing planner has a faster rotation as the Dutch farmer. The biggest problem with the Irish rotation planner is that the spring grass growth differs to much in the Netherlands. Grass growth in the Netherlands can really start between the end of March and the beginning of May. This means a difference of 4 weeks. That moment can't be planned or scheduled. This makes planning really hard for the farmers. On the other side farmers in the Netherlands don't stock pile grass during the winter because of the chance of damage during winter.

5.4 Dutch spring rotation planner

Previous chapter showed the advantages and disadvantages of the Irish Spring rotation planner. Taking all this in consideration, this chapter will explain a Spring rotation planner based on grass growth of the previous week(s). This grass is already there and can be grazed without becoming deficit. This way growth and intake will be optimised towards each other.

5.4.1 Dutch spring rotation planner

The difference in grass growth between early and late spring could be too big to make a standardized Spring rotation planner. Planning towards April 5th could be too mainstream and not accurate enough to successfully plan spring grazing. If the magic day would not occur April 5th but in May 5^{th,} the farmer would run out of grass rapidly because intake would maintain higher than growth. This could result in expansive supplementing and lower growth because grass grows grass. For farmers in the Netherlands it could be better to equate growth and rotation length to each other. this way cows won't run out of grass, intake would be optimised and grass growth would stay as high as possible. This means if growth rate is 10kg DM/ha/day it takes 170 days to reach 1700kg DM/ha. This means a farmer can graze 170th of the total grazing platform. Growth rate of the last 2 weeks is the best choice to level bumps in growth If growth goes from 10kgdm/ha/day towards 30kgdm/ha/day and back to 10kg DM/ha/day the next week, the intake would have tripled one week and go down 300% the week after. These chances are not good for the cows, it makes grazing less stable and it makes planning more difficult. If the farmer takes the previous 2 weeks he would go from a intake of 10kg DM/ha/day to 20 kg DM/ha/day and stay there the 3th week.

Specific principles spring rotation planner

To get the spring rotation planner work successfully farmers need to collect the following data:

1. First of all the target height needs to be chosen. If the farmer wants to graze in a grass height of 1700kgdm, he needs to set the target towards 1700.
2. Grass growth needs to be measured. This way the intake can be equated to the growth and the rotation length can be determined.
3. Amount of cows need to be recorded to know how much intake per cow there is. This needs to be done for the right amount of supplementation.
4. The amount of hectares that will participate in the grazing rotation. If a farmer has 40 hectares to graze he can put 40 hectares in the rotation planner. If he wants to cut 20 hectares before grazing he should remove them from the rotation plan and use 20 hectares.

5.4.2 Grazing platform Dutch Spring rotation planner

The Dutch Spring rotation planner has a more flexible and growth adapting approach. The possibilities of grazing are greatly if a farmer would use all his fields on the grazing platform. The farmer from the data collection could graze up to 85 hectares within one month without running out of grass. The downside would be that there wouldn't be any silage to cut. Therefor a farmer needs to plan how much he wants to cut and how much he wants and can graze. There are two ways to do this. One is just determine a certain amount that gets grazed. The second one is calculating it. As a rule of thumb a farmer can calculate his expected intake, along with the maximum growth. The maximum growth will be different for every soil and year but will be around 100kg DM/ha/day (Verlaan, 2013). Knowing the maximum growth is important to be sure cows won't have too much grass and there won't be surplus grass that needs to be cut but is fertilized for grazing. This would lower the quality of the grass along with losses in yield. This grazing platform can be grazed according to the rotation length that has been calculated threw the growth of the fields. In the beginning with a slow rotation length of for example 60 days (like the early spring of 2014) the farmer could have grazed 0,25 ha per day (15 hectares divided by 60). This rotation speeds up along with the growth. This way grazing and cutting gets planned and can be optimised. The farmer can choose to graze towards a maximum intake or grazes a certain amount of hectares that has been pointed out for grazing without getting the maximum out of the spring. an example is shown in textbox 3 below.

How to the calculate the grazing platform

- Measure/estimate the maximum fresh grass intake in kg DM/day of a cow.
- Multiply the intake by the amount of cows.
- Estimate the maximum growth of the fresh grass.
- Divide the total intake by the maximum growth.

To calculate grazing platform
Divide the total DM intake of grass by the maximum growth
*e.g., 15kg DM * 100 cows = 1,500 kg DM ÷ 100kg DM/ha = 15 ha.*

Textbox 2 calculating the grazing platform

5.4.3 3'Dutch' Spring rotation planners on growth base

This chapter will show different spring rotation planners based on grass growth. Rotation planner 1 directly adapts on the growth where rotation planner 2 adapts on the previous 7 days and rotation planner on the previous 14 days. The reason for adapting on grass growth is to get the optimal intake of the cows. Main goal of grazing is getting as much grass in cows as possible. The reason for comparing different rotation lengths is to look what benefits it has on adapting based on different growth lengths. Several days is to prevents bumps on intake and prevent running short on grass when a sudden deficit occurs. This all will be explained and compared with the spring rotation of the farmer along with the rotation from the Irish plan.

To understand the rotation planners you need to understand and know a few numbers. First of all, the 'field Cover' target. This is the Cover where a farmer wants to introduce his cows. After knowing this target Cover, getting the right rotation length is easy. Take the Target and part it by the growth per hectare per day. This will tell in how many days a hectare will take to get from 0 the target. After knowing the rotation length part it by your grazing platform (chapter 5.2.2) This results in the hectares you can graze every day. This is all put down in textbox 2 below for a fast example.

How to the calculate the hectares grazed per day.	example
• Set your target for field cover.	1700kg DM
• Calculate your Grazing platform.	15 hectares
• Measure growth of the grazing platform.	50 kg DM
• Divide the target field cover by the growth of the last 14 days.	
○ This makes the rotation length.	
• Divide the rotation length by the grazing platform.	

To calculate rotation planner
Divide the target field cover by the growth
e.g., 1700kg DM ÷ 50kg DM/day = 34 days

Divide the amount of days by the grazing platform.

Textbox 3 Calculating the hectares grazed per day.

5.4.4 Rotation planners late spring

Figure 27 below shows the effects of the planner to the rotation length, the amount of hectares a farmer could graze and the difference within the rotation planners. This on a slow and late spring (2013)

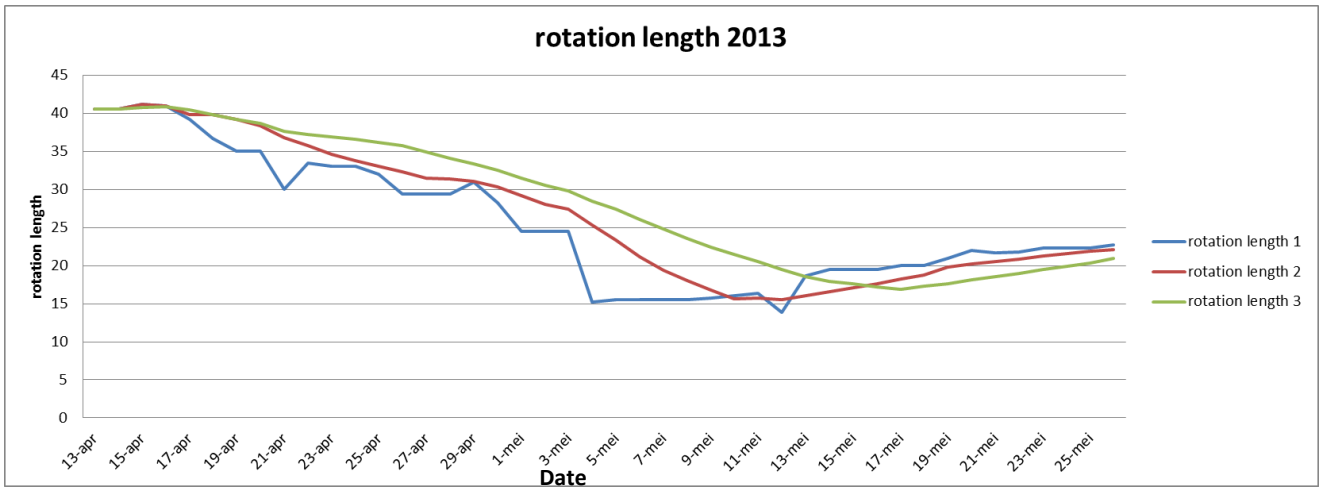

Figure 25 Rotation length (2013)

Rotation length 1 The Cover target is set on 1700 kg DM. grow rate is set on 27.8kg DM/HA/ day. (chapter…) This makes a rotation length of 61 days (1700/27,8) . At march 29 the second measuring date the growth went from 27,8 towards 98,7. This lowers the rotation length towards 17 days.

Rotation length 2 This rotation length is almost the same as the 1st one. The only difference is that the length is based on the previous 7 days instead of the actual day. This makes it slightly slower and gives the cows more time to adjust. Also big jumps in grass growth will be levelled. This makes sure cows have more time to adapt to fresh grass and it will give farmers space to easily adjust the grazing platform to prevent running out of grass when grass suddenly stops growing again.

Rotation length 3 This third one is also basically the same as the first one but instead of the previous week it takes the previous 2 weeks. This gives even more time for changes, on cow and farmers base.

5.4.5 Rotation planners 2014 early spring.

figure 28 below shows the effects of the planner to the rotation length, the amount of hectares a farmer could graze and the difference within the rotation planners. This on a fast early spring (2014).

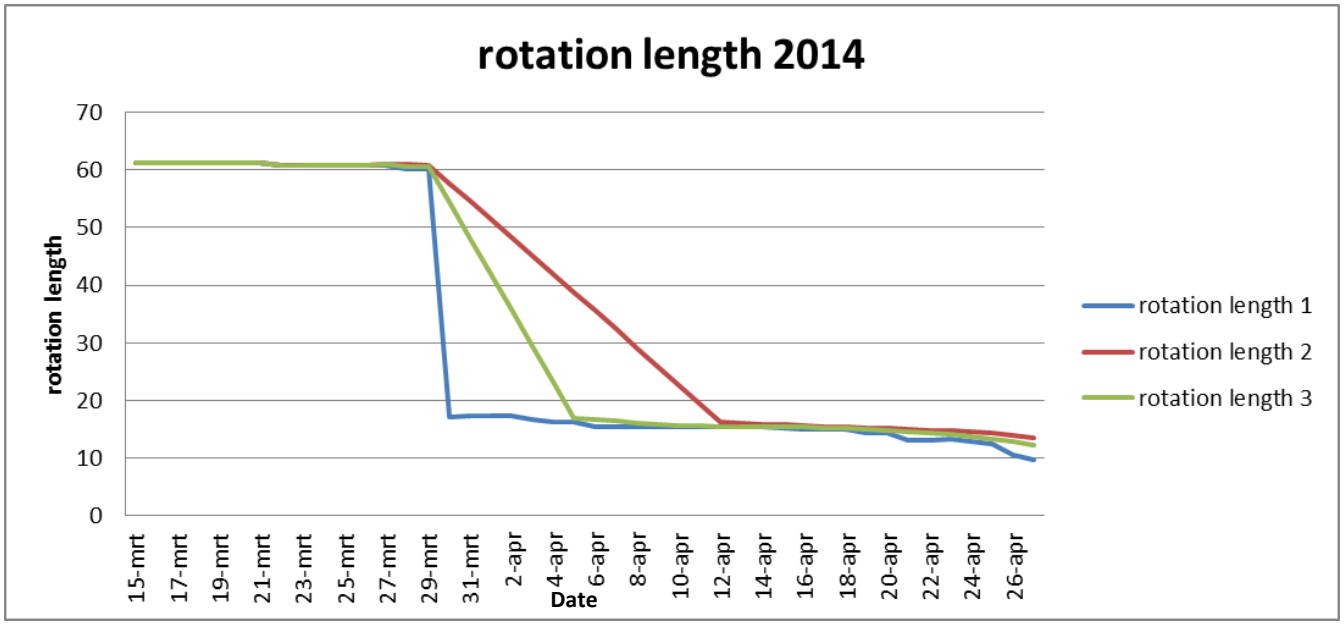

Figure 26 Rotation length (2014)

Rotation length 1 The Cover target is set on 1700 kg DM. grow rate is set on 27.8kg DM/HA/ day. This makes a rotation length of 61 days (1700/27,8) . At march 29 the second measuring date the growth went from 27,8 towards 98,7. his lowers the rotation length toward 17 days.

Rotation length 2 This rotation length is almost the same as the 1st one. The only difference is that the length is based on the previous 7 days instead of the actual day. This makes it slightly slower and gives the cows more time to adjust. Also big jumps in grass growth will be levelled. This makes sure cows have more time to adapt to fresh grass and it will give farmers space to easily adjust the grazing platform to prevent running out of grass when grass suddenly stops growing again.

Rotation length 3 This third one is also basically the same as the first one but instead of the previous week it takes the previous 2 weeks. This gives even more time for changes, on cow and farmers base.

5.4.6 Possibilities Spring rotation planner

The Irish Spring rotation planner works on a tight schedule towards a certain date. It plans on grazing the maximum amount and ensure grazing all the fields once before the 'Magic Day'. The disadvantage of this system is not being flexible in grazing, the early starting date and not being able to have the systematic approach addressing to manure spreading and mowing that we always use in the Netherlands. The Dutch Spring rotation planner a farmer can get a handhold on grazing during spring. He can easily decide what fields to graze during spring. This way the planner makes choices easy for the farmer. It can calculate the amount of hectares that is needed for the grazing, along with the hectares that should be grazed every day. It is easy to understand and follow. It ensures that intake along with growth will be optimised. It prevents over and under grazing. This Planner gives a farmer a guide unregarded how intensive the grazing will be and the start date. It will show how much hectares should be grazed, and how much there can be planned in for silage.

6 Possibilities of Autumn grazing in the Netherlands

On average the autumn grazing planner takes 6 to 8 weeks. In those weeks the cows graze the grazing platform once more. when farmers stop grazing really depends on the weather during autumn. Some soils get trapped easily during wet weather because soil type and the amount of rain during that period. This way there can't be a straight forward autumn grazing planner. To get the right planner for different soils there are different autumn rotation planners. A dry soil means grazing for a longer time then a wet soil. Irish farmers have 3 types of autumn grazing planners namely for: dry soils, mixed soils and wet soils. These rotation planners are the same but with a 2 weeks gap towards an earlier closing date for the 60% and 100% for dry, mixed and heavy soils (Healy, 2013). In those 6 to 8 weeks the cows on a pasture based farm eat all the fresh grass towards an average Cover of 500kgdm/ha.

This chapter will analyse grazing during autumn at the selected Dutch farm. This farm will be screened on the Irish Autumn budget planner taking into account the intake, growth and if the farm (could) budget(s) grass for periods with deficient growth (figure 29) Chapter 5.3.3 and 5.3.4 discuss a different approach of an Autumn grazing planner focused on grazing a certain amount of hectares instead of the entire farm.

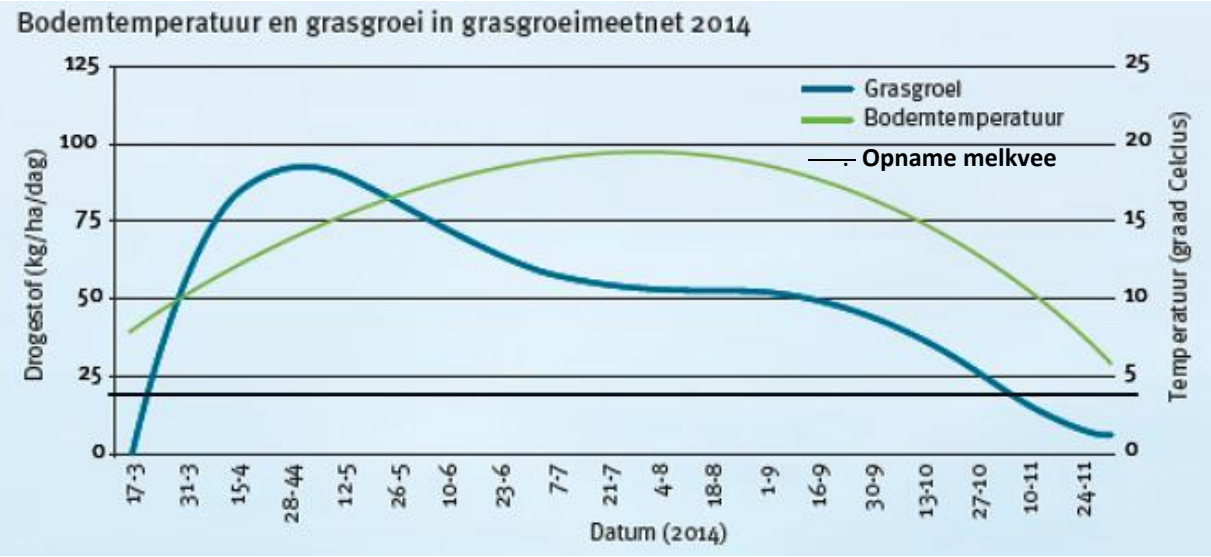

Figure 27 growth, soil temperature and intake cows on Dutch farms (2014)

6.1 Autumn budget planner in the Netherlands

Figure 31 below shows 4 lines. Where the green one is for the farms with dryer soils and the purple ones are for the farm with the heavier/wetter ones (Chapter 3.3.1) The red and blue lines are the farmer his Covers during 2013. Blue is the same one as red except here the Covers above 2500kg dry matter per hectare are cut out of the calculation. This way a good comparison with the targets could be made because those high Covers can't be grazed anymore (Teagasc, 2011). The blue line bumps less than the red line but still has 2 big gaps at the end of July and September. These 2 periods occurred because fields got cut. This includes fields below 2500 kg dry matter per hectare. If he would have cut only the surplus fields (>2500 kg DM) he would have been able to stay closer to the purple line.

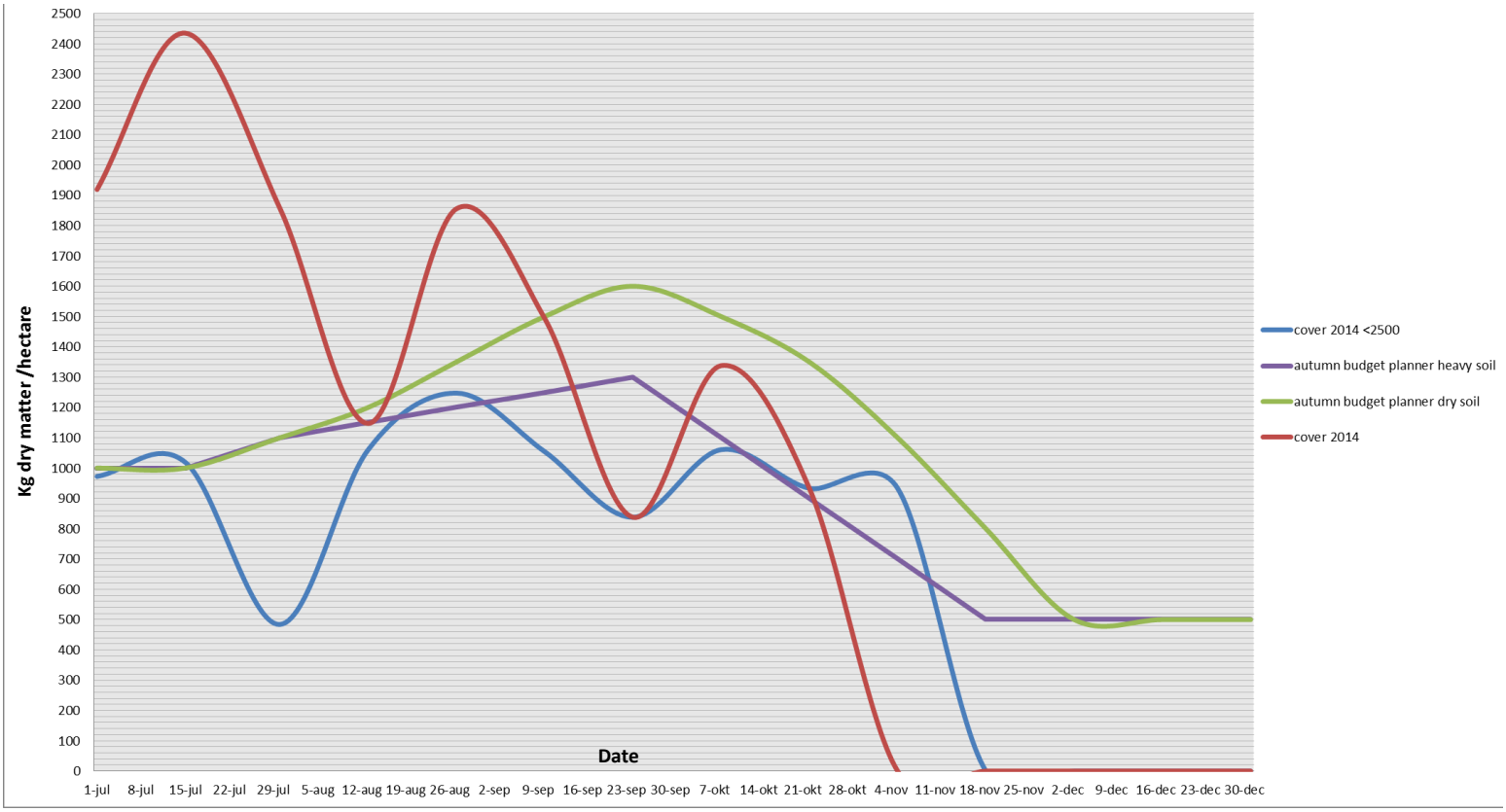

Figure 28 Autumn budget planner Comparison

Figure 21 above shows the lines of the farmer with the target. Even though the farmer was way below the target in August he overgrew the wet soil target at the beginning October and almost hit the target of the dryer soils during the beginning of November. This is because the DM intake/ day of the cows didn't come near to the growth until October. After this the growth kept around the intake and made the blue line keep flat. Around the end of grazing (November 18) the farmer housed the cows and cut the last fields of surplus grass. All this makes the use of a budget planner in the Netherlands doubtful with this stocking-rate and fresh grass intake.

6.2 Autumn grazing planner in the Netherlands

6.2.1 Possibilities of the autumn grazing planner in the Netherlands

Autumn grazing has two planners, previous chapter showed the Autumn budget planner to ensure the right Cover build up for the autumn deficit period. The autumn grazing planner will show the hectares that should be grazed every day. First chapter of this capital will compare the grazing of the farmer along with the 60/40 rule until Oct. 31 (closest to the last day of grazing). Second chapter will look at different rotation planners and the effects on the hectares grazed by October 31 and November 10.

Farmer versus autumn grazing plan

Figure 32 shows that the hectares grazed per day differs between 0,5ha and 2ha per day. The reason of the big difference between the hectares is the field size. The cows get another field every day no matter what size. The reason of this rotation strategy is to maximise the voluntarily intake of the cows. Giving them fresh grass every day improves the intake according to the farmer. The amount of hectares grazed per day at the autumn grazing planner starts with around 0,9 ha per day. The second part stays around 0,55ha per day. This to ensure there is enough time for the 60% to regrow along with a higher grazing Cover for the other 40% (Chapter 3.3.2 Autumn grazing planner).

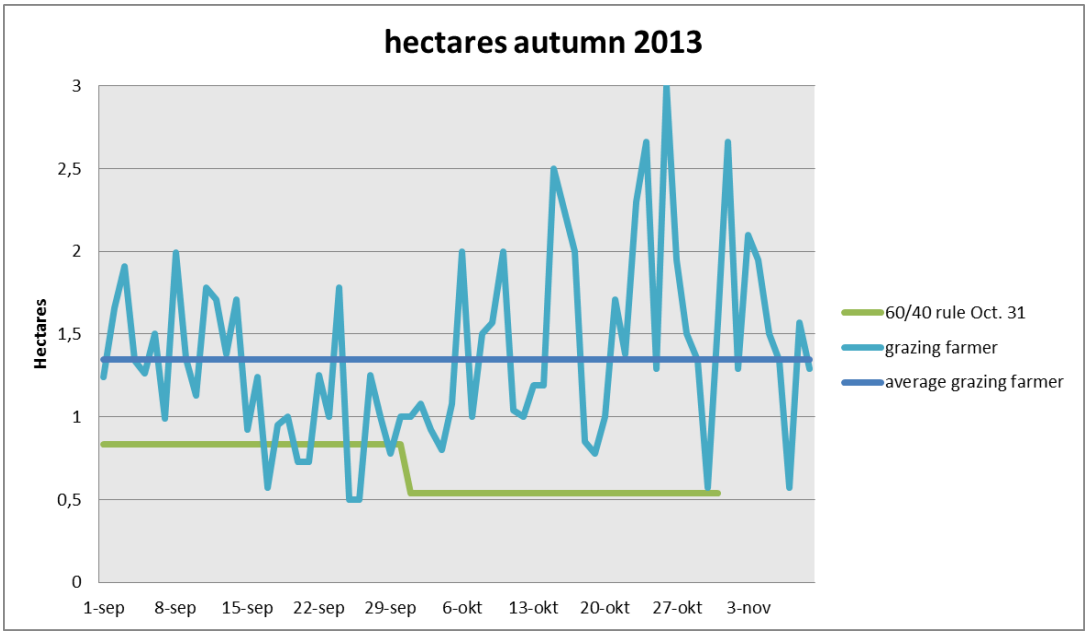

Figure 29 Hectares grazed Autumn 2013

6.2.2 Autumn grazing planners

The autumn grazing planner is made to have a structure and plan in grazing during autumn. The autumn grazing planner focuses already at the spring during autumn. The farmer focused more on intake of the cows. He grazed all his fields twice during September 1st and November 10th. There was no intension for stockpiling grass for the next spring. The farmer could have easily adapt one of these grazing planners. This way the farmer could graze more intensively on these fields. The biggest problem with these Autumn grazing planners is if the cows have enough intake to get this fields grazed. The second thing is if stockpiling grass is suitable for the Netherlands. Stockpiled grass can damage the fields during winter (Visscher, 2010).

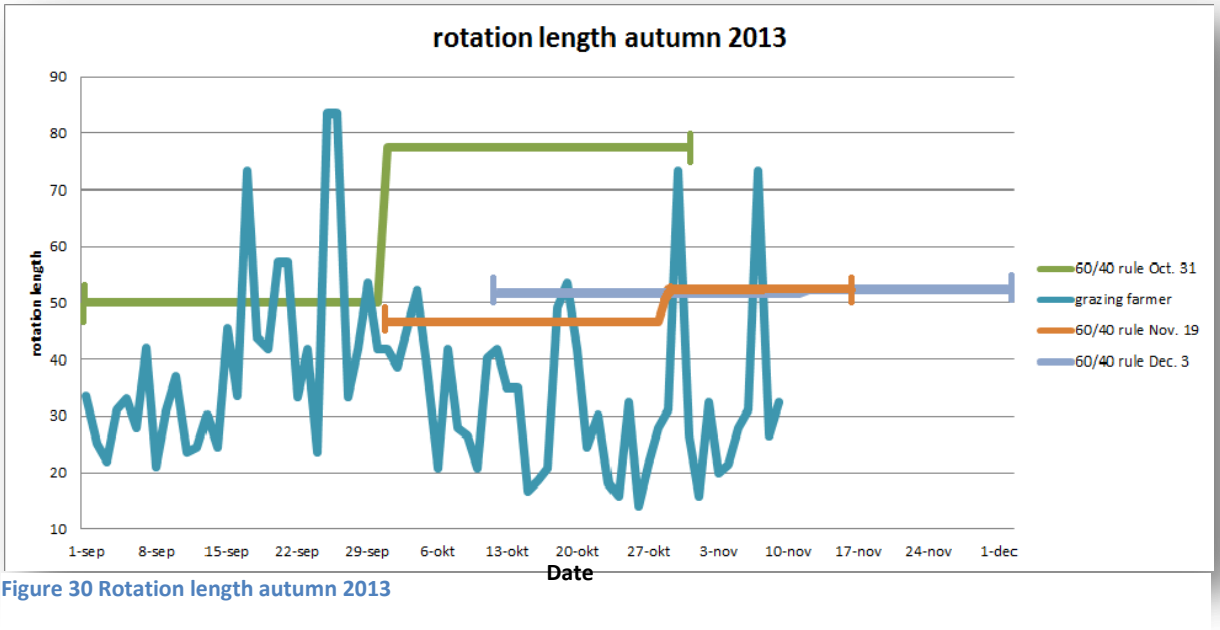

Figure 30 Rotation length autumn 2013

6.3 Possibilities Dutch Autumn grazing planner

This chapter presents a new design for the autumn grazing planner on a more extensive way of grazing. This autumn grazing planner focuses more on the way the farmer wants to graze. It uses the Irish autumn grazing planner. But instead of planning on a date with a tight schedule, it uses a flexible date. It focuses on the intake and Cover of the farm

6.3.1 Challenges Dutch Autumn grazing planner

The problem for most Dutch farmers to use the Autumn grazing planner and Autumn budget planner is that they have their intake too low to get all the fresh grass eaten in those 2 months. This along with sudden changes in weather where grazing can get impossible because of the change of trampling. There are two possibilities the cows can eat all that fresh grass. With a high stocking rate and/or a high intake per cow. This planner adapts the stocking rate depending on the intake and Cover of the farm. This way a farmer can plan his Autumn grazing on his fresh grass intake per cow and amount of cows that are grazing.

How much hectares the cows can graze in that period is easy to calculate. These way farmers can make a plan of how much they have to cut before winter arrives. This makes it easier to manage grazing and cutting. In a short list: if the intake is too low, lower the offer by cutting paddocks.

6.3.2 Specific principles for Dutch autumn grazing planner

For the Dutch Autumn grazing planner its crucial to measure, plan and estimate. The what and how will be explained below with an example in the end.

Measure grass height

Without measuring the grass height a farmer can't plan. This is because height is needed to know the Cover, the growth and the paddocks herbal mass.

Measure grass intake

This autumn grazing planner focuses on balancing intake, growth and Cover. The plan is to graze the cover before closing. To plan the grazing a farmer needs to know what the intake is. The farmer can do this on the fresh grass side and/or on the refeeding side. The farmer knows the Cover on the paddock he grazes, this along with the amount of hectares grazed that will give an indication of the intake. If the farmer weights his refeeding he can also check the amount of feed given. The expected dry matter intake minus the dry matter amount of refeeding gives a gap in intake that is filled by pasture grass.

Plan in front

Plan what paddocks still need to be grazed, what paddocks can be grazed during wet periods and when the farm will be closed for grazing. Planning makes it manageable, planning gives goals for grazing. This will take experience and knowledge, plan along with your advisors and look how others plan.

Closing date

Dutch farmers could but mostly shouldn't copy the Autumn grazing planner. Not only the soils but also dry and wet autumns make the grazing period vary a lot. A farmer knows for himself what kind of soil he has and can choose when he wants the farm to close for grazing. The farmer starts with choosing a date between 1 November and 1 December (from wet to dry soils). This can vary every autumn and is adjustable. It is however important to set a date for focus and planning autumn grazing. This way you get the right Autumn grazing planner for each farm. The farmer could even choose an earlier date as long as the date gets set 6 to 8 weeks before that date (determination date)

Determination date

This date has to be set about 8 weeks(60 days) before the actual moment. This way the autumn grazing planner can be set to work. This date can be adjusted anytime when wet weather is expected. In a nutshell: when high surplus rains are expected shorten the days till housing and mow the hectares with the highest Cover. This will give extra costs but will avoid trampling of grass and soil.

Calculating the amount of hectares

An example of these things are shown in the textbox below:

Reminder for the calculation

When the farmer has set a date of housing he can start planning on the hectares he want to graze. Important reminder for the Cover/ha calculation is to exclude all the hectares above 2500kgdm (mow them) and those who already been grazed. Set and adjust the autumn grazing planner weekly. Adjust for higher or lower growth rates and higher or lower Covers. When weather changes the housing date can be adjusted alongside with the Cover. The Cover can be adjusted threw including or excluding paddocks.

How to the calculate the grazing platform. example

- The amount of cows getting pasture (count) 100
- Fresh grass (kg DM) intake per cow per day (estimate/plan) 10 kg DM
- Days till the cows will be fully housed (estimate/plan) 60 days
- The average Cover per hectare (Measure) 800kg DM
- The Cover per field (measure) 1500kg DM
- The **expected** growth of the hectares till housing (estimate) 30kg DM

Multiply the DM intake of grass per day by the cows. (weekly)
*e.g., 10kg DM * 100 cows = 1,000 kg DM*

Multiply this to the days till housing. (weekly)
*1,000kg DM * 60 days = 60,000kg DM*

Multiply expected growth to the days till housing. (weekly)
30kg DM 60 days = 1,800kg DM/ ha*

Sum the average Cover and the total expected growth. (weekly)
800kg DM Cover + 1,800kg DM growth = 2,600 kg DM/ha

Divide the total demand by the average Cover plus the expected growth. (weekly)
60,000kg DM ÷2,600kg DM = 23 ha grazed in 60 days.

Divide the fresh grass intake of the cows per day by the Cover of the field. (daily)
1,000 kg DM ÷ 1,500kg DM = 0,66ha.

Textbox 4 calculate daily hectares of grazing platform autumn

As textbox 4 above calculated this farmer should graze 0,66 ha for the next 60 days. This needs to be checked and calculated weekly. This means a weekly Farmwalk along with a new calculation.

6 Discussion and recommendations

Ireland and Netherlands have some big differences. Weather, regulation, milk price basis and focus on grazing are different. Dutch farmers don't focus on grazing as much as in Ireland. Spring calving herds, early starting and long grazing periods are normal in Ireland where those things are abnormal in the Netherlands. This makes the grazing system rather different.

This research used a farm that isn't using the Irish Indicators and planners in any way. At time of the research it was the only farm available for a research. Other farms missed crucial information for a correct interpretation. This makes the research less reliable because of the small scale of the recording.

The Dutch planners are not tested advices. They are based on the problems the one selected farm had during early spring and late autumn, along with the disadvantages of the Irish planners. There could be practical errors, these needs to be tested first.

The Dutch planners are partly based on estimations of growth. This will make it more vulnerable for mistakes when estimated wrong. This should be estimated correctly and closely with local advisers.

7 Conclusion

1. The average Irish climate is quite similar to the Dutch climate. The yearly rainfall and average temperature has bigger difference within the countries comparing to the difference between Ireland and the Netherlands.

2. Cover stands for the herbal mass either per hectare, per field or per farm. In Ireland it is used as a guide to know how much grass they can graze and how much they need to refeed aside with the Spring rotation planner, the Autumn budget planner and the Autumn grazing planner.

3. Magic Day stands for the day where the intake of the cows divided by the hectares of the farm is equal to the growth per hectare. This means growth of the grass equals the intake of the cows. This day farmers go from the Spring rotation planner towards the Feedwedge.

4. During early spring the Spring rotation planner can be used until the Magic Day. The Spring rotation planner is a rotation planner that starts on February 1st with a slow rotation of 100 days (1% of the farm) towards a fast rotation of 19 days at the first week of April.

5. During autumn Irish farmers use the Autumn grazing planner and the autumn budget planner. The autumn grazing planner is based on the 60/40 rule. This means that 60% of the fields needs to be grazed before a certain date depending on soil type. This 60% has time to regrowth for the early spring grazing where growth is deficient. The Autumn budget planner is a planner to stock grass during the beginning of the Autumn where growth is still surplus. This way the cows can eat more fresh grass during late autumn where growth is deficient.

6. Dutch farmers can use the Indicator Cover the same as the Irish. there is no need for any adaption of the indicator.

7. The Magic Day used in Ireland can be used in the Netherlands by farmer who graze there cows from the beginning of February. If farmers start on a later date the Irish Magic day can't be determined anymore. The in this research developed Dutch Magic Day can be more widely usable Magic Day. This focuses on the Cover where the cows are grazed in that day. As soon as that Cover reaches the set target Cover the Magic Day arrived farmers can switch to the Feedwedge.

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Annex

Annex I Cover Dutch farm

		PER HA				PER PERCEEL		
perceel	grootte	1e meting	2e meting	3e meting	per peceel	1e meting	2e meting	3e meting
1	1,57	7	11	7,5		11,0	17,3	11,8
2	1,5	7,5	8,5	8		11,3	12,8	12,0
3a	1,1	5,5	7,5	7		6,1	8,3	7,7
3b	0,92	4,5	8	6,5		4,1	7,4	6,0
4a	1,04	4	6	7		4,2	6,2	7,3
4b	1	4	5,5	6,5		4,0	5,5	6,5
5a	1,19	4	5	7,5		4,8	6,0	8,9
5b	1,19	4	5	6		4,8	6,0	7,1
6	0,78	6	8			4,7	6,2	0,0
7	0,85	5,5	9	10		4,7	7,7	8,5
9	1	6,5	8,5	12		6,5	8,5	12,0
10	1,38	7,5	10	14		10,4	13,8	19,3
11	1,71	6,5	10	13		11,1	17,1	22,2
13	0,57	6	7,5	10,5		3,4	4,3	6,0
14	0,95	6,5	7,5	9,5		6,2	7,1	9,0
15	1	6,5	7	8		6,5	7,0	8,0
16	0,73	5,5	7,5	8,5		4,0	5,5	6,2
18a	1,5		10	12,5		0,0	15,0	18,8
18b	1,49		10,5	13,5		0,0	15,6	20,1
19	0,92	6,5	10	12,5		6,0	9,2	11,5
20	1,24	6,5	9,5	13		8,1	11,8	16,1
21	0,73		5,5	7		0,0	4,0	5,1
22	1,25		6,5	6,5		0,0	8,1	8,1
23	1,35		4,5	7		0,0	6,1	9,5
24	1,78		7	8		0,0	12,5	14,2
25	1,34		7	8,5		0,0	9,4	11,4
26	1,26		7	8,5		0,0	8,8	10,7
27b	1,12					0,0	0,0	0,0
27a	1,1					0,0	0,0	0,0
28	0,69	7	8,5	11		4,8	5,9	7,6
29	1,29	7	9	11,5		9,0	11,6	14,8
30a	1,46	7	9	11,5		10,2	13,1	16,8
30b	1,2	6,5	10	11		7,8	12,0	13,2
31	2,1	7,5	9,5	11,5		15,8	20,0	24,2
32	1,5	6,5	6,5	9,5		9,8	9,8	14,3
					measurement	13-apr	21-apr	27-apr
totaal	41,8	28,9	39,6	39,6	Cover kg DM/ha	448	709	906

Annex II growth and Intake Dairy cows Dutch farm 2013

week 1 pasture	13-4-2013	14-4-2013	15-4-2013	16-4-2013	17-4-2013	18-4-2013	19-4-2013
kg DM fresh grass	-	-	-	4,5	8,4	9,0	9,0
week 2 pasture	20-4-2013	21-4-2013	22-4-2013	23-4-2013	24-4-2013	25-4-2013	26-4-2013
kg DM fresh grass	8,8	8,8	9,6	9,6	9,3	9,3	7,6
week 3 pasture	27-4-2013	28-4-2013	29-4-2013	30-4-2013	1-5-2013	2-5-2013	3-5-2013
kg DM fresh grass	9,52	9,56	11,00	10,46	9,67	9,67	9,74
week 4 pasture	4-5-2013	5-5-2013	6-5-2013	7-5-2013	8-5-2013	9-5-2013	10-5-2013
kg DM fresh grass	11,06	11,70	12,55	12,55	12,55	11,41	11,41
week 5 pasture	11-5-2013						
kg DM fresh grass	11,41						

measurement 1	13-apr	14-apr	15-apr	16-apr	17-apr	18-apr	19-apr	
cm/day	0,3	0,3	0,3	0,3	0,3	0,3	0,3	
kg DM/day	41,9	41,9	41,3	41,5	43,3	46,3	48,6	
Intake/ kd DM/ha/day	0,00	0,00	0,00	9,12	16,93	18,12	18,12	
measurement 2	20-apr	21-apr	22-apr	23-apr	24-apr	25-apr	26-apr	27-apr
cm/day	0,3	0,4	0,4	0,4	0,4	0,4	0,4	0,4
kg DM/day	48,6	56,6	50,8	51,4	51,4	53,0	57,8	57,8
Intake/ kd DM/ha/day	17,59	17,7	19,2	19,2	18,8	18,8	15,0	18,9
measurement 3	28-apr	29-apr	30-apr	1-mei	2-mei	3-mei	4-mei	
cm/day	0,4	0,4	0,4	0,5	0,5	0,5	0,8	
kg DM/day	57,8	54,9	60,1	69,2	69,2	69,2	111,8	
Intake/ kd DM/ha/day	18,8	21,6	20,5	19,2	19,2	18,9	21,4	
measurement 4	5-mei	6-mei	7-mei	8-mei	9-mei	10-mei	11-mei	
cm/day	0,8	0,8	0,8	0,8	0,8	0,8	0,7	
kg DM/day	109,5	109,2	109,2	109,2	107,7	105,8	103,6	
Intake/ kd DM/ha/day	22,7	24,0	24,0	24,0	21,8	21,8	21,8	

Annex III Growth and Intake Dairy cows Dutch farm 2014

week 1 pasture	27-3-2014	28-3-2014	29-3-2014	30-3-2014	31-3-2014	1-4-2014	2-4-2014
kg DM fresh grass	4,66	5,05	5,47	7,13	7,13	7,45	11,24
week 2 pasture	3-4-2014	4-4-2014	5-4-2014	6-4-2014	7-4-2014	8-4-2014	9-4-2014
kg DM fresh grass	11,00	10,03	11,17	11,17	8,73	8,94	9,45
week 3 pasture	10-4-2014	11-4-2014	12-4-2014	13-4-2014	14-4-2014	15-4-2014	16-4-2014
kg DM fresh grass	8,55	9,41	9,41	9,23	9,30	9,30	8,23
week 4 pasture	17-4-2014	18-4-2014	19-4-2014	20-4-2014	21-4-2014	22-4-2014	23-4-2014
kg DM fresh grass	9,14	8,26	7,45	7,71	7,71	6,64	7,66
week 5 pasture	24-4-2014	25-4-2014	26-4-2014	27-4-2014			
kg DM fresh grass	7,65	7,41	7,58	8,38			

measurement 1	15-mrt	16-mrt	17-mrt	18-mrt	19-mrt	20-mrt	21-mrt	
cm/day	0,2	0,2	0,2	0,2	0,2	0,2	0,2	
kg DM/day	27,8	27,8	27,8	27,8	27,8	27,8	27,8	
Intake/ kd DM/ha/day	0	0	0	0	0	0		
measurement 2	22-mrt	23-mrt	24-mrt	25-mrt	26-mrt	27-mrt	28-mrt	29-mrt
cm/day	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2
kg DM/day	28,0	28,0	28,0	28,0	28,0	28,0	28,2	28,2
Intake/ kd DM/ha/day	0	0	0	0	0	11,1	12,1	13,2
measurement 3	30-mrt	31-mrt	1-apr	2-apr	3-apr	4-apr	5-apr	
cm/day	0,7	0,7	0,7	0,7	0,7	0,7	0,7	
kg DM/day	98,7	98,1	97,7	97,9	101,2	104,3	104,3	
Intake/ kd DM/ha/day	16,7	16,7	17,5	26,4	24,5	22,3	24,9	
measurement 4	6-apr	7-apr	8-apr	9-apr	10-apr	11-apr	12-apr	
cm/day	0,8	0,8	0,8	0,8	0,8	0,8	0,8	
kg DM/day	110,3	110,3	110,3	110,3	110,3	109,6	109,6	
Intake/ kd DM/ha/day	24,9	19,6	20,1	21,3	19,2	21,2	21,2	
,,,,,,,,,,,,,,,,,,,,,,,,,,,,	13-apr	14-apr	15-apr	16-apr	17-apr	18-apr	19-apr	20-apr
cm/day	0,8	0,8	0,8	0,8	0,8	0,8	0,8	0,8
kg DM/day	110,3	110,7	112,0	113,7	113,7	113,8	117,7	118,3
Intake/ kd DM/ha/day	20,8	20,9	20,9	18,1	20,1	18,2	16,4	17,0
measurement 5	21-apr	22-apr	23-apr	24-apr	25-apr	26-apr	27-apr	
cm/day	0,9	0,9	0,9	0,9	1,0	1,1	1,2	
kg DM/day	128,8	129,3	127,5	132,5	137,0	160,6	173,6	
Intake/ kd DM/ha/day	17,0	14,6	16,9	17,4	16,5	17,2	19,0	

Annex IV hectares rotation lengths farm 2014

	HA March 27/ April 27	Ha/ day	difference farmer
spring farmer	28,1	0,9	-
rotation length 1	85,0	2,7	56,9
rotation length 2	73,4	2,3	45,4
rotation length 3	62,2	1,9	34,1
spring rotation planner	66,5	2,1	38,4

	total HA March 15/April 27	HA/day	difference farmer	advance early start
spring farmer	28,1	0,6	-	-
rotation length 1	93,2	2,1	65,1	8,2
rotation length 2	81,6	1,9	53,6	8,2
rotation length 3	70,4	1,6	42,3	8,2
spring rotation planner	81,1	1,8	53,1	14,7

Annex V growth, intake, Cover-growth Dutch farm 2013