

Pasture management using grass growth measurements and fresh grass analyses

Advantages, benefits and practical approach

Grass growth measurements are a practical tool for farmers and advisers to optimise the planning of forage production on meadows and pastures. The data can be used to efficiently manage grazing, mowing dates and fertilisation, to make targeted use of forage reserves and to support animal welfare.

Outline

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Objectives of grass growth measurements

1. Determining the optimal time for grazing

Questions to be answered:

- Is the pasture ready for grazing? → Grazing too late: stem-rich stands of lower quality, delayed regrowth and reduced feed intake.
- Has the pasture been grazed down sufficiently? → Insufficient grazing of the pasture: lower quality of regrowth.



Rules of thumb for the optimal grazing time (according to Schleip *et al.*, 2016)

Short-grass pasture

- Pasture height: 7.5 – 8.7 clicks* in spring, 10.5 clicks (in summer)

Rotational grazing

- Pasture height: 12 – 18 clicks and grazing height < 7.2 clicks



These are guide values which must be adapted to individual farm conditions.

* 1 click = 0.5 cm of compressed pasture height, measured using a rising plate meter (see p. 3)

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2. Estimating pasture cover (pasture available for grazing)

Questions to be answered:

- How much pasture cover is available (calculation, see p. 8)?
- Does the grazing management need to be adjusted (more rotation/turnover/reducing stocking density) or should supplementary feeding be provided in the barn? → Inappropriate supplementary feeding in the barn: delayed response to the supplementary feed, loss of efficiency and a drop in performance.
- One tool for visualising and assessing the pasture cover is the 'feed wedge' (Fig. 1). The pasture cover is:
 - **scarce**: provide supplementary feeding/adjust pasture management;
 - **sufficient**;
 - **abundant**: preserve.

Feed wedge for assessing available pasture cover

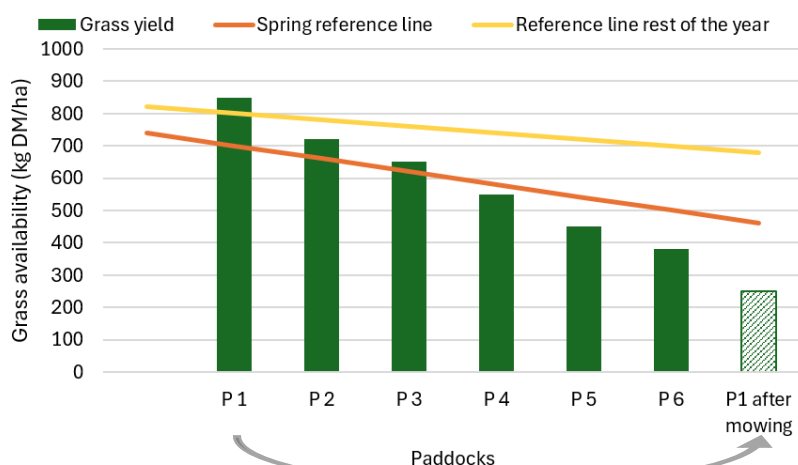


Fig. 1: Feed wedge for assessing the pasture cover based on example data from a rotational pasture comprising six paddocks. The paddocks are shown in descending order according to the available pasture cover.

Interpretation: The average pasture cover (approx. 600 kg DM/ha) is to be assessed as sufficient to abundant in spring, whilst it would be rather scarce in summer. To prevent the stand from becoming overgrown during periods of high growth in spring, paddock P1 should be mown. Paddock P2 has an optimal herbage mass for grazing; the subsequent paddocks follow suit within the management system.

Guideline values for pasture available for grazing:

Spring: 500 – 700 kg DM¹ /ha

Rest of the year: 700 – 800 kg DM/ha

When assessing the pasture cover, particular attention must be paid not only to current **growth conditions** but also to **stocking density, grazing duration** and the **available area**.

¹ DM = dry matter



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- How long can the pasture be grazed?
 - → Consider grass growth over time (grass growth, Fig. 2).

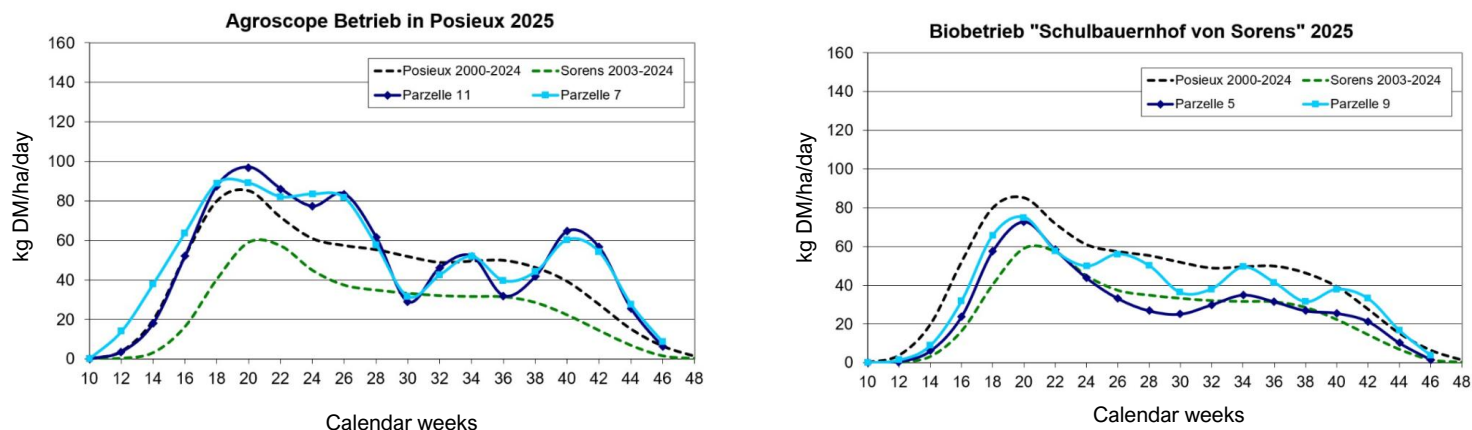


Fig. 2: Grass growth curves (kg DM/ha/day) in 2025 at the Agroscope farm in Posieux and at the 'Schulbauernhof von Sorens' organic farm, compared with long-term averages. The curves show site-specific differences, but follow the typical pattern with a pronounced spring peak, a more or less pronounced growth depression in summer and a renewed, weaker increase in autumn. The deviations from the averages highlight the influence of annual weather conditions on grass growth (Agroscope, 2025).

3. Appropriate supplementary feeding in the barn

Questions to be answered:

- How many kg of dry matter does a cow consume per day whilst grazing?
- Does pasture management need to be adjusted (more rotation/movement) or should supplementary feeding be provided in the barn?

Procedure:

1. Determine the usable pasture cover before and after grazing → measure pasture height (→ see p. 4).
2. The difference provides an indication of the grass intake of the entire herd.
3. Compare this with the requirements for barn feeding, considering nutrient supply and adjusting the ration to the nutrient content of the fresh grass (Fig. 3).

Crude protein and crude fibre content as well as energy density of intensively used pastures over the course of the year

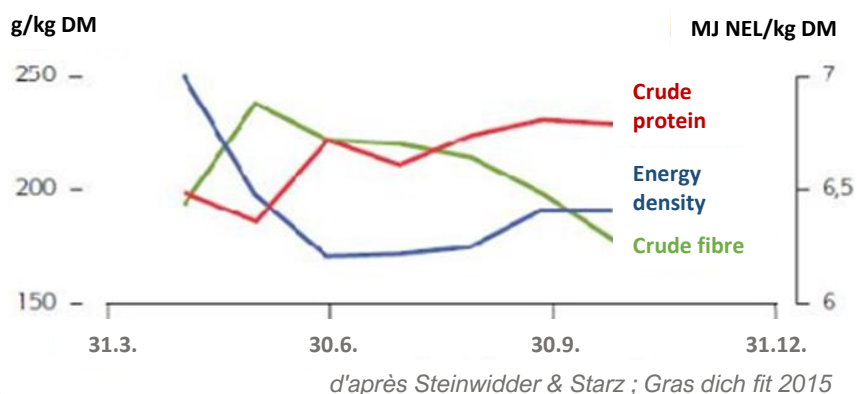


Fig. 3: Crude protein, crude fibre content and energy density of intensively used pastures over the course of the year (adapted after Steinwider & Starz; 2015)

Measuring grass growth – procedure, implementation, analysis

General information

- **Measuring device:** Rising Plate Meter (RPM; Fig. 4) → The plate is lifted by the grass. The denser and taller the grass, the higher the plate is lifted. → The **compressed pasture height** is measured, depending on the device, in mm, cm or clicks (1 click = 0.5 cm) ≠ measurement using a simple metre stick or folding rule.
- Using calibration formulas, the pasture cover can be estimated and grass growth (= growth between two points in time) determined.

* Alternative measuring instruments are described by Schleip *et al.* (2016): Erfolgreiche Weidehaltung. Der Schlüssel zu niedrigen Kosten in der Milchproduktion. Merkblatt.

<https://www.fibl.org/de/shop/1714-weidehaltung>



Fig. 4: Herbometer

Carrying out the measurement and measurement log

- **Period:** during the vegetation season/from the start to the end of grass growth (approx. March – November)
- **Frequency:** weekly (every two weeks if conditions are dry)
- **Number of paddocks to be measured:** depends on the farm; ideally at least 5 (3 different) paddocks.
- **Number of measurement points per paddock:** at least 30 measurement points
- **Measurement scheme:** cross the area diagonally twice (Fig. 5); the measurement points must be evenly distributed across the paddock (e.g. always the same number of steps between measurement points; this also applies to fenced-off areas).
- **Repetition:** where possible, always use the same person and the same measurement scheme.
- **Do not carry out measurements whilst the paddock is being grazed or mown:** only ungrazed paddocks are measured (Fig. 7); fencing off may be necessary (e.g. for short-grass pasture or where there are < 7 days between grazing intervals)
- **Baseline measurement:** the first measurement represents the initial condition → after grazing or mowing, a new baseline measurement must be carried out, preferably immediately after the activity.

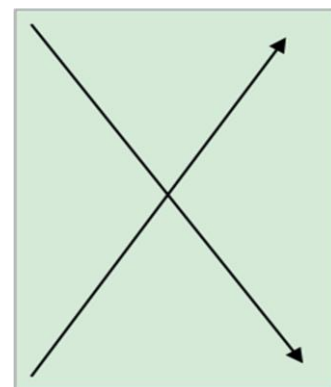


Fig. 5: Measurement scheme for grass growth, walking route across the plot

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Possible sources of error

- Place the herbometer upright so that the plate rests completely on the grass (pay particular attention to this on sloping pastures!) (Fig. 6).
- Insufficient or irregular distribution of measurement points.
- Different people carrying out measurements.

Fig. 6: Correct placement of the herbometer on the grass stand, L. Fritzinger, CAA.

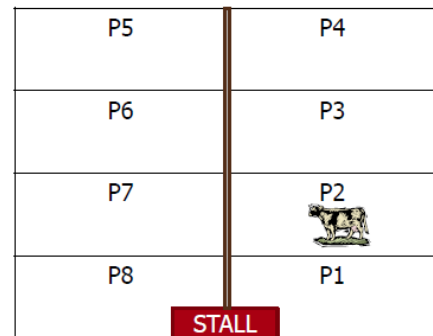
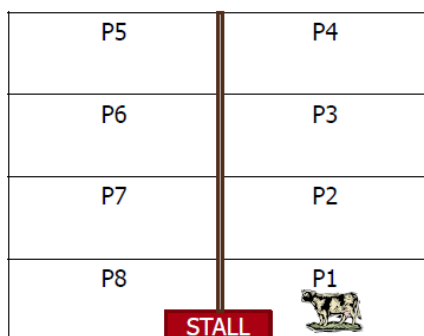
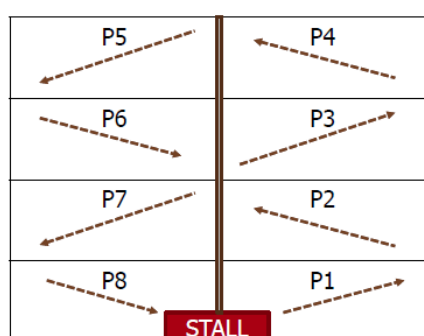
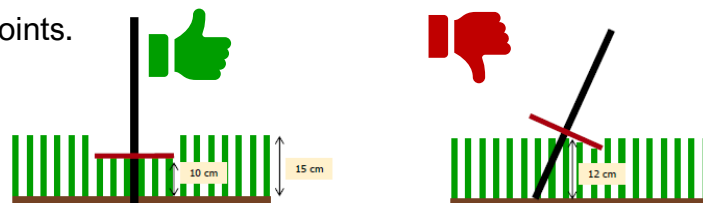


Fig. 7: Example measurement scheme for rotational grazing with 8 paddocks and rotation every two to three days. Week 1: Start of measurements, all paddocks. Week 2: Measure P2–P8, do not measure P1; Week 3: Measure P1, P3–P8, do not measure P2; L. Fritzinger, CAA.

Procedure depending on the grazing system

- **Strip grazing:** Grazing paddocks divided into portions with feeding fences. The fence is moved further along each day.
 - Only those paddocks that are not being grazed are measured, and grazing activity must be recorded.
- **Rotational grazing:** Grazing paddocks that are rotated every few days.
 - Only the paddocks that are not being grazed are measured; grazing activity must be recorded.



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- **Permanent pasture/short-grass pasture:** One or a few large paddocks with a short fallow period.
 - If only a single paddock is available: fence off two areas measuring 9 m².
 - Carry out the baseline measurement (zero measurement) on the day the fencing is erected.
 - Switch to a different fenced-off paddock after approx. 4 weeks (when the compressed pasture height is > 15 cm or 30 clicks) → switch/move the herd directly on that day and carry out the baseline measurement so that the new paddock can be measured the following week.
 - If two or more paddocks are available and the cows move between them:
 - Baseline measurement when the paddock is vacated.
 - Take two further measurements after the baseline measurement, depending on the rest period (days 7 and 14) → if this is possible, there is no need for fencing off a smaller area.
 - Cross the fenced area twice diagonally; the measurement points must be evenly distributed across the plot.
- **A/B/C pasture (with AMS):** Several, small paddocks, which may be divided into daily portions. The animals change paddocks approximately every 8 hours.
 - Only those paddocks that are not being grazed are measured; alternatively, grazing activity must be recorded → how long are the intervals without grazing? → This depends on whether the pastures are classified as rotational grazing or short-grass pasture (→ fencing off a measurement area may be necessary).

Recorded values

- **Data collection:** the RPM provides two measured values:
 - number of measurement points,
 - compressed pasture height, depending on the model, in clicks, mm or cm,
 - date of measurement,
 - additionally, record grazing and/or mowing (< 7 days since last use) and fertilisation.

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Calculation of grass yield and grass growth

Pasture cover – conversion to kg DM/ha

Formulas for Switzerland and southern Germany (Schori, 2020)

- **Prerequisites:** minimum pasture height of 7.2 clicks
- **Basic formula:** $y = 120 \cdot x - 767$ (y = yield in kg DM/ha; x = pasture height in clicks)
- **Seasonal adjustments** to account for the course of vegetation growth (grass density):
 - **April–June:** $y = 117x - 841$
 - **July–August:** $y = 124x - 850$
 - **Sept.–Nov.:** $y = 148x - 896$

Formulas for Alsace:

- **Prerequisite:** minimum pasture height of 5 cm of compressed pasture height (10 clicks), maximum 20 cm of compressed pasture height (40 clicks)
- **Basic formula:** compressed grass height in cm $\times$ grass density in kg DM/ha/cm = pasture cover in kg DM/ha
- **Seasonal adjustments** to account for the course of vegetation growth (grass density):
 - **Start of the growing season – 4 May:** 225 kg DM/ha/cm
 - **5 May – 31 May:** 250 kg DM/ha/cm
 - **1 June – 14 June:** 275 kg DM/ha/cm
 - **15 June – 14 July:** 300 kg DM/ha/cm
 - **after 15 July:** 325 kg DM/ha/cm

Calculation of grass growth

- Average grass growth (kg DM/ha/day) =

$$\frac{(\text{Pasture cover measurement 2} - \text{pasture cover measurement 1})}{\text{Number of days between measurement 1 and measurement 2}}$$

- Grass growth is always calculated between the current value and the last measured value.
- After grazing or mowing, a baseline measurement must first be taken to determine grass growth.

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- The average grass growth across all paddocks can be plotted graphically as a grass growth curve (Fig. 8).

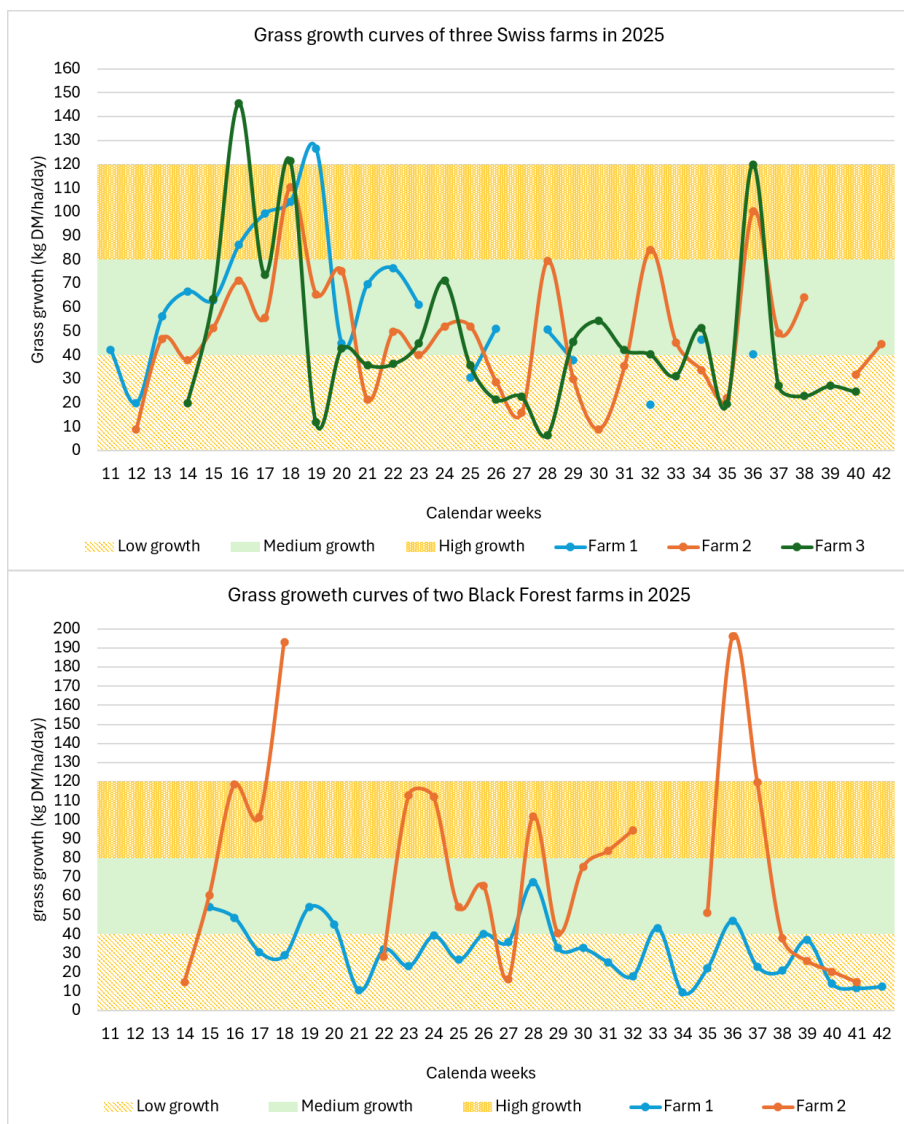


Fig. 8: Grass growth curves for 2025 for various pilot farms in Switzerland (above) and Germany (below). Grass growth varies between farms depending on altitude, management intensity, soil and water conditions. The colour-coded areas indicate low (< 40 kg DM/ha per day), medium (40–80 kg DM/ha per day) and high growth (> 80 kg DM/ha per day). Depending on the growth rates, pasture management must be adjusted or can be maintained as is.

Calculating the pasture available for grazing

- Calculate usable pasture cover in kg DM/ha (see p. 6)
- Usable pasture cover × size of the paddock
- Average pasture availability = add up the usable pasture cover of all areas and divide by the total area (= size of all paddocks). Grazed paddocks or those mown less than 7 days ago are not taken into account.

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Collection of fresh grass samples to determine the optimal mowing time

In addition to grass growth measurements, grassland stands can be sampled to determine the optimal mowing time based on yield and nutrient content (Fig. 9).

Procedure and sampling

- **Timeframe and frequency:** Spring – starting at approximately 5 weeks before the first cut (→ temperature sum at approx. 500 °C → see factsheet [‘Temperature sums’](#) and 10 cm of growth height), once a week until the first cut.
- **Timing:** Take samples at the start of the week → to allow sufficient time for laboratory analysis!
- **Sampling area:** identify a meadow representative for the farm and select a representative patch of grass measuring 10 m² s (always the same one).
- **Sampling:** Cut tufts of grass to a height of 7–8 cm, place them in a bucket and mix thoroughly → a total of 500 g.
- **Dispatch:** Place the grass in plastic bags, squeeze out the air (or vacuum-seal) and wrap airtight with adhesive tape, then send to the laboratory **immediately**. In the event of high temperatures or late posting, fill a plastic bottle with water, freeze it, wrap it in newspaper and place it in the parcel with the sample as a cooling element to keep it fresh.
- **Interim cutting/grazing:** leave a strip of grass standing for further analysis.

Recorded values and evaluation

- **Laboratory analysis (NIRS):** crude nutrients, NDF, ADF, crude protein and calculation of protein value (in Switzerland: APDE/APDN, in Germany: nXP, in France: PDI) as well as energy (MJ NEL, UF).
- **Recorded values:** compressed pasture height, meadow type, date of sampling

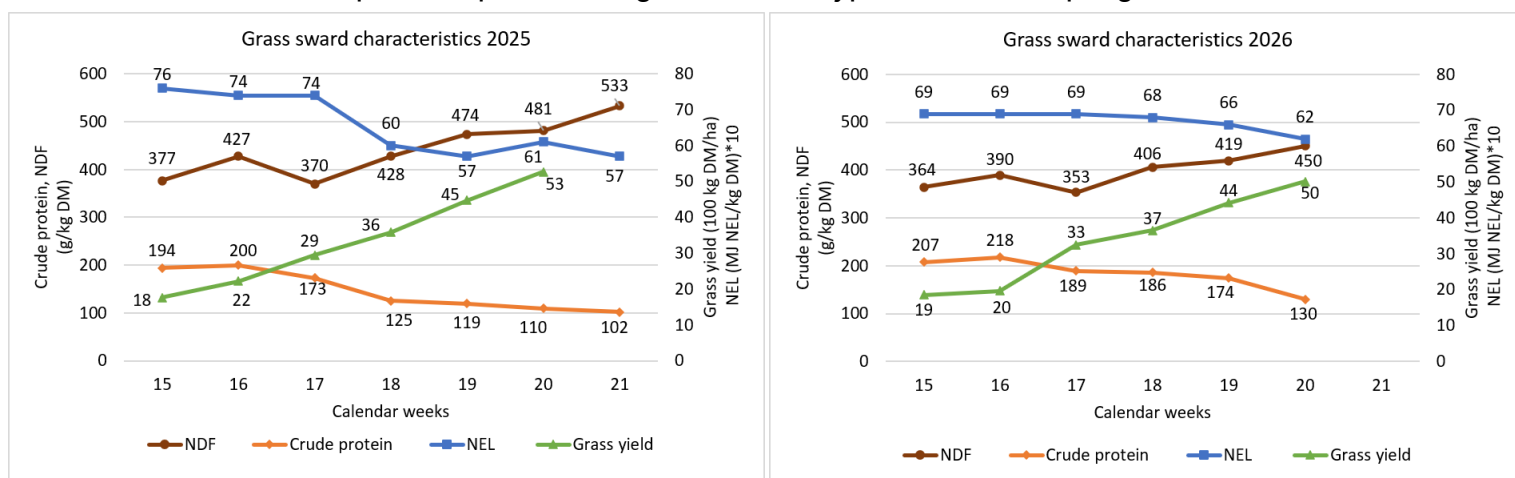


Fig. 9: Development of nutrient content and yield in the grass swards in 2025 and 2026 on a Swiss farm in the canton of Basel-Landschaft. The optimal mowing time was in calendar weeks 17 to 18 in 2025 and in calendar weeks 18 to 19 in 2026. The choice of mowing time is based on a balance between forage quality and yield, as well as the farm's production objectives.

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References

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