Producing High-Quality Dry Hay: Best Practices

Harvesting dry hay requires balancing weather conditions while minimizing quality losses. Losses can range from **10% in grasses** to **35% in legumes**, but proper management can significantly reduce these losses.

Key Pre-Baling Operations

- **Rapid Drying:** Speed up moisture loss to reduce nutrient degradation.
- **Moisture Control:** Bale at the optimum moisture level to prevent spoilage.

Shortening Hay Drying Time:

Efficient hay drying is critical for maintaining forage quality and minimizing losses. Understanding the drying process and implementing best practices can significantly reduce respiration-related nutrient loss and weather damage.

- **Respiration Losses:** After cutting, plants continue to respire until moisture falls below **40%**, consuming sugars and starch that contribute to **Total Digestible Nutrients (TDN)**.
- **Rain Risk:** Rain within the first 48 hours after cutting causes severe leaching losses. Extended light rains are more damaging than a single heavy event.
- **Goal:** Reduce moisture from **80% (fresh cut)** to **14–16% (baling)** as quickly as possible.

Three Stages of Drying

1. **Stage 1 (80% → ~70%):**
    - Moisture loss through **stomatal openings**, which function only in light.
    - Wide swaths allow better light penetration, speeding this stage.

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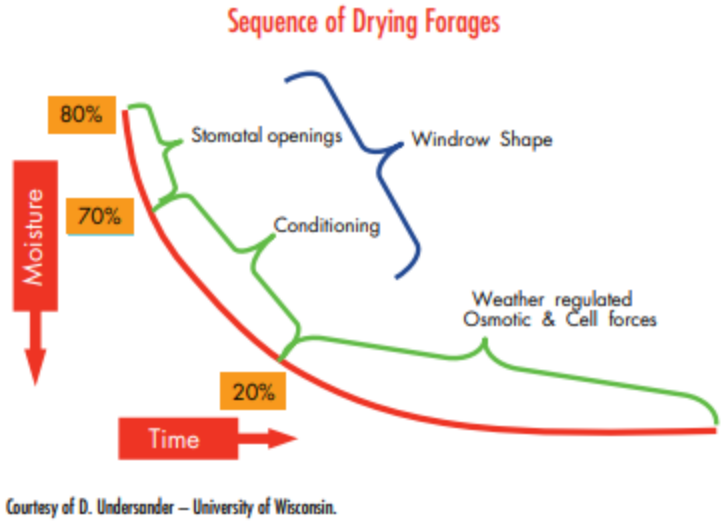
2. **Stage 2 (~70% → ~20%):**
    - Water loss from leaf and stem surfaces after stomates close.
    - Conditioning accelerates this stage.
3. **Stage 3 (~20% → baling moisture):**
    - Water removal from stems.
    - **Roller conditioners** work best for alfalfa; **flail conditioners** for grasses.
    - Proper adjustment prevents leaf loss and plant damage.



Best Practices for Faster Dry Down

- **Wide Swaths:**
    - Target **72% of mower width** for optimal drying.
    - Wide swaths reduce respiration losses and ash contamination compared to narrow, thick windrows.
- **Conditioning:**
    - Use roller or flail conditioners appropriately for crop type.
    - Avoid excessive pressure to prevent leaf shatter.
- **Drying Agents:**
    - Effective mainly in warm, dry climates; less useful in cool, humid conditions. *See The Breakdown of Hay Preservatives and Additives*

Conditioning

- Freshly cut hay is ~80% moisture; must reach **20% moisture** for baling.
- Conditioning speeds drying by breaking the stem cuticle.
- Adjust rollers to crack stems without breaking leaves.
- Proper conditioning reduces dry matter loss to **1–3%**.
- Alternative: Cut in a wide swath (≥70% of cutting width) and rake after a few days for similar drying with less energy use.

Raking

- Avoid raking legumes below **35–40% moisture** to prevent leaf loss.
- Rake in the early morning or late evening to help minimize leaf loss
- Synchronize PTO and field speed for gentle handling.
- Form uniform windrows for consistent bale density.
- Wheel rakes: Adjust height just above ground to reduce ash contamination.
- Parallel bar rakes: Avoid for dry hay; suitable only for silage.

Tedding

- Improves drying but increases leaf loss if hay is too dry.
- Best for grass hay; perform at **≥40% moisture**.
- Alternative: Wide swath cutting and timely raking.

Macerators

- Crush stems to speed drying but add cost, time, and wheel traffic, reducing yield potential.

Dry Matter Losses by Various Harvesting Operations

Operation	Dry Matter Loss
Cutting	1–6%
Conditioning	1–4%
Raking	5–15%
Baling	1–4%
Rain (1 inch)	3–4%
Storage	5–10%

Insight: Raking and rain cause the greatest losses—timely operations and weather monitoring are essential.

Moisture Management

- **Target moisture for baling:**
  - Large round alfalfa bales: **18–20%**
  - Above 20%: Risk of spoilage and fire unless preservatives (e.g., propionic acid) are applied.
- **Too dry:** Increased leaf loss; resume baling during dew periods for better leaf retention.
- Dew moisture releases easily during curing, allowing slightly higher baling moisture.

An Easy Method to Determine Forage Dry Matter (SIDE BAR)

Knowing dry matter content is important when harvesting or buying and selling forage. Forage dry matter content can be easily determined in a few minutes, using a microwave oven and a small fish or diet scale.

1. Weigh an empty paper plate.
   Example weight: 100 grams
2. Place forage sample on plate — approximately 200 grams — and record combined weight.
   Example: 300 grams
3. place plate and subsample in microwave oven with a cup of water
4. microwave on high for three minutes
5. remove plate and sample, and re-weigh, recording the weight
6. place sample back in oven, and microwave on high for one minute
7. continue heating sample for one-minute intervals (and re-weighing) until sample stops losing weight.
   Example subsample and plate final weight: 150 grams

Example:

$$\frac{\text{(final wt of sample) - (wt of plate)}}{\text{(original wt of sample and plate) - wt of plate}} \times 100 \text{ per cent} = \text{per cent forage Dry matter (DM)}$$

$$\frac{150-100}{300-100} \times 100 \text{ per cent} = 25 \text{ per cent forage dry matter}$$

Managing Rained-On Hay and Baling Risk

Rainfall during hay curing can significantly reduce forage quality and increase storage risks. Understanding the sources of loss and proper management practices is essential for maintaining feed value and safety.

- **Leaching of Nutrients:**
  - Soluble carbohydrates and minerals are lost; protein usually unaffected.
  - Up to **50% of dry matter loss** can be soluble carbohydrates, reducing ensiling potential.
  - Additives can replace lost sugars but increase costs.
- **Prolonged Respiration:**
  - Plants respire until moisture drops below **30%**; re-wetting restarts respiration, consuming nutrients.
- **Leaf Shatter:**
  - Frequent handling (raking, tedding) and wet-dry cycles increase leaf loss.
- **Microbial Activity:**
  - Wet hay promotes mold growth and nutrient breakdown.
- **Color Bleaching:**
  - Sun and rain exposure reduce green color, lowering market value.

Baler Losses

- **Pickup Loss:**
  - Typically **1–3%**, up to **12%** if hay is overly dry or equipment poorly adjusted.
  - Reduce loss by baling at higher moisture and synchronizing ground speed with PTO speed.
- **Bale Chamber Loss:**
  - Higher in round balers (2–3× more than rectangular).
  - Minimize by:
    - Feeding hay quickly into the chamber.
    - Using large windrows and high forward speeds.
    - Avoiding excessive bale rotations during twine wrapping.

Optimal Moisture for Baling

Hay quality depends on uniform drying and proper moisture levels:

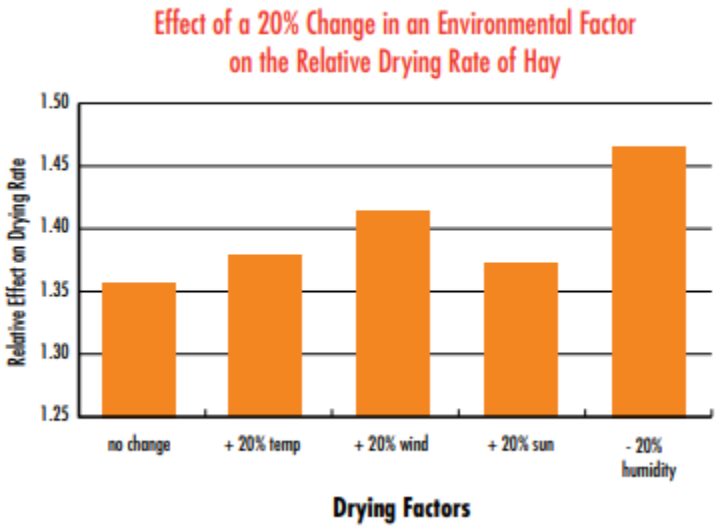
- **Too Wet:** Increases risk of spoilage, mold, heating, and even spontaneous combustion.
- **Too Dry:** Leads to dry matter and nutrient losses.
- For high-moisture hay or baled silage, refer to *Baled Silage Production* (MAFRI factsheet).

Weather and Drying Conditions

- Wet bales risk **mold, heating, and fire**—do not bale if uncertain.
- Use preservatives when baling above recommended moisture to prevent spoilage.

Weather significantly affects drying rates:

- **Ideal Conditions:** Warm, dry, sunny days accelerate dry down.
- **Key Factors:**
    - **Wind Speed:** Enhances moisture removal.
    - **Relative Humidity:** High humidity slows drying.
        - At **70% humidity or higher**, alfalfa typically dries only to ~20% moisture, regardless of sunshine, resulting in lower quality ha



Contact Us

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