Alfalfa to get back into planetary boundaries

2025 world alfalfa congress
FRANCE REIMS-CHÂLONS

Technologies for alfalfa breeding and production

Julier B. & Noushahi H.

Parallel session 5

FROM 03 TO 06 nov. 2025

Alfalfa to get back into planetary boundaries

2025 world alfalfa congress
FRANCE REIMS-CHÂLONS

Technologies to Remoisturize Alfalfa in the Windrow for Baling

Earl Creech, Ryan Larsen, and Matt Yost

Utah State University, Logan, Utah, USA

Extension
UtahStateUniversity®

FROM 03 › TO 06 nov. 2025

Windrow moisture is critical

- Alfalfa baled too wet can:
  - Spoil
  - Discolor
  - Combust
- Alfalfa baled too dry has:
  - Leaf shatter
  - Brittle stems
  - Dust
- Bottom line: Less value in hay baled outside of the proper moisture window.

Natural Dew

- Needed to reduce leaf and stem shatter during baling
- Timing and amount can be unpredictable
- Schedule baling around the weather
- Often varies over the course of a baling event.

What about artificial moisture?

- Apply water over the top of the windrow with sprayer

OR

- Specialized equipment that injects moisture into the windrow at baling.
- Claims from manufacturers:
    1. Widen the window of time for baling to occur
    2. Allow single baler to cover more acres per day
    3. Produce bales at a more consistent moisture level

Much interest in these technologies in recent years, but little to no university data on how these systems compare.

Materials and Methods

- Large, pivot irrigated farm in Milford, UT
- 2nd and 3rd cuttings in 2020 and 2nd cutting in 2021
- Alfalfa windrowed and raked according to normal practice on the farm
- Baling took place the evening of the day or raking

Treatments

1) Steamer (Staheli West Dew Point)
2) Treat and bale (Harvest Tec Dew Simulator)
   - baling approximately 5 seconds after treating with the Dew Simulator
3) Treat and wait (Harvest Tec Dew Simulator)
   - baling approximately 10 minutes after treating
4) No treatment (dry)

No artificial moisture (dry)

ersity.

Staheli West Dew Point (steamer)

Harvest Tec Dew Simulator (treat and bale)

rsity.

Data collection

- 6 bales were evaluated for each treatment
- Moisture
- Yield
- Bale Weight
- Forage quality (ADF, NDF, RFV, and CP)

Moisture and Yield

Treatment	Moisture	Bale Weight	Yield With Moisture	Yield Dry Matter
	%	kg	Mg/ha	Mg/ha
Steamer	12.0 b	673 a	3.18 a	2.82 ab
Treat and bale	13.3 a	651 b	3.27 a	2.87 a
Treat and wait	12.4 b	647 b	3.09 ab	2.73 ab
Dry	9.4 c	610 c	2.89 b	2.64 b

Moisture and Yield

Treatment	Moisture	Bale Weight	Yield With Moisture	Yield Dry Matter
	%	kg	Mg/ha	Mg/ha
Steamer	12.0 b	673 a	3.18 a	2.82 ab
Treat and bale	13.3 a	651 b	3.27 a	2.87 a
Treat and wait	12.4 b	647 b	3.09 ab	2.73 ab
Dry	9.4 c	610 c	2.89 b	2.64 b

Moisture and Yield

Treatment	Moisture	Bale Weight	Yield With Moisture	Yield Dry Matter
	%	kg	Mg/ha	Mg/ha
Steamer	12.0 b	673 a	3.18 a	2.82 ab
Treat and bale	13.3 a	651 b	3.27 a	2.87 a
Treat and wait	12.4 b	647 b	3.09 ab	2.73 ab
Dry	9.4 c	610 c	2.89 b	2.64 b

Moisture and Yield

Treatment	Moisture	Bale Weight	Yield With Moisture	Yield Dry Matter
	%	kg	Mg/ha	Mg/ha
Steamer	12.0 b	673 a	3.18 a	2.82 ab
Treat and bale	13.3 a	651 b	3.27 a	2.87 a
Treat and wait	12.4 b	647 b	3.09 ab	2.73 ab
Dry	9.4 c	610 c	2.89 b	2.64 b

Forage Quality

Treatment	Protein	NDF	RFV
	%	%	
Steam	22.2	37.7	163
Treat and bale	22.2	37.8	164
Treat and wait	22.3	37.5	166
Dry	22.1	37.1	161
	NS	NS	NS

Forage Quality

Treatment	Protein	NDF	RFV
	%	%	
Steam	22.2	37.7	163
Treat and bale	22.2	37.8	164
Treat and wait	22.3	37.5	166
Dry	22.1	37.1	161
	NS	NS	NS

Forage Quality

Treatment	Protein	NDF	RFV
	%	%	
Steam	22.2	37.7	163
Treat and bale	22.2	37.8	164
Treat and wait	22.3	37.5	166
Dry	22.1	37.1	161
	NS	NS	NS

Partial Budget Analysis (USD)

Category	Steamer	Dew Simulator
Annualized Cost of Ownership	$44,171	$14,608
Total Operating Cost	$12,600	$7,067
Total Cost	**$56,771**	**$21,675**
Benefits per ha	$63.70	$53.62
Costs per ha	$35.06	$13.39
Net Benefits per ha	**$28.64**	**$40.23**

**Assumptions: 405 ha farm, $220/Mg alfalfa, $0.66/liter diesel

Partial Budget Analysis (USD)

Category	Steamer	Dew Simulator
Annualized Cost of Ownership	$44,171	$14,608
Total Operating Cost	$12,600	$7,067
Total Cost	**$56,771**	**$21,675**
Benefits per ha	$63.70	$53.62
Costs per ha	$35.06	$13.39
Net Benefits per ha	**$28.64**	**$40.23**

**Assumptions: 405 ha farm, $220/Mg alfalfa, $0.66/liter diesel

Partial Budget Analysis (USD)

Category	Steamer	Dew Simulator
Annualized Cost of Ownership	$44,171	$14,608
Total Operating Cost	$12,600	$7,067
Total Cost	**$56,771**	**$21,675**
Benefits per ha	$63.70	$53.62
Costs per ha	$35.06	$13.39
Net Benefits per ha	**$28.64**	**$40.23**

**Assumptions: 405 ha farm, $220/Mg alfalfa, $0.66/liter diesel

Partial Budget Analysis (USD)

Category	Steamer	Dew Simulator
Annualized Cost of Ownership	$44,171	$14,608
Total Operating Cost	$12,600	$7,067
Total Cost	**$56,771**	**$21,675**
Benefits per ha	$63.70	$53.62
Costs per ha	$35.06	$13.39
Net Benefits per ha	**$28.64**	**$40.23**

**Assumptions: 405 ha farm, $220/Mg alfalfa, $0.66/liter diesel

Partial Budget Analysis (USD)

Category	Steamer	Dew Simulator
Annualized Cost of Ownership	$44,171	$14,608
Total Operating Cost	$12,600	$7,067
Total Cost	**$56,771**	**$21,675**
Benefits per ha	$63.70	$53.62
Costs per ha	$35.06	$13.39
Net Benefits per ha	**$28.64**	**$40.23**

**Assumptions: 405 ha farm, $220/Mg alfalfa, $0.66/liter diesel

Partial Budget Analysis (USD)

Category	Steamer	Dew Simulator
Annualized Cost of Ownership	$44,171	$14,608
Total Operating Cost	$12,600	$7,067
Total Cost	**$56,771**	**$21,675**
Benefits per ha	$63.70	$53.62
Costs per ha	$35.06	$13.39
Net Benefits per ha	**$28.64**	**$40.23**

**Assumptions: 405 ha farm, $220/Mg alfalfa, $0.66/liter diesel

Conclusions

- Both technologies were successful in increasing bale weight and yield.
- The weight increase was mostly due to increased moisture content in the bale.
- Forage nutritive values were not improved by either technology.
- A partial budgeting strategy can be used to analyze the potential return of these technologies
  - results depend on the size and needs of a specific operation.