

Artificial Moisture for Alfalfa Windrows

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An obsession with windrow moisture...

- Alfalfa baled too wet can be subject to:
 - Spoilage
 - Discoloration
 - Combustion
- Alfalfa baled too dry can be undesirable due to:
 - Leaf shatter
 - Brittle stems
 - Dust
- Regardless of whether the hay will be used on farm or sold, it is worth less if baled outside of the proper moisture window.



Natural Dew

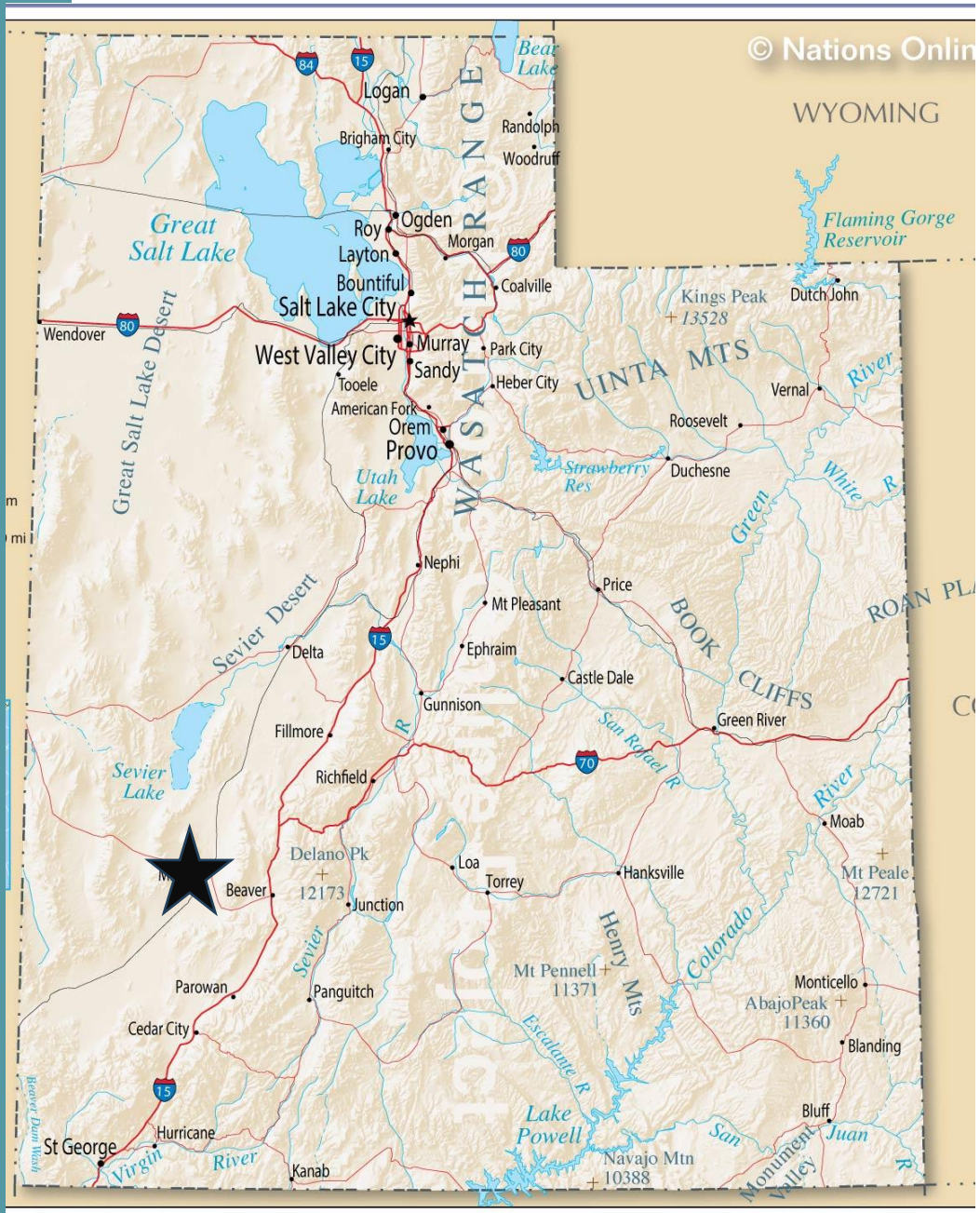
- Needed to reduce leaf and stem shatter during baling
- Timing and amount can be unpredictable
- Schedule baling around mother nature
- Often varies over the course of a baling event.



What about artificial moisture?

- Early attempts consisted of a producer loading a sprayer with water and applying over the top of the windrow.
- Today, specialized equipment that injects moisture into the windrow at baling has been developed.
- Manufacturers claim that these systems:
 - Widen the window of time for baling to occur
 - Allow single baler to cover more acres per day
 - 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.





Here is what we did:

- Large, pivot irrigated farm in Milford, UT with 2 Staheli Dew Point steamers
- 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)



On the day of harvest...



- Baling for all three harvests occurred between the hours of 9 pm and 1 am
- 3 x 4 baler equipped with a Dew Point steamer and operated at 45 to 50 flakes per bale at an average speed of 8 mph.
- The same baler was used for all treatments but the steamer was only used for its designated treatment



On the day of harvest...

- There were 2 runs of each treatment:
 - The four treatments were randomly assigned to windrows within a single pivot span.
 - After those windrows were baled, the treatments were re-randomized and applied to windrows in a second pivot span.
- 5-7 bales of each treatment were made in each windrow; the first 2-4 were not included in the evaluation to allow for pre-run adjustments.
- 3 consecutive bales from each run of each treatment were then tagged for evaluation (2 runs x 3 reps = 6 bales)



No artificial moisture



Staheli West Dew Point



Harvest Tec Dew Simulator



Data collection

- 6 bales were evaluated for each treatment (2 runs x 3 reps)
- Bale moisture (on baler and probe)
- Length of windrow required to make each bale was marked and measured
- Bales were weighed
- Forage quality (composite of 6 cores, 3 per end on a diagonal)
 - NIR at Dairyland lab for fiber (ADF and NDF), relative feed value (RFV), and crude protein



Moisture and Yield

Treatment	Moisture	Bale Weight	Yield With Moisture	Yield Dry Matter
	%	lb	ton/ac	ton/ac
Steam	12.0 b	1483 a	1.42 a	1.26
Treat and bale	13.2 a	1435 b	1.47 a	1.28
Treat and wait	12.3 ab	1427 b	1.45 a	1.27
Dry	9.2 c	1347 c	1.29 a	1.18



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Forage Quality

Treatment	Protein	NDF	RFV
	%	%	
Steam	22.2	37.4	164
Treat and bale	22.3	37.4	164
Treat and wait	22.5	37.0	166
Dry	21.4	38.0	161



Then stack in the shed and wait 3 months...



Moisture and bale weight 3 months later

Treatment	Moisture		Bale Weight	
	July 12	Oct 21	July 12	Oct 21
	-----%-----		-----lb-----	
Steam	13.4 b	12.1 ab	1470 a	1470 a
Treat and bale	15.2 a	11.2 b	1420 b	1390 bc
Treat and wait	14.5 ab	12.9 a	1457 ab	1413 b
Dry	10.5 c	9.3 c	1317 c	1343 c



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Dry	10.5 c	9.3 c	1317 c	1343 c



Forage quality 3 months later

Treatment	RFV		Crude Protein		NDF	
	July 12	Oct 21	July 12	Oct 21	July 12	Oct 21
			-----%-----		-----%-----	
Steam	176	166	22.7	22.3	35.2	36.9
Treat and bale	173	157	22.6	21.3	35.9	38.3
Treat and wait	180	166	22.9	22.2	34.7	37.1
Dry	171	173	22.7	22.5	36.0	36.1

Forage quality 3 months later

Treatment	RFV		Crude Protein		NDF	
	July 12	Oct 21	July 12	Oct 21	July 12	Oct 21
			-----%-----		-----%-----	
Steam	176	166	22.7	22.3	35.2	36.9
Treat and bale	173	157	22.6	21.3	35.9	38.3
Treat and wait	180	166	22.9	22.2	34.7	37.1
Dry	171	173	22.7	22.5	36.0	36.1

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Hay broker visual assessment



Brokers were not told what treatment was applied to any bale (blind test)

- Moisture-treated bales always scored higher than dry bales
- Moisture-treated bales using different technologies did not differ from each other
- Moisture-treated bales were valued at \$280-285 per ton (2021)
- Dry bales were valued at \$270 per ton (2021)



Thanks!

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