The FC Northern SNOTEL SWE Signal, Grade A Water-Supply Directional Read

Why Montana plus Wyoming plus Idaho SNOTEL snow-water equivalent z-scored on 5 years and inverted is a Grade A directional signal tied for strongest IC in the FC library.

David Stendahl · Market Lab Analytics · November 1, 2026

The signal and why it matters today

The USDA NRCS SNOTEL network tracks snow-water equivalent (SWE) at hundreds of mountain-west stations. The April 1 SWE reading predicts summer water and forage availability across Montana, Wyoming, and Idaho BLM grazing allotments – the northern-tier stocker-and-cow-calf country.

High SWE forecasts a wet summer with good forage, which DELAYS feeder placement as ranchers hold cattle on pasture longer. Low SWE forecasts dry conditions and early placement into feedlots. The timing shift flows forward through the feeder cattle market over 60 to 90 days.

The engine INVERTS the raw z-score so that positive composite = low SWE (dry mountain, early placement, bullish-FC); negative composite = high SWE (wet mountain, delayed placement, bearish-FC through late-summer supply flood).

Daily Spearman IC against FC fwd60d is plus 0.297 at p-value less than 1e-182 across 8,989 observations – the strongest IC in the FC library tied to the US Herd Inventory anchor. Non-overlapping (every-60-day) IC is plus 0.298 at p-value 0.0001 across 150 independent samples – STRONGLY SIGNIFICANT.

Phase +1 (Dry Mountain) delivers plus 3.14 percent fwd60d (plus 1.94 pp above baseline, hit 65 percent). Phase –1 (Wet Mountain) delivers minus 1.00 percent (minus 2.21 pp below baseline, hit 45 percent). 4.15 pp directional spread between the primary phases.

Current reading: Wet Mountain moderate-negative firing at composite minus 0.563, 83 trading days running. Northern-tier SNOTEL SWE is running above the 5-year baseline. Historical Phase –1 delivers minus 2.21 pp below baseline. Moderate bearish-FC lean.

• • •

How the mountain-water mechanism composes

The USDA NRCS SNOTEL (SNOwpack TELemetry) network measures daily snow-water equivalent at hundreds of mountain-west stations. April 1 SWE is the industry benchmark for summer water and forage prediction across the northern-tier stocker-and-cow-calf country (MT/WY/ID).

Dry Mountain (positive composite, Phase +1 or +2) means SWE is BELOW the 5-year rolling baseline. Dry conditions predict poor summer forage. Ranchers push cattle to feedlots EARLY to avoid grazing on degraded pasture. This regime historically coincides with:

- Western drought years (2012, 2021 are modern anchors)
- Early feeder-cattle market flow into feedlots
- Short-term pulls of forward feeder supply

Historical pattern: Phase +1 delivers plus 1.94 pp above baseline (65 percent hit).

Wet Mountain (negative composite, Phase −1 or −2) means SWE is ABOVE the 5-year rolling baseline. Wet conditions predict good summer forage. Ranchers DELAY feeder placement into feedlots to graze cattle longer. This regime historically coincides with:

- Heavy snowpack years (2017, 2023 are anchors)
- Delayed Mountain-West placement
- Thinner immediate feeder supply followed by heavier late-summer flooding

Historical pattern: Phase −1 delivers minus 2.21 pp below baseline (45 percent hit).

Normal regime (Phase 0) is the equilibrium zone where SWE tracks the 5-year baseline. Historical pattern: slightly below baseline.

The signal reads NORTHERN-tier only (MT/WY/ID). Southern-tier (TX/OK/KS) drought conditions are not covered – pair with other weather signals for broader confirmation.

• • •

What the state-conditional returns have actually done

> **Reference baseline – FC fwd60d (unconditional)**
>
> CME Feeder Cattle back-adjusted continuous (FC_110ARD) forward-60-day return baseline (unconditional): mean plus 1.20 percent, median plus 1.60 percent, standard deviation 7.8 percent, percent negative 42 percent. Sample window 1990-11-29 through 2026-10-30, 8,989 trading days with observable fwd60d.

Per-day sampling (full 5-state breakdown):

Phase plus 2 (Dry Mountain Ex, composite greater than plus 0.7) covers 1,175 trading days – 13.1 percent of the sample. Per-day mean fwd60d is plus 6.82 percent, hit rate 79 percent. OUTPERFORMS baseline by plus 5.61 pp (deepest-bullish cell, but partly reflects 2012 and 2021 drought cycle overlaps).

Phase plus 1 (Dry Mountain, composite between plus 0.3 and plus 0.7) covers 1,990 trading days – 22.1 percent of the sample. Per-day mean fwd60d is plus 3.14 percent, hit rate 65 percent. OUTPERFORMS baseline by plus 1.94 pp.

Phase 0 (Normal) covers 1,964 trading days – 21.9 percent of the sample. Per-day mean fwd60d is plus 0.22 percent, hit rate 48 percent. Below baseline (minus 0.98 pp).

Phase minus 1 (Wet Mountain, composite between minus 0.7 and minus 0.3) covers 3,860 trading days – 43.0 percent of the sample. Per-day mean fwd60d is minus 1.00 percent, hit rate 45 percent. UNDERPERFORMS baseline by minus 2.21 pp.

Phase minus 2 (Wet Mountain Ex, composite less than minus 0.7) covers some portion of the sample with further bearish pattern.

The live-page regime_table collapses to 3 rows (Dry Mountain combines Phase +1 and +2; Wet Mountain combines Phase –1 and –2) for reader simplicity.

• • •

Three cases that frame how to read this signal

Case 1: Q2 2012. Dry Mountain – 2012 historic drought.

Context: Severe western drought in 2012 collapsed MT/WY/ID SNOTEL SWE across all three states. Composite near plus 0.90 (Dry Mountain extreme). Mountain-West placement was pulled forward. Feeder cattle at approximately 155 dollars. Forward FC experienced mixed dynamics with per-day Phase +1 bullish on average, though the broader 2012 drought complex dynamics intervened. Canonical Dry Mountain anchor documenting the mechanism.

Case 2: Q2 2021. Dry Mountain – 2021 western drought.

Context: Severe 2021 western drought dropped MT/WY/ID SNOTEL SWE below normal across the belt. Composite near plus 0.85 (Dry Mountain extreme). Early Mountain-West placement triggered. Feeder cattle at approximately 155 dollars. Forward FC rallied through Q3 2021 as per-day Phase +1 directional edge materialized. Modern-era Dry Mountain bullish-FC anchor.

Case 3: Q1 2017. Wet Mountain – 2017 heavy snowpack.

Firing date: March 15, 2017 at composite near minus 0.85 (Wet Mountain extreme). Context: Heavy 2017 snowpack across MT/WY/ID SNOTEL stations. Delayed Mountain-West placement thinned forward feeder supply briefly then flooded late-summer market. Feeder cattle at approximately 124 dollars. Forward FC softened through Q2-Q3 2017. Canonical Wet Mountain bearish-FC anchor.

• • •

How to use the signal today

As of November 1, 2026, the composite reads minus 0.563 – Wet Mountain moderate-negative firing, 83 trading days running. Northern-tier SNOTEL SWE is running above the 5-year baseline. CME Feeder Cattle trades the 330 to 340 dollar range.

The current firing is in the Wet Mountain moderate band. Historical Phase –1 delivers minus 2.21 pp below baseline (45 percent hit rate). Moderate bearish-FC lean.

Pair with four confirming reads for direction:

- **FC US Herd Inventory Signal (Z6637)**. Strongest-IC structural supply anchor (tied).
- **FC TX Panhandle Polar Vortex Event Signal (Z1426)**. Second-strongest-IC event detector.

- **FC Light Placement Pace Signal (Z3769)**. Grade A placement flow.
- **LC-Corn Ratio Signal (Z15201)**. Grade A LC fundamental anchor.

When SNOTEL and herd inventory align on direction (both bullish or both bearish), conviction is HIGH. The SNOTEL signal is a water-supply forecast layer complementary to the structural herd supply.

• • •

Methodology notes

Data source. USDA NRCS SNOTEL network daily snow-water equivalent (SWE, wteq_in) readings from Montana, Wyoming, and Idaho stations. The SNOTEL network has 800-plus stations across the western United States; this signal uses the MT/WY/ID subset covering northern-tier BLM grazing allotments.

Signal construction. Compute mean 60-day SWE across the northern belt. Z-score on 5-year rolling window with 252-day minimum sample. Bound with tanh. INVERT the sign. Engine runs 5-state regime map at thresholds plus or minus 0.3 and plus or minus 0.7. Phase +2 above +0.7, phase +1 between +0.3 and +0.7, phase 0 within +/- 0.3, phase −1 between −0.7 and −0.3, phase −2 below −0.7. Target: CME Feeder Cattle back-adjusted continuous (FC_110ARD). Daily release.

Validation statistics. Daily Spearman IC plus 0.297 at p-value less than 1e-182 across 8,989 observations – strongest IC in the FC library tied to the US Herd Inventory anchor. Phase +1 (Dry Mountain) per-day mean fwd60d plus 3.14 percent (plus 1.94 pp above plus 1.20 percent baseline, hit 65 percent). Phase +2 (Dry Mountain Ex) per-day mean plus 6.82 percent (plus 5.61 pp above baseline, hit 79 percent). Phase 0 mean plus 0.22 percent (near baseline). Phase −1 (Wet Mountain) per-day mean minus 1.00 percent (minus 2.21 pp below baseline, hit 45 percent). Phase −2 further bearish.

Independence test. Non-overlapping (every-60d) sampling yields Spearman IC plus 0.298 at p-value 0.0001 across 150 independent observations – STRONGLY SIGNIFICANT. The directional ordering holds across per-day and non-overlap sampling.

• • •

What this signal does not cover

First, the signal reads NORTHERN-tier only (MT/WY/ID). Southern-tier (TX/OK/KS) drought conditions are not covered. For southern-tier weather exposure, pair with the FC TX Panhandle Polar Vortex Event signal (Z1426) and corn-belt drought signals.

Second, Phase +2 (Dry Mountain Ex) shows the deepest bullish edge in sample (plus 5.61 pp) but the sample includes the 2012 drought and 2021 drought which coincided with broader cattle-cycle dynamics. The isolated SWE effect is likely smaller than Phase +2 cell suggests. Pair with structural supply reads to separate SWE effect from cycle effect.

Third, the signal is TIMING-based – SNOTEL April 1 reading predicts summer placement timing, which flows through to feeder supply over 60-90 days. Sharp inflections can disrupt the lag. The 60-day forward window is approximate.

Broader caveat: Grade A directional water-supply signal with the strongest IC in the FC library tied to the US Herd Inventory anchor. The signal provides a high-conviction tactical lean on FC positioning. Pair with structural supply, placement pace, and the Polar Vortex Event detector for stacked confirmation.

This research brief is for informational purposes only and does not constitute investment advice. Past performance is not indicative of future results. Signal reads reflect historical state-conditional statistics; any decision to act on signal readings is the reader's responsibility. Data sources: USDA NRCS SNOTEL daily snow-water equivalent (SWE, wteq_in) from Montana, Wyoming, and Idaho stations; CME Feeder Cattle back-adjusted continuous (FC_110ARD). State-conditional statistics computed through 2026-10-30.