The FC Feedlot THI Stress Signal, Grade A Heat-Stress Directional Read

Why daily temperature-humidity index for Kansas, Nebraska, and Texas Panhandle feedlot zones is a Grade A directional heat-stress signal with independent-sample confirmation on CME Feeder Cattle forward returns.

David Stendahl · Market Lab Analytics · November 1, 2026

The signal and why it matters today

The temperature-humidity index (THI) measures the combined effect of heat and humidity on cattle. When THI runs sustained above 72, feedlot cattle reduce feed intake, average daily gain drops, days-on-feed extends, and feedlot producer margins compress.

The economic response: feedlots cut their bids for new feeder cattle to compensate for degraded output economics. The feeder-cattle market absorbs the compressed-margin signal over 60 days forward.

This signal reads daily maximum THI across the two US cattle feedlot regions in the source table – Kansas-Nebraska and Texas Panhandle – averaged across the composite, smoothed with a 60-day rolling mean to capture sustained heat-stress magnitude, then z-scored on a 5-year daily rolling window.

Daily Spearman IC against FC fwd60d is minus 0.193 at p-value less than 1e-75 across 8,989 trading days. Non-overlapping (every-60-day) IC is minus 0.190 at p-value 0.020 across 150 independent samples – INDEPENDENTLY SIGNIFICANT. Clean negative polarity: positive composite (heat stress) predicts negative FC fwd60d.

Phase +1 (Heat Stress Firing) delivers minus 0.70 percent fwd60d at 47 percent hit rate, minus 1.91 pp below the plus 1.20 percent baseline. Phase –1 (Cool Anomaly) delivers plus 3.05 percent at 62 percent hit rate, plus 1.84 pp above baseline. 3.75 pp directional spread.

Current reading: Heat Stress Firing extreme-positive at composite plus 0.737, 102 trading days running. Southern Plains feedlot THI has been running sustained above the 5-year baseline since early June 2026. Modest bearish-FC lean per the empirical direction.

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How the heat-stress mechanism composes

The temperature-humidity index (THI) is the industry-standard measure of combined heat-plus-humidity stress on cattle. The USDA uses THI thresholds – 72 ALERT, 79 DANGER, 84 EMERGENCY – to classify heat-wave severity for feedlot operators.

Heat Stress Firing (positive composite, Phase +1) means the 60-day THI mean has moved above the 5-year baseline. Sustained heat-stress conditions degrade feedlot economics:

- Cattle reduce feed intake in heat, slowing average daily gain
- Days-on-feed extends to reach target finished weight
- Water consumption spikes, operating cost rises
- In extreme events, heat death-loss hits placement economics directly

Historical pattern: Phase +1 delivers minus 1.91 pp below baseline (47 percent hit rate). The forward 60-day FC return softens as feedlot margin compression carries through to feeder bidding.

Cool Anomaly (negative composite, Phase –1) means the 60-day THI mean has moved below the 5-year baseline. Cool conditions favor feedlot economics:

- Normal feed intake maintains target average daily gain
- Days-on-feed stays near plan
- Operating costs stay in budget

Historical pattern: Phase –1 delivers plus 1.84 pp above baseline (62 percent hit rate). The forward 60-day FC return firms as feedlot margin expansion carries through to firmer feeder bids.

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

The signal is complementary to the FC Northern SNOTEL SWE signal – both tie to summer temperature regimes but different geographies. SNOTEL reads Mountain-West winter snowpack as a summer-forage forecast; this signal reads Southern Plains summer heat stress directly.

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What the state-conditional returns have actually done

> **Reference baseline – FC fwd60d (unconditional)**
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> CME Feeder Cattle back-adjusted continuous 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 (used for daily Spearman IC):

Phase plus 1 (Heat Stress Firing, composite greater than plus 0.3) covers 3,904 trading days – 43.4 percent of the sample. Per-day mean fwd60d is minus 0.70 percent, hit rate 47 percent. UNDERPERFORMS baseline by minus 1.91 pp.

Phase 0 (Normal) covers 1,372 trading days – 15.3 percent of the sample. Per-day mean fwd60d is plus 1.65 percent, hit rate 57 percent. Near baseline (plus 0.44 pp).

Phase minus 1 (Cool Anomaly, composite less than minus 0.3) covers 3,713 trading days – 41.3 percent of the sample. Per-day mean fwd60d is plus 3.05 percent, hit rate 62 percent. OUTPERFORMS baseline by plus 1.84 pp.

Clean asymmetric directional pattern: Phase +1 bearish, Phase 0 near-neutral, Phase –1 bullish. 3.75 pp directional spread.

Methodology callout – per-day vs run-entry sampling. The per-day statistics shown above correspond to the daily and non-overlap IC tests. The live-page regime_table uses RUN-ENTRY sampling (one observation per state run) which produces OPPOSITE sign (Phase +1 run-entry mean approximately plus 2.40 percent, Phase –1 approximately minus 0.04 percent). Run-entry catches inflection moments that differ from within-run averages. The per-day IC is the authoritative directional-edge measure.

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Three cases that frame how to read this signal

Case 1: Q3 2011. Heat Stress Firing – 2011 Southern Plains heat wave.

Firing date: July 15, 2011 at composite near plus 0.85. Context: Severe Southern Plains heat wave drove sustained THI above 80 for weeks. Feedlot margins compressed. Feeder cattle at approximately 140 dollars. Forward FC softened through Q4 2011 as feedlot margin compression carried through to feeder bids. Canonical Heat Stress bearish-FC anchor.

Case 2: Q4 2017. Cool Anomaly – 2017 La Nina mild autumn.

Firing date: November 15, 2017 at composite near minus 0.85. Context: La Nina phase produced mild autumn temperatures across Southern Plains feedlot regions. Feedlot margins expanded. Feeder cattle at approximately 155 dollars. Forward FC rallied through Q1 2018. Canonical Cool Anomaly bullish-FC anchor.

Case 3: Q3 2022. Heat Stress Firing – 2022 drought-plus-heat combination.

Firing date: July 15, 2022 at composite near plus 0.90. Context: Severe Southern Plains drought combined with heat wave. Feedlot margins compressed on both input (dry forage) and output (slowed gain) sides. Feeder cattle at approximately 180 dollars. Forward FC softened through Q4 2022 as the combined weather stress carried through. Modern-era Heat Stress anchor.

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How to use the signal today

As of November 1, 2026, the composite reads plus 0.737 – Heat Stress Firing extreme-positive, 102 trading days running. Southern Plains feedlot THI has been running sustained above the 5-year baseline since early June 2026. CME Feeder Cattle trades the 330 to 340 dollar range.

Historical Phase +1 per-day delivers minus 1.91 pp below baseline (47 percent hit rate). Modest bearish-FC lean. The signal has been firing bearish for 102 days – long enough that feedlot margin compression should be showing up in current feeder bidding.

Pair with four confirming reads for direction:

- **FC US Herd Inventory Signal**. Strongest-IC structural supply anchor.

- **FC Light Placement Pace Signal**. Grade A with widest spread.
- **FC Northern SNOTEL SWE Signal**. Water-supply cousin.
- **FC Cattle Crush Margin Signal**. Full three-leg feedlot margin.

Heat stress is a FEEDLOT MARGIN SIDE signal. When heat stress firing aligns with tight structural supply or quiet placements, direction is mixed. When heat stress firing aligns with wide supply or heavy placements, bearish-FC conviction is high.

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Methodology notes

Data source. FEEDLOT_THI_DAILY weather table, daily maximum temperature-humidity index (THI) for US_CATTLE_FEEDLOT_KS_NE and US_CATTLE_FEEDLOT_TX_PANHANDLE regions. Weather modeled from ERA5 reanalysis.

Signal construction. Composite = daily THI max averaged across KS+NE and TX Panhandle regions, smoothed with 60-day rolling mean to capture sustained heat-stress magnitude, z-scored on 5-year (1,260-day) rolling window with 252-day minimum sample, clipped to [−3, +3], tanh-bounded to [−1, +1]. State thresholds plus or minus 0.2 (moderate) and plus or minus 0.5 (extreme). Phase +1 at composite above +0.3, phase −1 below −0.3. Target: CME Feeder Cattle back-adjusted continuous (FC_110ARD). Daily release.

Validation statistics. Daily Spearman IC against FC fwd60d is minus 0.193 at p-value less than 1e-75 across 8,989 observations – strongly significant daily. Phase +1 (Heat Stress Firing) per-day mean fwd60d minus 0.70 percent (minus 1.91 pp below plus 1.20 percent baseline, hit 47 percent). Phase 0 (Normal) mean plus 1.65 percent (near baseline). Phase −1 (Cool Anomaly) per-day mean plus 3.05 percent (plus 1.84 pp above baseline, hit 62 percent). 3.75 pp directional spread.

Independence test. Non-overlapping (every-60d) sampling yields Spearman IC minus 0.190 at p-value 0.020 across 150 independent observations – INDEPENDENTLY SIGNIFICANT. Both IC tests agree in negative sign.

Per-day vs run-entry divergence. The live-page regime_table uses RUN-ENTRY sampling which produces OPPOSITE sign from per-day (Phase +1 run-entry approximately +2.40 percent, Phase −1 approximately −0.04 percent). Run-entry sampling catches inflection moments where sustained heat-stress firings tend to BEGIN alongside LC rallies that briefly carry feeder bidding, then accumulate bearish forward returns as margins compress through the run. The daily and non-overlap IC are the authoritative directional-edge measure.

Reformulation note. The prior engine used a boolean SEVERE indicator rolled 7 days then z-scored – an integer-step series with long zero stretches that inflated daily IC via serial correlation (non-overlap p=0.135 FAIL). The reformulation replaces the boolean indicator with continuous THI max, applies a 60-day rolling mean, and uses a 5-year z-window.

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What this signal does not cover

First, the signal covers only two US feedlot regions (KS+NE and TX Panhandle) due to data availability in the source table. A broader regional composite would strengthen confidence.

Second, THI stress-to-margin pass-through has long lags (biologically, cattle take 150-200 days to finish). The 60-day forward window captures part of the mechanism but longer horizons would show stronger effects.

Third, moderate correlation (rho=0.64) with the FC Northern SNOTEL SWE signal reflects shared summer-temperature regime drivers. Pair the two for different geographic coverage, not as independent signals.

Fourth, per-day vs run-entry sampling divergence. The regime_table on the live page shows OPPOSITE sign from the per-day IC-based narrative. Per-day IC is authoritative; run-entry reflects inflection-moment returns.

Broader caveat: Grade A directional heat-stress signal with independent-sample confirmation. The signal provides a tactical lean on FC positioning. Pair with structural supply, placement pace, water supply, and crush margin 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: FEEDLOT_THI_DAILY weather modeled from ERA5 reanalysis for KS+NE and TX Panhandle feedlot regions; CME Feeder Cattle back-adjusted continuous target. State-conditional statistics computed through 2026-10-30.