The Carcass Weight Signal, Read as Supply Pulled Forward

Why lighter year-over-year carcass weights flag tight live supply and constructive forward Lean Hogs, and the six-percentage-point tail-to-tail spread anchored on daily USDA packer-plant data.

David Stendahl · Market Lab Analytics · October 28, 2026

What this signal is

Every US packer plant with 100,000-head annual slaughter or above reports daily carcass weights to the USDA Agricultural Marketing Service under the Mandatory Price Reporting program. The daily average weight of barrow-and-gilt market hogs is the industry's most immediate operational read on supply tempo.

The signal reads this daily carcass weight series, computes year-over-year percent change over 252 trading days, z-scores the growth over roughly two years with 60-day minimum, inverts the sign, and bounds with tanh. A composite above plus 0.5 means carcass weights are running roughly two standard deviations LIGHTER year-over-year (supply pulled forward). A composite below minus 0.5 means they are running roughly two standard deviations HEAVIER (supply backed up).

Over the full 1990 to 2026 window joined through the Lean Hogs reference asset, the signal's Spearman information coefficient against forward-60-day Lean Hogs returns is plus 0.0540 at p = 3.02e-07 across 8,986 trading days. The Lighter-Weight tail (composite above plus 0.5), 872 state-days, delivered a mean forward-60-day Lean Hogs return of plus 3.84 percent, roughly 3.4 points above the plus 0.41 percent baseline. The Heavier-Weight tail (composite below minus 0.5), 961 state-days, delivered mean minus 2.28 percent, 2.7 points below baseline.

On June 26, 2020, as the COVID packer-shutdown backlog had cleared through May-June and the pipeline flushed at light weights, the composite entered the Lighter-Weight tail at plus 0.737 with Lean Hogs at 48.12 cents per pound. Over the next 60 trading days, Lean Hogs rallied 105.48 percent to 98.86. On January 19, 2021, as the structural supply tightening continued into Q1 2021 with carcass weights running light on herd contraction, the composite re-entered Lighter-Weight at plus 0.638 with Lean Hogs at 66.47. Over the next 60 trading days, Lean Hogs rallied 56.22 percent to 103.85. On January 13, 2020, as weights ran heavy at the pre-COVID cycle top, the composite entered Heavier-Weight at minus 0.541 with Lean Hogs at 65.90. Over the next 60 trading days, Lean Hogs fell 49.01 percent to 33.60 as the COVID demand shock hit a market already carrying heavy inventory.

Here is the twist. Carcass weights have structurally trended higher over the past decade at roughly 0.3 to 0.5 pounds per year on genetics gains and grow-barn efficiency. The year-over-year transform strips most of this trend but not all; a particularly strong genetics year can register as "lighter" in year-two of the gain. The z-score transform further normalizes, so the signal is robust to the trend, but readers should recognize that absolute-weight readings are moving targets.

This brief documents the signal's edge, the three signature cases, the state-conditional evidence, and the five caveats that mark the limits of the lens.

Read on.

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How the inputs compose

The USDA Agricultural Marketing Service's Daily Direct Hog Prior Day Slaughtered Swine Report (LM_HG201) publishes multiple price and weight statistics from packers covered under the Mandatory Price Reporting program. The signal reads the daily average carcass weight (`avg_carcass_weight` key_metric), filtered on `report_id='LM_HG201'`.

In the 2015-2026 era, the daily average carcass weight has run from 210 pounds (short-pull periods, strong packer demand pulling animals forward) to 230 pounds (backed-up periods, slower chain speeds forcing producers to hold animals longer). The series carries 8,562 daily observations starting January 2015 at the trading-day cadence.

The YoY transform (252 trading days) strips the strong seasonal pattern. Carcass weights peak in late winter / early spring (fewer heat-stress-affected animals, maximum growth efficiency) and trough in late summer (heat stress limits feed intake and growth). The year-over-year transform compares like-cadence periods.

The engine's directional inversion maps lighter weights to a positive composite: lighter weights year-over-year means supply pulled forward, which means tight supply forward through either packer bid strength (demand pull), capacity constraint on producers (forced to ship light), or herd-contraction confirmation.

Mechanistically, three channels link lighter weights to constructive forward Lean Hogs:

- Short-pull demand: packers paying up to pull animals forward, driven by strong cutout and tight live supply.
- Capacity-constrained producers: barn-turnover limits force light marketings, independent of packer bid.
- Herd-contraction confirmation: when sow numbers are falling, the finish-barn pipeline tightens and animals move faster through, reducing average weight.

Four confirming features run alongside: five-day velocity, 20-day over 252-day volatility regime, 63-day correlation with Lean Hogs returns, 63-day autocorrelation.

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Three cases that frame how to read this signal

Case 1: June 26, 2020. The COVID packer-shutdown aftermath Lighter-Weight entry.

Firing date: the composite entered the Lighter-Weight tail at plus 0.737 on June 26, 2020. Lean Hogs front-month close: 48.12 cents per pound. Forward 60-day return: plus 105.48 percent. Lean Hogs rallied to 98.86 by late August 2020.

Weights had crashed through May-June 2020 as the April packer-shutdown backlog cleared and the pipeline flushed through at light weights. Producers who had held animals through April and May as plants reduced capacity had to ship whatever would fit through the recovered chain speed. The resulting weight compression was a flush of back-stacked supply at light average weight.

Through July and August, the forward slaughter book tightened sharply as the flush completed and the breeding-herd contraction from mid-2020 began to tighten supply. Lean Hogs futures rallied to the biggest in-sample forward return. On-mechanism for the signal's rated edge.

Lesson: Lighter-Weight tail readings after a supply flush catch the forward tightening cleanly. The 2020 case is the single largest reward in the sample, though its magnitude reflects the structural post-COVID recovery regime more than typical cycle dynamics.

Case 2: January 19, 2021. The structural recovery continuation.

Firing date: the composite re-entered Lighter-Weight at plus 0.638 on January 19, 2021. Lean Hogs front-month close: 66.47. Forward 60-day return: plus 56.22 percent. Lean Hogs rallied to 103.85 by late March 2021.

By early 2021 the post-COVID supply pipeline was running tight on both herd contraction (mid-2020 margin stress) and sustained-light carcass weights (packers pulling animals forward on strong cutout). The Lighter-Weight re-entry at plus 0.638 confirmed the regime. Over the following 60 trading days, Q1 2021 cutout surged and futures tracked higher.

Lesson: when the Lighter-Weight signal confirms the Tight-Supply reading from the breeding-herd signal, the aggregate composite reads unambiguously constructive. The 2021 case is the cleanest multi-signal confirmation in the sample.

Case 3: January 13, 2020. The deepest Heavier-Weight entry at the pre-COVID cycle top.

Firing date: the composite entered Heavier-Weight at minus 0.541 on January 13, 2020. Lean Hogs front-month close: 65.90. Forward 60-day return: minus 49.01 percent. Lean Hogs fell to 33.60 by mid-March 2020.

The pre-COVID pork complex had rallied through late 2019 on China African Swine Fever export anticipation. Producers held animals longer on expectations of further bid strength. The Q1 2020 US-China Phase One trade deal priced in sustained export flow. By mid-January 2020, weights were running two standard deviations heavier than year-ago.

Through February and early March 2020, the US pork complex was blindsided by the COVID demand shock. The Heavier-Weight reading had correctly flagged "heavy weights at cycle top, vulnerable to any demand shock." The forward 60-day collapse was amplified by the already-loaded pipeline.

Lesson: Heavier-Weight tail readings catch the regime where producers have over-held animals on expected demand that may not materialize. The signal does not predict COVID-type shocks, but it flags the pipeline regime where any demand shock would hit hard. On-mechanism.

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What the state-conditional returns have actually done

The SPY forward-60-day return baseline (unconditional) is mean plus 2.31 percent, median plus 3.13 percent. Standard deviation 7.23 percent. Percent negative 29.8 percent. State-conditional means below are expressed as edges relative to this baseline.

> **Reference baseline (8,986 Lean Hogs trading days, 1990 to 2026)**
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> Lean Hogs forward-60-day return baseline (unconditional): mean plus 0.41 percent, median minus 0.03 percent. Standard deviation 11.81 percent. Percent negative 49.8 percent.

The Lighter-Weight state (composite above plus 0.5), 872 trading days, delivered mean plus 3.84 percent, median minus 0.67 percent. The mean is plus 3.43 percentage points above the baseline mean; the median sits essentially flat to baseline. The mean figure is skewed by heavy right-tail observations (COVID-era rebounds). Percent negative 51.7 percent, close to baseline. Readers should treat the mean-median gap as evidence that the tail-reward is concentrated in supply-dislocation recovery regimes rather than evenly distributed.

The MODERATE_POS state (composite plus 0.2 to plus 0.5), 253 trading days, delivered mean plus 1.84 percent, median minus 1.34 percent. The band sits mildly above baseline on the mean, below on the median.

The Baseline state (composite minus 0.2 to plus 0.2), 6,601 trading days, delivered mean 0.00 percent, median minus 0.08 percent. The band dominates the sample at 73 percent and sits essentially flat.

The MODERATE_NEG state (composite minus 0.5 to minus 0.2), 299 trading days, delivered mean plus 2.54 percent, median plus 2.38 percent. The band is weakly constructive, which is non-monotonic.

The Heavier-Weight state (composite below minus 0.5), 961 trading days, delivered mean minus 2.28 percent, median minus 4.42 percent. That is minus 2.69 percentage points below the baseline mean and minus 4.39 points below the median. Percent negative 58.8 percent, 9.0 points worse than baseline. The band's conditional read is clean on both mean and median.

> **State-conditional returns summary (Lean Hogs forward 60-day)**
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> Lighter-Weight, N=872, mean plus 3.84 percent (plus 3.43 pp above baseline, median flat). MODERATE_POS, N=253, mean plus 1.84 percent (plus 1.43 pp above baseline). Baseline, N=6,601, mean 0.00 percent (minus 0.41 pp below baseline). MODERATE_NEG, N=299, mean plus 2.54 percent (plus 2.13 pp above baseline). Heavier-Weight, N=961, mean minus 2.28 percent (minus 2.69 pp below baseline, median minus 4.39 pp below). Spearman IC rho equals plus 0.0540 at p equals 3.02e-07 across 8,986 trading days.

The 6.12 percentage point tail-to-tail spread on the mean is modest. The Heavier-Weight tail is the cleaner signal on both mean and median; the Lighter-Weight tail carries skew from supply-dislocation observations.

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How to use the signal today

The current composite reads minus 0.10 (Baseline). Carcass weights have been running approximately in line with year-ago through October 2026, with modest week-to-week volatility that has swung the composite back and forth across Baseline.

For a reader asking what the carcass weight signal is saying about the next two months: the signal is in neutral territory. Neither Lighter-Weight nor Heavier-Weight tail is firing. The forward sixty-day read is baseline-consistent, offering no directional edge.

Pair the current reading with the other Lean Hogs specialists. The breeding-herd signal (Z4734) sits in Moderately-abundant, suggesting modestly loose forward supply. The margin signals (Z3294, Z4762) sit near baseline with a slight lean toward margin pressure. The cutout signal (Z3481) reads Low-Cutout (saturated bullish-forward empirically). The composite picture is mixed: cutout-channel supportive forward, breeding-herd modestly bearish forward, carcass-weight neutral.

For sizing: the signal is a confirming reader for the breeding-herd and margin signals, not a stand-alone trade. When the composite enters the Lighter-Weight tail concurrent with the breeding-herd signal firing Tight-Supply, the aggregate conviction is strongest. When the composite reads Baseline (current state), no position change is driven by this signal alone.

Daily carcass weights print continuously; the next YoY update is tomorrow's release.

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Methodology notes

The signal's full-sample Spearman information coefficient against Lean Hogs 60-day forward returns is rho equals plus 0.0540 at p equals 3.02e-07 across 8,986 observable trading days. The in-estate carcass weight series carries 8,562 daily observations from January 2015 to October 2026.

Engine fix applied October 28, 2026: the signal-states lambda ordering was corrected so EXTREME_POS and EXTREME_NEG fire before MODERATE_POS and MODERATE_NEG when the composite enters the saturated tails.

The engine's directional declaration is INVERT, meaning the raw YoY z-score is sign-flipped so lighter weights read positively. The empirical IC of plus 0.054 confirms this directional read is correct.

The 504-day z-score window captures roughly two years of trailing weight history. The 60-day minimum population ensures the composite does not fire on insufficient history. The a 252-trading-day percent change YoY construction captures a trading-year of baseline comparison, stripping the strong seasonal pattern.

The mean-median gap at the Lighter-Weight tail (mean plus 3.84 percent, median minus 0.67 percent) reflects supply-dislocation observation skew. Readers who use the mean for sizing should

recognize that typical Lighter-Weight tail observations deliver near-baseline forward returns; the heavy right-tail observations (COVID-era rebounds) carry the mean. The Heavier-Weight tail reads more consistently across mean and median.

Three complete Lighter-Weight episodes anchor the constructive-tail calibration: June 2020 (forward 60-day plus 105.48 percent), January 2021 (plus 56.22 percent), October 2016 (plus 27.16 percent). Three Heavier-Weight episodes anchor the opposite tail: January 2020 (minus 49.01 percent), February 2022 (minus 29.35 percent), April 2019 (minus 23.00 percent).

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What this signal does not cover

Five caveats on the signal's reach.

First, carcass weights have structurally trended higher at roughly 0.3 to 0.5 pounds per year on genetics gains. The YoY transform strips most of this but not all. In years of particularly strong genetics gain, the signal can register "lighter" purely on year-two productivity gain, independent of supply tempo. Readers should recognize absolute-weight readings are moving targets.

Second, the mean-median gap at the Lighter-Weight tail should temper tail-reward expectations. The mean plus 3.84 percent is skewed by supply-dislocation observations; the median at minus 0.67 percent is near-baseline. Readers sizing against the mean should expect typical observations near the median.

Third, weight decisions are jointly driven by packer bid AND feed cost. When corn is cheap, producers hold longer to accumulate weight. When corn is expensive, they ship earlier. The signal does not distinguish between these drivers. Pair with the hog-to-corn ratio signal (not covered here) to separate.

Fourth, the signal confirms rather than leads. It reads live supply tempo, which packer-plant data already prices into cash cutout each day. The forward edge is in the cycle-regime confirmation, not in signal lead over cash markets.

Fifth, the in-estate data starts January 2015. Pre-2015 state readings in the parquet are mechanical forward-fill artifacts and should not be used.

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The carcass weight signal reads supply tempo at daily packer-plant cadence. The Lighter-Weight tail has delivered plus 3.43 percentage points above baseline forward-60-day on the mean (median flat); the Heavier-Weight tail has delivered minus 2.69 points below baseline on the mean and minus 4.39 points on the median. The mechanism is biological pipeline velocity: lighter weights means supply pulled forward, means forward tightening.

The current reading sits in Baseline. No directional edge from this signal today.

End of brief. Full disclaimer and methodology at davidstendahl.com/disclaimer. Not investment advice.