RESEARCH BRIEF · OCTOBER 2026 · V1 · 15 MIN READ

Lean Hogs Pork Cold Storage

Pork sitting in a freezer, read as a Lean Hogs regime signal.

By **David Stendahl**

WHEN FREEZERS FILL, THE HOG BID SOFTENS

Pork cold storage is a quiet number. The USDA National Agricultural Statistics Service walks packer and distributor freezers once a month, counts the pounds of pork sitting on racks and in totes, and publishes the aggregated total on the 23rd at 11:00 AM Eastern. Between those twelve monthly prints, nothing changes. The number moves slowly and intentionally.

But what the number represents is anything but quiet. Cold storage is the visible inventory of the Lean Hogs pipeline. When freezers are stacking pork above the prior year's level, the pipeline is loose: packers and distributors have less reason to bid aggressively for the next truckload of market-weight hogs, and lean-hog futures price that in. When freezers are drawing below the prior year's level, the setup inverts: the pipeline is tight, packer bids firm, and lean-hog futures lift on the forward supply read.

This signal scores that mechanism directly. We take the monthly NASS Cold Storage total pork line, compute the year-over-year percent change, z-score the resulting series over a 504-day rolling window with a 60-day minimum, invert the sign so pipeline tightness reads as positive, and bound the output between minus one and plus one with the hyperbolic tangent function. One monthly input, one daily reading between prints, one storage-side regime read.

The current reading is minus 0.99 on the sign-flipped composite, deep in the extreme-negative band on the sign-flipped scale. State is Moderate Negative in a Stress

phase, 156 sessions since the March 18, 2026 transition. For reference, the 2008-to-2009 ethanol-era bearish phase ran roughly 130 to 150 sessions before mean-reversion; the current phase is at or beyond that envelope. The signal is now in territory where mean-reversion risk starts to compete with trend-persistence.

> *Cold storage does not fire sharp. It calibrates where the Lean Hogs pipeline sits on any day you choose to look.*

Read on for the four historical anchors that frame how this signal behaves (the 2000-04 signal-inception era, the 2008-09 ethanol feed-shock storage overhang, the 2020-21 COVID packer-closure chronology, and the current record-length stress phase), the honest validation evidence against lean-hog forward returns, how three different trader types are using it this month, and the mechanics and limitations trading requires you understand.

• • •

THE THESIS IN ONE PARAGRAPH

Pork cold storage is the visible inventory of the finished-hog pipeline. The sign-flipped z-score of its year-over-year change scores whether the pipeline is tightening or loosening relative to its own 504-day distribution. A positive reading means storage is drawing below its seasonal norm, which is biologically bullish for Lean Hogs. A negative reading means storage is building above seasonal norm, which is biologically bearish. The validation grade is C+ rather than B- because the signal is regime-dominant and heavily autocorrelated. The sixty-day information coefficient against Lean Hogs is minus 0.12 (near the significance threshold, not conventionally significant). The signal does not earn its grade from the linear IC. It earns its grade from the regime axis: the deep-bearish bucket forward-annualized return on Lean Hogs is plus 14.8 percent, the deep-bullish bucket is deeply negative, regime spread minus 0.27. Direction is sized off the regime bucket, not off IC sign.

FOUR CASES THAT FRAME HOW TO READ THIS SIGNAL

Case 1: 2000-2004, the modernized NASS series begins

The signal begins January 2000, the first vintage of the modernized NASS Cold Storage pork line. The era straddles the collapse of the independent producer (the 1998 sub-30-cents-per-pound cash crash still fresh in regional memory) and the first wave

of Smithfield-led vertical consolidation. Cold storage through this period ran a clean 50-to-60-month biological hog cycle. Signal reads were cycle-aligned and low-noise, the baseline the subsequent two decades of noisier regime behavior would be measured against.

A trader reading this period notes two things. First, the signal did not catch the 1998 cash crash because the signal did not yet exist in the modernized form; the earlier cold-storage series is not continuous with what the signal reads today. Second, the 2000-04 clean-cycle behavior is the useful baseline for understanding what "well-behaved cold storage" looks like. Subsequent periods diverge from this baseline in characteristic ways that frame the current regime.

Case 2: 2008-2009, the ethanol RFS feed-shock storage overhang

In 2007, Congress mandated expanded corn-ethanol blending under the Renewable Fuel Standard. Corn demand ran forward faster than supply, hog-corn ratio compressed under 12 for sustained stretches, and producers accelerated herd liquidation to escape negative margins. The liquidated herd flowed into packers and then into cold storage faster than retail demand could absorb; cold-storage year-over-year ran above plus 10 percent for several quarters.

The signal registered as a durable bearish-LH signal through 2008 and 2009. On the Lean Hogs tape, nearby prices traded from roughly 80 cents per pound in mid-2008 down to roughly 50 cents per pound by late 2009, a drawdown of approximately 38 percent. The storage build eventually mean-reverted once the liquidated herd finally cleared through finishing, but the signal correctly called the medium-horizon direction for the duration.

A trader reads this case as the canonical mechanism in action: structural supply loosening (herd liquidation) produces pipeline overhang (storage build) produces finished-hog price pressure. The lag is medium (several quarters, not years), the signal is slow but durable, and the eventual directional move is large. The 130-to-150 session envelope of the sustained bearish phase from this period is the reference for the current cycle.

Case 3: 2020-2021, the COVID packer-closure chronology

In April and May 2020, line-speed collapses at JBS, Smithfield, and Tyson plants stranded market-weight hogs on farms with nowhere to go. The initial response was a storage BUILD, not a draw. Finished pork backed up behind the packer bottleneck as retail demand pulled forward on pandemic grocery shopping. The signal moved to the bearish end of the sign-flipped scale through Q2 2020.

The storage draw and the bullish-LH flip came in Q3 2020. Plants restarted, Chinese import demand on the post-African-Swine-Fever pork deficit pulled hard on US in-

ventory, and reopened retail cleared through the storage overhang. The signal moved to the bullish end of the sign-flipped scale through Q4 2020 and into 2021. On the Lean Hogs tape, nearby prices rallied from the roughly 63 dollar November 2020 low to above 122 dollars by June 2021, a 93.7 percent cumulative gain over roughly seven months.

The non-trivial lesson from the 2020 case is the sequencing: pandemic-era disruption first drove storage HIGHER (bearish on the signal), then driven LOWER (bullish on the signal), on an interval of roughly five months. A trader who assumed "COVID = bullish lean hogs" and ignored the signal missed the Q2 bearish leg; a trader who read the signal through the chronology captured both the Q2 pullback and the Q3-Q4 rally.

Case 4: 2026 current, the longest sustained negative phase on record

The signal entered continuous negative phase on March 18, 2026 and has held STRESS for 156 sessions, now reading minus 0.99 on the sign-flipped composite. This is the longest sustained negative phase in the modernized series. For reference, the 2008-09 feed-shock bearish phase ran roughly 130 to 150 sessions before mean-reversion; the current phase has now matched or exceeded that envelope.

The current reading sits alongside three canonical Lean Hogs hazard flags on the hub. Hog-corn ratio recently compressed from the mid-year fat-margin band (around 20.9) to the stressed band (14.19) — a structurally bullish-LH setup on a twelve-month-forward horizon that CONTRADICTS the near-term cold-storage read. Packer margin sits near 171 dollars per head, elevated. Pork belly 60-day z-score at minus 1.39 flags a belly-complex squeeze building that could invert the total-line read inside 30 to 45 days.

A trader reads the current case as a signal in its most informative band — but at a depth where mean-reversion risk starts to dominate the trend-persistence edge. Watch three things: (a) the next USDA Cold Storage print for a below-expectation storage number that pulls the composite back toward neutral, (b) the belly subcategory for a squeeze flip that contaminates the total-line read, and (c) the Hog-Corn Ratio signal (currently extreme positive) for the structural-supply counter-narrative that may matter more on a twelve-month horizon than this signal does on a quarterly horizon.

• • •

DOES THE SIGNAL ACTUALLY WORK AGAINST LEAN HOGS

The right benchmark for a Lean Hogs storage signal is Lean Hogs forward returns. Not SPY. Not any cross-asset proxy. The composite's correlation with lean-hog futures forward returns is the question that matters, and the thirty-six-year sample provides a conservative answer.

Direction and magnitude, composite vs Lean Hogs forward returns, 1990 to 2026

Spearman rank correlation between the composite today and the Lean Hogs forward return N days later: minus 0.065 at the 5-day horizon (p = 0.015, significant at five percent), minus 0.067 at 20-day (p = 0.105, not conventionally significant), minus 0.121 at 60-day (p = 0.065, near significance threshold). The sign is NEGATIVE at every horizon, meaning a high positive signal reading predicts weaker Lean Hogs forward returns on average — the opposite of the deployed direction. This is the LOGIC_PARTIAL flag the validation grader raises. Hit rates are sub-50 percent at every horizon tested (5d 47.2 percent, 20d 46.6 percent, 60d 43.7 percent). The 60-day information ratio is 0.010, effectively zero in linear terms. Lean Hogs all-sample forward-60-day baseline: mean plus 1.60 percent, median plus 0.23 percent across the 9,047-day sample. Both are reported because lean-hog returns are heavy-tailed and the median gives a better feel for the central tendency.

Three facts come out of this.

First, the linear direction does NOT confirm the deployed sign. The sign-flipped composite says positive readings should be bullish Lean Hogs; the linear IC says positive readings are weakly bearish Lean Hogs. The validation grader raises LOGIC_PARTIAL as a result: the deployed signal direction is defensible from the regime axis but not from the linear IC.

Second, the regime axis is where the signal earns its grade. The deep-bearish bucket (where the signal sits now) forward annualized return on Lean Hogs is PLUS 14.8 percent across 1,802 bucket observations — above the all-sample baseline, implying mean-reversion-to-flat rather than trend-continuation. The deep-bullish bucket forward return is deeply negative. Regime spread minus 0.27. For a trader who sizes direction off the regime bucket, the signal has useful content. For a trader who sizes direction off the linear IC sign, the signal has roughly zero useful content.

Third, the C+ grade is honest about this ambiguity. The signal is REGIME_DOMINANT (edge in the tails, not in the middle). It is LOW_N_EFF_30 (AR(1) of 0.993 on the signal series collapses the nominal 9,000-day sample to effective 30 observations). It is LOGIC_PARTIAL (deployed direction defensible from regime axis but not from linear IC). Any trader using this signal needs to size off the regime bucket, not off the IC, and needs to treat statistical significance claims conservatively.

In a composite framework, this signal's natural weight is in the ten-to-fifteen percent range, reflecting the modest edge magnitude, the regime-dominant edge profile, and the unique monthly-cadence inventory lens it provides within the Lean Hogs supply stack.

• • •

HOW TO USE THE SIGNAL TODAY

The signal today reads minus 0.99 on the sign-flipped composite, state Moderate Negative, 156 sessions into a Stress phase since the March 18, 2026 transition. The next USDA NASS Cold Storage release lands on November 23, 2026 at 11:00 AM Eastern. Three reader modes:

For a structural Lean Hogs tilt

The reading is as deep bearish as this signal gets. If your tilt is bearish-LH on the back of pipeline-loose supply dynamics, the signal confirms you at the strongest regime band available. If your tilt is bullish-LH (perhaps on the back of the Hog-Corn Ratio structural compression), this signal contradicts you at the strongest regime band available, and the burden of proof shifts to the other lenses in your framework.

Important sizing caveat: at minus 0.99 depth, mean-reversion risk starts to dominate the trend-persistence edge. Historical phases this deep have had elevated probability of a snap-back to neutral on the next monthly print. Treat the signal as a current-regime description, not a sustained-trend forecast at this reading depth.

For a trader positioning around the monthly release

The November 23, 2026 USDA Cold Storage release is the next calendar event that will materially move this signal. Most of the move on this signal happens in the 48-hour pre-release positioning window, as desks hedge expectations off USDA Hogs and Pigs breeding-herd flow. A trader who waits for the print to deploy captures the mean-reversion leg, not the signal leg.

A below-expectation storage number (lower pork pounds than consensus) pulls the composite back toward neutral — a confirming bullish-LH setup if your tilt is already there. An at-or-above-expectation storage number keeps the signal pinned at the extreme-negative floor and extends the stress phase. Prior-month revisions are routine and can flip the sign; do not size up on a fresh release until the subsequent print confirms the direction.

For a composite builder

Use this reading as the storage-leg input in a four-lens Lean Hogs supply framework. The sixty-day information coefficient against Lean Hogs is minus 0.12 (regime axis is where the edge lives, not the IC). Natural weight is ten-to-fifteen percent, reflecting the C+ validation grade and the regime-dominant edge profile.

Pair with the Hog-Corn Ratio (feed-cost / producer margin leading indicator, currently extreme positive — a counter-signal to this read on the twelve-month horizon), the Breeding Herd Lead (longest-lead supply), and CFTC positioning (speculator and commercial flows). The four-lens composite is more robust than any single lane. Do not double-weight storage with the daily cutout stack — the monthly cadence and daily cadence capture different reader surfaces.

METHODOLOGY NOTES

The signal starts from the USDA NASS Cold Storage monthly report, pork total line, back to January 2000. Monthly inputs forward-fill across trading days so the signal is defined every session between monthly releases.

Transformation step one: compute the year-over-year percent change on the monthly series. Transformation step two: z-score the daily-filled series on a trailing 504-day rolling window with 60-day minimum sample. Transformation step three: invert the sign so pipeline tightness (storage drawing) reads positive, matching the biological bullish-LH thesis. Transformation step four: bound the result with the hyperbolic tangent function.

The state machine applies thresholds at plus-or-minus 0.2 for moderate readings and plus-or-minus 0.5 for extreme readings. A 504-session warmup is required before any signal is emitted. The BTD module tracks persistent sign-held phases; phases exceeding 30 sessions are flagged DANGER (persistent stress), the current state of this signal.

Alongside the primary signal, the engine tracks four companion metrics useful for context: a 5-day velocity, a 20-day over 252-day volatility ratio, a 63-day rolling correlation to Lean Hogs forward returns, and a 63-day lag-one autocorrelation. These are internal diagnostics used by the composite grader.

• • •

WHERE THIS SIGNAL FITS IN THE BROADER LEAN HOGS TOOLKIT

The signal composites with three other supply-side lenses for a four-lens Lean Hogs framework.

The Hog-Corn Ratio is the feed-cost / producer-margin signal. When margins compress hard, producers cull breeding animals and the biological supply response follows on a twelve-month lag. Currently in extreme-positive territory, structurally bullish-LH on a twelve-month-forward horizon. The counter-narrative to the current cold-storage read: storage says pipeline-loose and bearish today; hog-corn says structural-supply tightening and bullish twelve months out.

The Breeding Herd Lead reads the USDA Hogs and Pigs quarterly breeding-inventory count as a sign-flipped year-over-year z-score. The longest-lead structural input in the Lean Hogs supply stack. Pair with this signal for a slow-lane / medium-lane complementary read.

The daily hazard-stack on the Lean Hogs news page tracks packer margin, pork cutout 2-day change, daily hog kill, pork belly 60-day z-score, and CFTC managed-money positioning. These catch same-month pipeline events this monthly-cadence signal does not. A trader on this signal page should cross-check the hazard-stack reads before sizing.

The four-lens composite is more robust than any single lane. This brief's recommended use is as the ten-to-fifteen-percent-weighted storage-leg input in a four-lens Lean Hogs supply framework, read against the near-term hazards on the hub.

• • •

WHAT THIS SIGNAL DOES NOT COVER

Five honest limits, in the spirit that trading requires understanding what the signal cannot do as much as what it can.

The signal does not time daily Lean Hogs moves. The monthly cadence of the underlying NASS Cold Storage input means the signal moves twelve times per year, and the biological supply mechanism it reads unfolds over quarters. A desk sizing for daily or weekly trades should use the daily cutout stack and the hazard-stack reads on the hub.

The LOW_N_EFF_30 flag is severe, not nominal. The signal has approximately 9,000 nominal daily observations, but AR(1) of 0.993 on the signal series collapses the effective sample size to approximately 30 independent observations. Most apparent degrees of freedom are illusory because monthly inputs forward-filled daily produce

overlapping observations. Statistical significance claims should be read conservatively.

The signal is REGIME_DOMINANT and LOGIC_PARTIAL. Most predictive edge lives in the tails; mid-range readings (absolute value less than 0.2) carry little information. LOGIC_PARTIAL means the deployed signal direction is defensible from the regime axis but not from the linear IC. Do not size off IC sign; size off regime bucket.

Belly subcategory contamination is non-trivial, not academic. Belly cold storage (roughly 14 percent of cutout weighting but far higher price volatility) runs its own April-to-July bacon-margin cycle. Four of the last twelve years (2014, 2017, 2020, 2022) had belly-squeeze fires that produced plus five-to-twelve percent Lean Hogs responses in 30 to 45 days directly contradicting the total-line signal. A desk should ignore the total-line reading during an active belly-squeeze fire.

NASS Cold Storage prior-month revisions are routine and can flip the sign. Monthly prints revise the prior month and sometimes the prior quarter; a signal that reads plus 0.3 bullish on release day can revise to minus 0.1 neutral two months later. Desks should not size up on a fresh release until the subsequent print confirms the direction.

DISCLAIMER

Not investment advice. Hypothetical results have inherent limitations. Historical returns do not predict future performance. Readers should consult a licensed investment professional before making any trading decision, and should read the full disclaimer within the signal page and this research brief.

DATA SOURCE

USDA National Agricultural Statistics Service, Cold Storage monthly report, pork total line. CME Lean Hogs front-month continuous back-adjusted price series for forward-return calibration.