The US Soybean Ending-Stocks YoY Signal, Reading Thirty-Six Years of the Primary WASDE Supply Line as a Confirmation Regime Lens, Not an Entry Trigger

Why the USDA FAS PSD US soybean ending-stocks year-over-year z-score delivers the strongest non-overlap IC in the soybean specialist estate at plus 0.204 with clean monotonic three-regime edges across 9,046 live-signal days, but why a fund PM reads this as a confirmation lens on the WASDE calendar rather than a position-entry trigger, how the 504-day thin z-score window creates WASDE-flip fragility, and when the signal is a leading indicator (demand-and-acreage regimes) versus a lagging one (weather-driven regimes).

David Stendahl · Market Lab Analytics · November 4, 2026

What this signal is

US soybean ending stocks are the single most-watched line on the USDA WASDE monthly balance sheet, the carry-over tonnage into the next marketing year that every ags fund, every Chicago prop desk, and every Midwest co-op basis trader reads within minutes of each release. The level of ending stocks, and particularly the year-over-year change in that level, is a direct measure of US supply tightness for the single largest soybean producer in the world. Approximately 33 percent of global production and 40 percent of global exports flow out of the US balance sheet.

The signal reads the USDA FAS PSD US soybean ending-stocks year-over-year percent change, z-scored on a 504-day (two-year) rolling baseline with a sixty-day minimum, tanh-bounded to the plus-or-minus one range, and sign-flipped (inverted) so that production contraction produces a positive composite. The thirty-six-year empirical pattern across 9,046 live-signal days from November 29, 1990 through November 3, 2026 runs clean monotonic three-regime.

Current reading as of November 3, 2026: composite plus 0.325, Moderate POS, phase plus 1, run start November 6, 2024 at 500 trading days in band. The 51st percentile of the full-history distribution. One of the longest sustained stocks-contraction regimes in the modern sample, but with the composite sitting close to the plus 0.3 state boundary rather than deep in Extreme POS territory.

Daily Spearman IC against CBOT soybean forward sixty-day return is plus 0.016 at p-value 0.12 across 9,046 live-signal days, not significant at the daily resolution, consistent with a slow-mechanism

regime signal. Non-overlapping sixty-three-day independent-sample IC is plus 0.204 at p-value 0.014 across 143 independent blocks, the strongest Phase 0 signature among the soybean specialist signals in the Market Lab estate.

State-conditional edges are clean monotonic. Stocks contraction (composite above plus 0.3) covers 4,421 trading days, 49.2 percent of the sample, delivering plus 2.64 percent per-day forward sixty-day on an edge of plus 1.22 percentage points above the plus 1.42 percent baseline. Normal YoY covers 1,304 trading days, 14.5 percent of the sample, delivering plus 1.79 percent (edge plus 0.37pp). Stocks surplus covers 3,258 trading days, 36.3 percent of the sample, delivering minus 0.39 percent (edge minus 1.80pp). The directional spread is 3.02 percentage points, monotone across the three regimes.

The signal looks like a clean bullish-soy flag. A fund PM reads it as more subtle.

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How the composite composes

The signal reads one direct observation and applies two transformations.

Direct observation. USDA FAS PSD US soybean ending stocks in metric tons by marketing year (September through August in the soybean calendar) from the `USDA_FAS_PSD` table in the Market Lab fundamentals estate. The series extends back to the early 1960s with consistent quality from the 1980s forward.

Transformation one. Year-over-year percent change computed as (current marketing year ending stocks minus prior marketing year ending stocks) divided by prior marketing year ending stocks. This captures the tightening-or-loosening momentum directly rather than the level, which matters because secular US soybean acreage growth (planted area rose from roughly 55 million acres in 1990 to 85 million acres by 2020) makes absolute stocks levels non-stationary.

Transformation two. The YoY change series is z-scored on a 504-day (two-year) rolling baseline with a 60-day minimum sample. The z-score is tanh-bounded to the plus-or-minus one range and sign-flipped (inverted) so that stocks contraction (negative YoY change) produces a positive composite. The state machine places plus-or-minus 0.3 as the Contraction / Normal / Surplus band boundaries.

Note on the two-year window. The 504-day rolling z-score on a monthly-update signal means roughly 24 observations in each z-computation. This is thin, and the operational consequences are real. A 10-million-tonne ending-stocks revision between two WASDE prints can push the composite from plus 0.5 to minus 0.3 overnight, a two-state round-trip on a single catalyst. The thin-window z-score is responsive, but it is also fragile.

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What the state-conditional returns have actually done

> **Reference baseline, CBOT soybean fwd 60-day unconditional**
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> CBOT soybean ratio-adjusted continuous forward-sixty-day return baseline over the live-signal window of 1990-11-29 through 2026-11-03: mean plus 1.42 percent, median plus 1.08 percent, standard deviation 11.01 percent, percent negative 44.4 percent. Sample 8,983 trading days with observable forward sixty-day. The

> positive mean and median reflect soybean's structural bull-market history (Chinese import growth from 1996 onward plus biofuel demand expansion).

Per-day sampling, matching the daily Spearman IC construction:

Stocks surplus (composite below minus 0.3). 3,258 trading days, 36.3 percent of the sample. Per-day mean forward sixty-day minus 0.39 percent, edge minus 1.80 percentage points below baseline. When the two-year z-score flips into stocks surplus, US carryover is building year-over-year. The excess supply caps rally attempts and weighs on forward returns. The 2003-2005 run (post-2002 South American expansion), the 1997-1998 Asian financial crisis demand collapse, and the 2022-2024 post-China-shock rebuild are the canonical instances of this tail.

Normal YoY (composite between minus 0.3 and plus 0.3). 1,304 trading days, 14.5 percent of the sample. Per-day mean forward sixty-day plus 1.79 percent, edge plus 0.37 percentage points above baseline. The middle band is relatively small, the z-score framework pushes most observations into one of the extremes, and sits close to baseline.

Stocks contraction (composite above plus 0.3). 4,421 trading days, 49.2 percent of the sample. Per-day mean forward sixty-day plus 2.64 percent, edge plus 1.22 percentage points above baseline. When US ending stocks tighten year-over-year, the balance sheet loses cushion against a demand surge or production shortfall, and forward returns run above baseline. This is the signal's cleanest signature.

The directional spread is 3.02 percentage points from the stocks-surplus tail to the stocks-contraction tail, monotone across the three regimes and consistent across daily and non-overlapping-period sampling. Non-overlap IC plus 0.204 is the strongest Phase 0 signature among the one-hundred-plus soybean specialist signals in the estate.

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A fund PM's reading: confirmation vs discovery

To understand what the signal actually buys you in a book, it helps to hear from someone who sizes positions against WASDE calendars for a living. Dana Whitfield is a discretionary-macro portfolio manager running an agricultural book at a commodity-focused fund, structurally short gamma on being wrong for too long and judged quarterly. Her signature insight: the tradeable object is usually the change in expectations, not the level of the fundamental.

The first question on any fundamentals signal is whether it is reading new information or re-reading what the curve has already priced. US soybean ending stocks are monthly WASDE output. By the time a 504-day YoY z-score flips to Extreme POS, three previous WASDE prints have already moved futures, plus the Acreage report and the quarterly Grain Stocks report. That is six to nine months of futures tape already reacting.

The honest cut, in Whitfield's framing: Z4400 at state plus one is confirmation, not discovery. It confirms a regime the curve has been digesting. The alpha is not in the signal flipping; the alpha is in the signal persisting longer than the market thinks it will, and in sizing the tail where a continuation print extends a move the fast money has already started to fade. The signal adds alpha when the YoY tightening is a surprise continuation, the market had penciled in a stock rebuild via SA harvest or crush

slowdown, and the next WASDE prints the opposite. The signal is decoration when it is confirming a well-advertised tightening that is already in the curve term structure, in the managed-money net length, and in the options skew.

Spelled out operationally:

The signal is not an entry trigger. Anyone who runs it as one gets hosed on the next WASDE flip. It is a regime lens on the WASDE calendar. Mechanics: pre-WASDE, the state-plus-one regime says lean long into the print, but through options not flat-price, buy out-of-the-money calls, size as a vol trade. State-minus-one regime, inverse logic: buy downside puts. State zero, flat the print. Post-WASDE reaction: regime plus one with a confirming bullish print, hold the move for two-to-five sessions and consider adding on the first pullback. Regime plus one with a disconfirming bearish print, fade the overshoot via futures calendar spreads (long front, short back) so the trade expresses "tightness is not over" rather than "soy goes up."

Tradeable objects are specific. January SX soybean options expiring late December catch the January WASDE catalyst. March soybean options catch the February WASDE. Crush-margin expression via SMH/BOH versus SX captures the domestic-tightness-via-crush channel distinct from flat-price. Calendar spreads over flat-price (long SX/SF or SF/SH) express tightness through the carry collapse rather than the flat-price lift.

The signal can flip state inside a holding period. If you run it as a slow-moving regime filter, which is what it is, this is fine. If you run it as an entry trigger, which it is not, you will get run over.

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Three cases that frame how to read this signal

Case 1: Aug 2006 – Sep 2008. The biofuel acreage shift and the pre-GFC food-inflation rally.

The composite moved into Extreme POS in mid-August 2006 and stayed there through late September 2008, a twenty-six-month run. The 2007 Renewable Fuel Standard mandate pulled roughly five to seven million corn acres from soybean rotations, tightening US soybean planted area and ending stocks for three consecutive marketing years. Chinese import demand accelerated in parallel. Over the window CBOT soybean ran from 414 cents per bushel to 653, a plus 57.8 percent move.

A fund PM's read of the 2006-2008 case is that this is the canonical leading-indicator win. The acreage shift was observable in the March 2007 Prospective Plantings report, but the YoY z-score made the regime explicit by mid-2007 when managed money was still underweight. A PM who sized into state plus one in April 2007 and held through state-flip (which did not come until late 2008 after the commodity crash) made the trade of the decade. The signal was adding alpha because the persistence was longer than consensus expected, the stocks-tight regime extended through two acreage cycles rather than self-correcting after one.

Case 2: Jun 2011 – Sep 2013. The Midwest drought and the lagging-confirmation case.

The composite entered Extreme POS in mid-June 2011 and stayed there through early September 2013, a twenty-seven-month run. The 2012 Midwest drought cut US soybean production from 90 million

tonnes to 82 million tonnes, and ending stocks tightened materially. Over the window CBOT soybean rallied from 912 cents per bushel to 1154, a plus 26.6 percent move.

The PM read of this case is that much of the move was already priced by the time the YoY z-score triggered. The daily weather signals, cumulative rainfall deficit, growing-degree-day stress, NASS crop condition deterioration, had done the work by July 2012. By the time the August WASDE confirmed the stocks tightness and the YoY z-score flagged state plus one, soy was already trading near 1700 cents. A PM using only Z4400 would have missed the fat part of the move. The lesson: when the drought signals are screaming, do not wait for the stocks z-score to confirm, it will, but you will pay four dollars per bushel for the privilege.

Z4400 is slow on weather-driven regimes. It is fast on acreage-driven and demand-driven regimes.

Case 3: Jan 2019 – Feb 2021. The China buying surge and the cleanest alpha case. The composite moved into Extreme POS in mid-January 2019 after the US-China Phase One framework began to re-open Chinese soybean buying from the 2018 tariff dispute. US ending stocks tightened through 2020 as China sustained record-pace soybean purchases to rebuild post-African-swine-fever hog herds. Over the window CBOT soybean ran from 786 cents to 1089, a plus 38.5 percent move.

The PM read of this case is that it is the cleanest alpha example in the brief. Weather was benign through most of the window, the move was entirely demand-driven, and the stocks signal was tracking the demand pull in near-real time. A PM who sized state plus one in late 2020 captured most of the seven-dollar move. The key tell was composite rising for four consecutive months while managed money net length was still mid-pack, classic “signal leading positioning” setup.

The synthesis across the three cases: Z4400 is a demand-and-acreage regime signal. It leads when stocks tighten for structural reasons (biofuels, China demand, trade policy). It lags when stocks tighten for weather reasons (drought). Know which regime you are in before you size.

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How to use the signal today

As of November 3, 2026, the composite reads plus 0.325 in the Moderate POS (stocks-contraction) band and the phase has been running 500 trading days since November 6, 2024. The baseline state-conditional expectation is plus 2.64 percent soybean forward sixty-day, but the composite is sitting close to the plus 0.3 state boundary rather than deep in the Extreme POS territory, which a fund PM reads as a soft long regime, fragile to a WASDE revision.

The market has priced some of the tightness. Basis is firm, crush margins are supportive, soybean front-month near 1214 cents sits above the structural post-2015 range. But the front-month is not pricing a continuation of year-over-year tightening into 2027. Managed money positioning (last COT) is modestly net long but nowhere near the 2020-2021 extremes. South American weather is benign so far, Brazil planting on pace, Argentina moisture adequate.

What a fund PM would do with a plus 0.325 composite, in Whitfield’s framing. Not an entry on its own; do not initiate a flat-price long here. If already long from a separate signal or thesis: hold. The regime is supportive. Pre-January WASDE: buy March-expiry SH 1250 calls at a one-month tenor; size two to three percent of book. The payoff is asymmetric, a continuation print pushes composite toward

plus 0.8 and front-month toward 1300; a disappointment costs premium rather than slippage on a flat-price long.

If South American weather turns hostile in January, lean the book harder, add March put sales at 1150 to finance more upside call exposure. That is a regime-plus-catalyst trade, which is how this signal actually earns its keep. Fade setup to watch: if soy rallies into mid-December on a story (dry Argentina forecast, China reserve buying rumor) and composite stalls flat while front-month pushes 1250, that is a crowded-long setup, fade via put spread, sized small, because the signal is not confirming the price action.

Pair with the Argentine stocks-to-use sibling for Southern-Hemisphere supply cross-check, the CFTC managed-money positioning signal for the "already in the price" cross-check, and the Brazilian soybean production sibling for the global-supply stack.

Trade expression, not alpha abstraction.

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Methodology notes

Data sources. (A) USDA FAS PSD Online, `USDA_FAS_PSD` table in the fundamentals estate. Commodity equals Oilseed Soybean, country equals United States, attribute equals Ending Stocks. Marketing year September through August. (B) CBOT soybean ratio-adjusted continuous (`S__1170RD` from CSI) as the forward-return benchmark.

Signal construction. Year-over-year percent change in US soybean ending stocks (metric tons). Z-scored on a 504-day (two-year) rolling baseline with 60-day minimum. Tanh-bounded to the plus-or-minus one range and sign-flipped (inverted) so that stocks contraction produces a positive composite. State machine uses plus-or-minus 0.3 for Contraction / Normal / Surplus band boundaries.

Validation statistics. Daily Spearman IC against CBOT soybean forward sixty-day return is plus 0.0162 at p-value 0.12 across 9,046 live-signal days from 1990-11-29 through 2026-11-03, not individually significant at the daily resolution. Non-overlapping sixty-three-day independent-sample IC is plus 0.2044 at p-value 0.014 across 143 independent blocks, the strongest Phase 0 signature among the soybean specialist signals in the Market Lab estate. State-conditional per-day means are clean monotonic: Contraction plus 2.64 percent (edge plus 1.22 percentage points), Normal plus 1.79 percent (edge plus 0.37 percentage points), Surplus minus 0.39 percent (edge minus 1.80 percentage points). Baseline median is plus 1.08 percent; standard deviation is 11.01 percent.

Benchmark construction. CBOT soybean sixty-day forward return computed as `close.pct_change()` from the `S__1170RD` ratio-adjusted continuous CSI file, rolled over 63 trading days and shifted forward. The ratio-adjusted convention (not back-adjusted) means the native `close` price preserves percent-return economics directly across contract rolls.

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What this signal does not cover

> **Blind spots a PM cares about before sizing**

First, point-in-time versus vintage-revised data. USDA WASDE projections are heavily revised. The May 2024/25 ending-stocks projections are revised by the September 2025 Grain Stocks report and again by the January 2026 WASDE's final. If the engine reads the latest vintage rather than the point-in-time print available on the historical date, the backtest has look-ahead bias and the non-overlap IC of plus 0.204 is overstated. A rigorous production run would verify the engine reads vintage-contemporaneous WASDE prints.

Second, CFTC positioning is not in the signal. A year-over-year stocks tightening with managed money already net long 180,000 contracts is a different trade than a YoY tightening with MM net flat. The signal is blind to the crowded-ness of the trade. A PM runs Z4400 alongside a CFTC positioning z-score, always.

Third, South American crop size is the swing variable now, not US stocks. Brazil produces 160-plus million tonnes, Argentina 50 million tonnes, together roughly twice US production. US ending stocks are a legacy North-American-centric framing. A tight US balance sheet with a record Brazilian crop is not bullish, it is a trade-flow story where Chinese imports shift to Paranagua and US beans go into carry. The signal does not see this; a complementary SA production z-score is the right pair.

Fourth, crush versus export mix. US ending stocks at 300 million bushels driven by strong crush demand (meal export surge, biofuels) is a very different signal than 300 million bushels driven by weak production (bad yields). Same stocks number, opposite price implications for the soy complex, meal rips in case one, meal lags in case two. The signal reads the level; the composition requires drilling into USDA's Oil Crops Outlook, which is a separate signal.

Fifth, acreage-price elasticity for next crop. A state-plus-one reading at ten-dollar soybeans means farmers will plant more soy in 2027, which rebuilds stocks and self-corrects the signal 18 months out. The signal is not a perpetual-motion machine. A long held past the March 2027 Prospective Plantings report is a different trade than one held through the January WASDE.

Sixth, the signal is a confirmation lens on the WASDE calendar. Non-overlap IC plus 0.204 is a real, significant edge at the signal level. But the signal does not survive a family-wise Bonferroni correction across the one-hundred-plus soybean specialist signals in the estate at a conservative alpha equal 0.05 / 100. Treat it as corroborating evidence in a multi-signal soybean stack rather than a standalone position-sizing input.

This research brief is for informational purposes only and does not constitute investment advice. Past performance is not indicative of future results. State-conditional statistics are computed through 2026-11-03 against CBOT soybean ratio-adjusted continuous. The non-overlapping-period IC and multiple-testing-correction considerations are explicitly disclosed. Data sources: USDA FAS PSD Online (US soybean ending stocks), CSI `S__1170RD` ratio-adjusted continuous target. Internal Phase 0 audit dated 2026-11-04.