Problem Statement

Develop an autonomous Shrinkage Detector Agent that analyzes inventory data from two time points (e.g., yesterday and today) alongside recorded sales to identify discrepancies indicating shrinkage. The agent should calculate unaccounted inventory losses, detect affected locations and products, and rank them by severity to enable focused loss prevention actions.

Shrinkage Detector Agent

Assigned: Ananth
Status: LIVE n8n Workflow (5 Nodes → CEO Briefing)

Phase 0: Data Sources

- Transaction Report (Sales Register)
- Inventory Snapshots Report (Stock Analysis)
- Adjustment logs (pilot_shrink_log.csv)
  Scope: 193 micromarkets → 150 with shrinkage

Phase 1: Core Formulas

- Shrinkage: (Opening - Sales) - Closing → Clip negatives at 0
- Spoilage Exclusion: Subtract disposals
- Financial Impact: Units × Unit Price
  Output: JSON with rankings, $loss, top_products (e.g., HIE Rancho: $3,938 HIGH, Smart Water)

Phase 2: n8n Build

- First, I worked on: Top 1 (HIE Rancho $3,938)
- Second: Top 10 HIGH/MEDIUM
- Third: Full 150 locations
- Fourth: Ghost SKUs (high depletion, zero sales)
  Live: **GitHub Gist** of all micromarkets which faces shrinkage and spoilage

Production Workflow

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Trigger node → HTTP Gist → Parse → JS1 (52 sites) → JS3
                                        (Top-5) → AI → Chat
```

- JS1: JSON →excluding to 52
- JS3: Extract Top-N
- AI Node: → Hallucination-proof output

Risk Tiering

Level	$Loss Threshold	Count	Example
🔴 HIGH	≥$363	37	HIE Rancho $3,938
🟢 MEDIUM	<$363	15	Desert Palms $341

Shrinkage and Spoilage Breakdown

Spoilage: Planned waste (expired/damaged) - FIFO rotation needed

Shrinkage: Inventory that disappeared without sales (theft/errors)

Aspect	Shrinkage	Spoilage
Cause	Theft, errors	Expiration, damage
Action	Cameras, training	Stock rotation
n8n	Rank by $loss	Track expiry_date

Breakdown of final Output

Sample-1.HIE – Rancho Cucamonga Market ($3,938; 716 units)
Top theft items: Smart Water 20oz, Dasani 20oz, Smart Water 1L

- Shrinkage Quantity (716 units): Derived from *CSVStock Analysis Report.csv* ("On Hand Qty"). Since the ending inventory was 0 with no sales or adjustments, the starting quantity was treated as shrinkage.
- Shrinkage Value ($3,938.43): Calculated as (*Shrinkage Qty × Avg Unit Price*) using prices from *Product Rank Report (1).csv*.
- Verification: Line 11019 of *CSVStock Analysis Report.csv* confirms 716 units total; reconstructed value matches $3,938.43.