

Final Shelf-Life Evaluation Report – Beef Tallow (PO M13884E)

Study Overview

A 12-month real-time shelf-life study was conducted on beef tallow stored at ambient conditions (25°C, ambient humidity). Samples were evaluated at defined intervals (0, 3, 6, 8, 10, and 12 months) to assess microbiological stability, oxidative changes, moisture content, and organoleptic quality.

Microbiological Stability

The product demonstrated excellent microbiological stability throughout the entire study period.

- Standard Plate Count (SPC): Remained consistently <10 cfu/g at all time points
- Yeast: Maintained at <10 cfu/g, with a single minor detection (10 cfu/g at 6 months)
- Mold: Consistently <10 cfu/g

These results confirm that the product environment does not support microbial proliferation. The extremely low moisture content and lipid-rich composition create unfavorable conditions for microbial growth, resulting in a highly stable microbiological profile over time.

Oxidative Stability (Rancidity Assessment)

Oxidative changes were observed over time but remained within acceptable limits for the duration of the study.

- Peroxide Value increased progressively from 0.74 meq/kg at Day 0 to 4.70 meq/kg at 12 months
- The peak value (4.96 meq/kg at 10 months) remained below the established limit of <5.00 meq/kg

This gradual increase is expected in fat-based products and reflects normal oxidative progression. Importantly, values did not exceed the threshold associated with significant rancidity, indicating maintained product quality through the intended shelf life.

Moisture Control

Moisture levels remained consistently low and well-controlled throughout the study.

- Moisture ranged from 0.11% at initiation to <0.1% for the majority of the study period

This low moisture content is a critical factor in both microbial stability and oxidative control, reinforcing the product's resistance to spoilage.

Organoleptic Performance

No adverse sensory changes were observed over the 12-month period.

- Color: White and consistent
- Odor: Neutral, slightly sweet; no development of rancid or off-notes
- Texture: Smooth, creamy, and soft; no structural degradation
- Packaging: Remained intact throughout

Sensory attributes remained stable and aligned with expectations for high-quality beef tallow, with no indications of oxidation or spoilage detectable through organoleptic evaluation.

Interpretation of Results

The product maintained stability across all measured parameters for the full duration of the study.

- Microbiological levels remained negligible and well below concern thresholds
- Oxidative markers increased gradually but stayed within acceptable limits
- Moisture remained tightly controlled, supporting overall stability
- Sensory characteristics showed no deterioration

These combined factors demonstrate a robust and stable product under the tested storage conditions.

Shelf-Life Determination

Based on the collected data, a shelf life of 12 months at 25°C is supported for this product.

The data shows that the product remains within acceptable microbiological, chemical, and sensory limits through the entire study period without evidence of spoilage or quality loss.

Conclusion

The beef tallow exhibits excellent shelf stability under ambient storage conditions, with no limiting factors identified within the 12-month study period.

The product's low moisture content and fat-based composition provide strong intrinsic protection against microbial growth, while oxidative changes remain controlled and do not impact sensory quality. The recommended 12-month shelf life is well supported by the study findings.