Applications of Low Oxygen Carbon Monoxide Packaging

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Overview

- Case Ready
- Packaging systems
- Atmospheres
- Color
- Consumers
- Carbon monoxide

* Discussions will generally reference beef

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Why Case Ready?

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- National Meat Case Study
  - From 2002 to 2004, 11% increase in fresh meat case ready packages
  - Better in stock positions when case ready packaging is used at retail
- Consumers prefer leak proof packaging
- Product consistency improved by eliminating store-level cutting variability
- Reduction of mark downs and throw-aways
- Labor shortages and/or increased labor costs
- Minimized Food Safety Risks

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Case Ready Decisions

There are only two decisions to make when identifying which case ready system:

1. What packaging system (appearance)?

2. What atmosphere?

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Packaging

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- “Mother Bag” Systems
  - Also referred to as over-wrap or pillow pack systems
- Barrier Tray Pack Systems
  - Barrier film sealed onto either a plastic or foam barrier tray
- “*Peelable*” Systems
  - Two layer film sealed onto a plastic or foam barrier tray
- Vacuum / Skin Pack Systems – not a MAP system
  - Referred to as “*purple*” meat systems
  - Atmosphere discussions not applicable
  - Excellent sensory traits
  - Meats natural reduced state

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Atmosphere

Ø High Oxygen -> 70-80% O_2 & balance CO_2

Benefits

- þ Stable color early in shelflife
- þ Very intense red bloom – oxygen saturation of myoglobin
- þ Relatively easy to manufacture

Issues

- x Must use antioxidants to protect flavor and color
- x Extremely high levels of oxidation
- x Limited flavor and colorlife
- x Bone discoloration
- x Poor freezing properties, must be rewrapped
- x Premature browning

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Atmosphere, cont.

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Ø Low Oxygen -> 70-80% N_2 & balance CO_2

Benefits

- þ No oxidation
- þ No antioxidants needed
- þ Longer shelflife than HiOx
- þ Excellent flavor profile
- þ Better freezing properties than HiOx

Issues

- x Residual oxygen and re-bloom issues
- x Scavengers are needed
- x Labor intensive at retail

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Atmosphere, cont.

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Ø Carbon Monoxide -> 70-80% N_2, 20-30% CO_2 & .40% CO

<u>Benefits</u>

- Þ No oxidation
- Þ Longer shelflife than HiOx
- Þ Excellent flavor profile
- Þ Excellent color stability
- Þ No antioxidants needed
- Þ Excellent freezing properties

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Atmosphere, cont.

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Ø Carbon Monoxide, cont.

<u>Issues</u>

- x Residual oxygen during packaging
- x Raw color variation between muscles
- x Cooked color issues?

<u>The “non-science” issue</u>

Public concerns about deception to consumers

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Why Use Modified Atmosphere Packaging?

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ð ONE REASON

Manage muscle color

- Ø Bloom at manufacturing – barrier tray pack
- Ø Bloom at retail – Mother bag or peelable

Ø It is important to note that ALL MAP systems create conditions that are *different* than conventional over wrapped meat

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Why is Color Important?

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ü We all know the answer to this question!

ü How many times have we heard the answer?

Color is the #1 selection criteria of consumers purchasing red meats

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Why do consumers use color?

Color is perceived as an indicator of quality at the time of purchase

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A Couple Questions to Ponder

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- Is color truly a good indicator of quality?
- Does color correlate to food safety?
- Will the use of color in purchasing decisions ensure repeat buyers?
- Which color state has more desirable sensory traits: red/bloomed, purple/reduced, or discolored/brown?

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Color Dilemmas

- Discolored product
  - For obvious reasons is not purchased by consumers
  - It appears to be “old”
  - Millions of dollars to the industry each year
- Purple meat
  - The benefits of vacuum packaging are well known by academia and industry, but not consumers
  - Education of consumers is needed to be more readily accepted and understood
- Red or bloomed with MAP
  - Color stability benefits
  - Sensory traits can be positive or negative depending on gas blend used

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The Consumer

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What does the consumer really want?

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FMI US Grocery Shopper Trends 2005

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- 63% of consumers say “Quality” is the most important trait when purchasing meat

- 23% is price!

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What factors define quality?

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- Color or appearance
- Flavor
- Tenderness
- Juiciness

Ø A combination of all of these?

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Can quality be guaranteed?

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Can you ensure a flavorful steak every time?

Can you ensure every steak is tender and juicy?

Can you ensure every steak is appealing?

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Manageability

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What quality factors can be consistently managed to acceptable levels in production environments?

- Flavor
- Tenderness
- Juiciness
- Color

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Which system to use?

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Evaluate the “Pro’s and Con’s” of all options

- Purple meat?
  - There have been some successes, but there have been many expensive failures
  - Can purple meat be merchandized through large scale national distribution chains without failure?
  - Are YOU willing to gamble your meat business on this one question?

If not vacuum packaging, then which:

- MAP packaging system
- MAP atmosphere

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The Challenge

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To produce a desirable and stable color on all muscles under production conditions that deliver the expected eating experience and consumer satisfaction that results in repeat purchases

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Conclusions

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- L LowOx systems - residual oxygen issues, re-bloom issues and labor intensive at retail
- K HiOx systems - have color consistency, but a relatively short shelflife. Also, they have a negative impact on cooked color and sensory traits that can cause consumer dissatisfaction
- J Carbon Monoxide - offer processors and consumers the most consistent and highest quality product in a MAP package

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Carbon Monoxide

or

CO

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CO Applications

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- Red meats in US from 2002
- Red meats in Norway from 1985-2004
- Tuna processing
- Smoked meats
- Vegetable processing

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GRAS Approvals for CO in Red Meats

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- ü 2002 -> Pactiv GRAS 83 approval for .40% CO in “mother bag” applications
- ü 2005 -> Precept GRAS 143 approval for .40% CO in barrier packages
- ü 2005 -> Tyson GRAS 167 approval for CO in barrier packages based on consumable amount

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Listings of approvals

- 7120.1Safe and Suitable Ingredients Used in the Production of Meat and Poultry Products (Aug 4, 2004, 8 pp) Amendment 7 - (Apr 10, 2006)
  - The use of CO has been reviewed multiple times by various agencies with the same conclusions – there are no concerns

ü 8 entries for various red meat CO applications

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Approval requirements

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1. CO concentration limits -> CO cannot exceed .40% of the atmosphere or 2.2 mg/pd of consumable CO
2. 35 and 28 day warranty for muscle cuts and grinds, respectively
3. Must use a “Use or Freeze By” date on barrier packaged products
   - Ø No labeling restriction on *motherbag* or *peelable* systems due to the natural discoloration that occurs when exposed to oxygen

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FMI US Grocery Shopper Trends 2005

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- ü 99% of consumers are aware of “sell or use by” dates
- ü 91% of consumers *frequently* or *always* use “sell or use by” dates on food items
- ü 81% of consumers use these dates in uncooked meat and poultry products
- ü This compares to only 72 and 54% in prepackaged deli and deli sliced meats, respectively

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Is there really deception with CO?

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- Consumers are aware of and use “sell or use by” terminology on all types of packages, specifically meat products
- CO MAP is no different than vacuum packaged meats, color is stabilized until exposed to oxygen.
- Spoilage is readily evident by odor and gas formation
- Color does NOT guarantee customer satisfaction and repeat purchases

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Summary

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- ü Case ready is here to stay and growing at exceptional rates
- ü Consumers demand and expect high quality in their protein purchases
- ü Competitiveness in the market place is commanding continuous improvements in product quality and benefits to consumers
- ü Innovation is taking the industry to more efficient and beneficial packaging systems
- ü CO meets these needs and thus is the next generation of MAP packaging

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