
Cold chain conditions of meat and dairy products in Mexican retail food stores

Maldonado-Simán, E., Zaragoza-Ramírez, J. L., Martínez-Hernández, P. A., González-Ariceaga, C. C., García-Méndez, J. L.

Outline

- ✓ Introduction
- ✓ Objective
- ✓ Methods
- ✓ Results
- ✓ Conclusion



Introduction



- ✓ Temperature control - supply chain - quality and quantity of perishable foodstuff
- ✓ Non-compliance of temperature holding and cleanliness and temperatures of refrigeration equipment
- ✓ Food safety management of cold chain in retail food stores - key issue in food products
- ✓ Cold chain problems in retail stores during storage - a threat to consumer health - poor product shelf-life

Introduction...

- ✓ Own-checking routines of temperature control within a self-planning tailored for each store - food safety policy
- ✓ Failure in keeping temperature within range - as a critical violation
- ✓ Foodstuff losses - related to temperature fluctuations while in storage
- ✓ Official Mexican Norms (OMN) - protocols and standards - applied in the cooling storage temperatures for food products



Source: Asociación Nacional de Establecimientos TIF (ANETIF). 2016.

Objective

To determine the conditions of meat and dairy products displayed and cleanliness of the surrounding display area in five retail food stores of different national food chains established in a municipality of Mexico to compare them against OMN standards



Source: El Financiero. 13 abril 2013

Material and methods

- ✓ Five retail food stores established in a municipality of Mexico
- ✓ Four different national food-chain stores
- ✓ Variables:
 - ✧ surface food temperature
 - ✧ cleanliness of display area
- ✓ Temperature - on-site-inspection - an infrared thermometer
- ✓ Cleanliness was visually scored based on a set scale



Source: Asociación Nacional de Establecimientos TIF (ANETIF). 2016.

Material and methods...

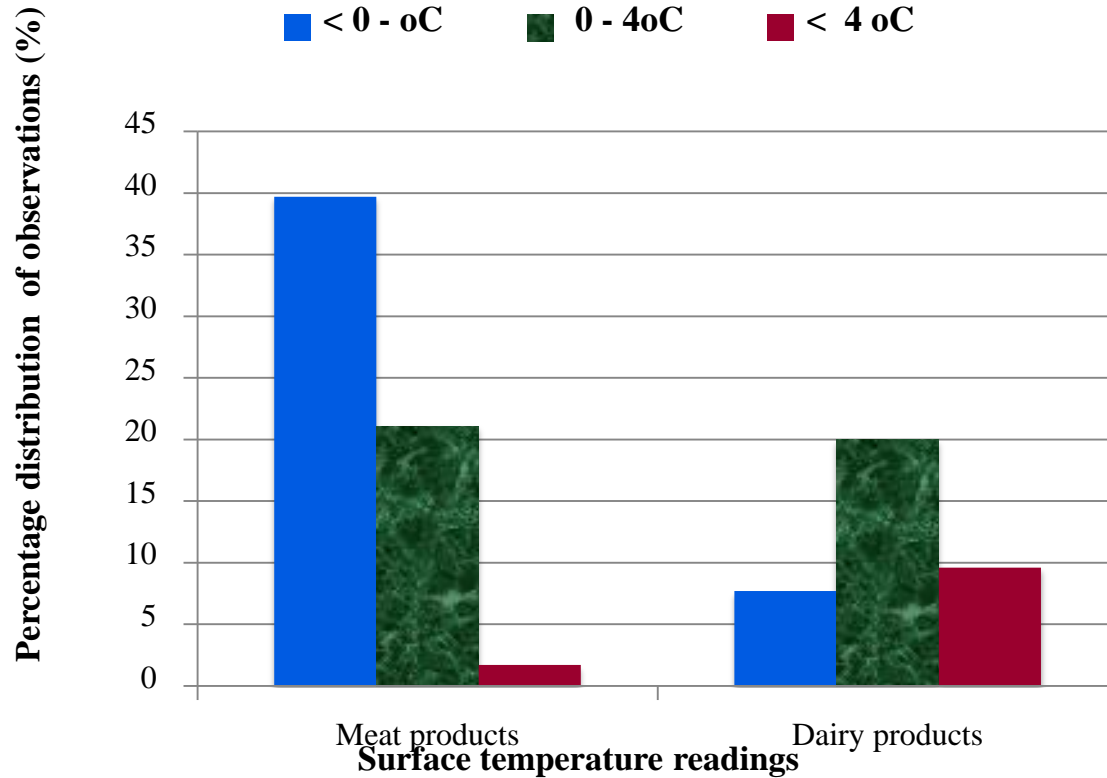
- ✓ Statistical analysis based on frequency of surface temperature
- ✓ Above the OMN set for products:
 - ✓ 4° C - meat
 - ✓ 6° C- dairy
- ✓ On-site inspection restricted to the display area
- ✓ Cleanliness evaluated one time for each store
- ✓ Statistical analysis based on failure frequencies by store and product



Source: Inocuidad de los quesos artesanales mexicanos
21Oct 2013 Fuente: <http://www.foodnewlatam.com>



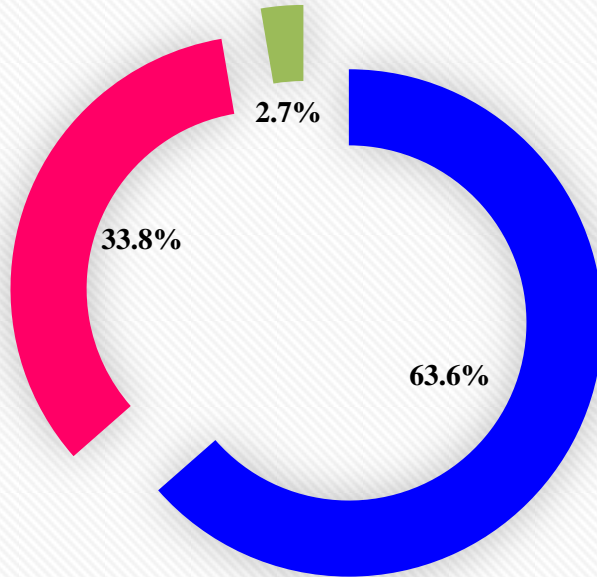
Results



- N= 360 temperature readings
- OMNs optimal range surface temperature
- Meat products: *breaded beef, chicken breast and pork chops* (0 - 4 °C)
- Dairy products: *fluid milk, Oaxaca cheese type and smoothen yogurt* (0 - 6 °C)

Results...

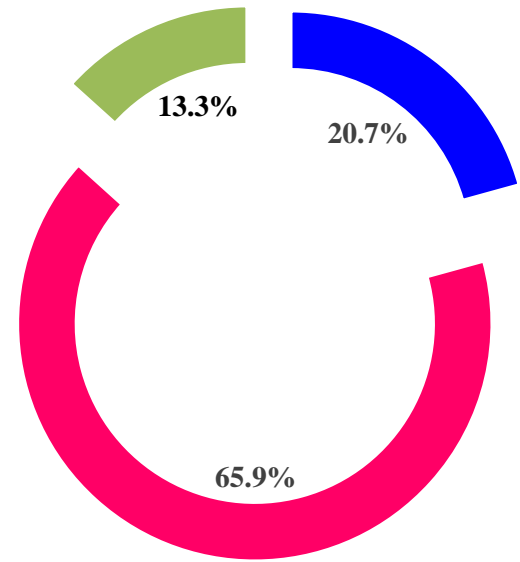
Meat products



■ < 0 oC ■ 0 - 4 oC ■ < 4 oC

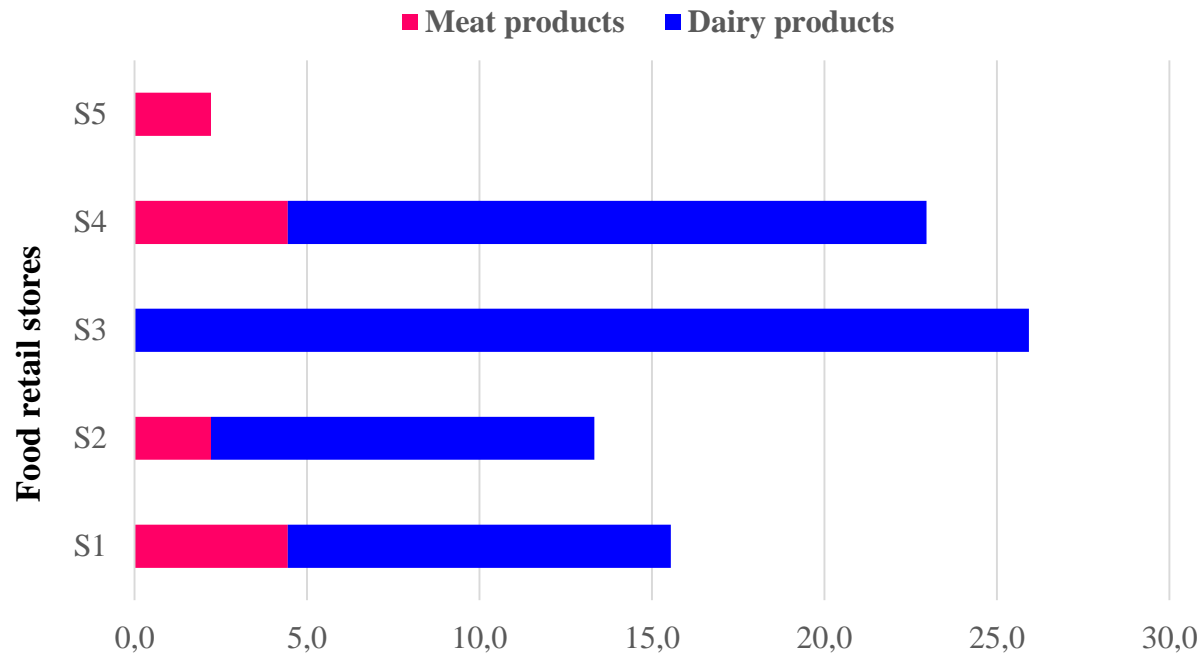
N= 225

Dairy products



■ < 0 oC ■ 0 - 6 oC ■ < - 6 oC

Results...



Distribution (%) of temperature readings above the standard

($p \leq 0.05$)

Non-compliance:

- Meat products 2.2 and 4.4% over 4 °C (S1, S2; S4 and S5)
- Dairy products 11.1 and 25.9 over 6 °C (S1, S2, S3 and S4)

Results...

Non-compliance related to cleanliness in retail food stores (N = 5)

<i>Unclean area</i>	Number of food stores with non-compliance (%)
Facilities out of reach of customers	3(60.0)
Cleaning equipment room	3(60.0)
Cleaning equipment	4(80.0)
Service area	1(20.0)
Self service area	1(20.0)
Total	4(80.0)

- Particularly three places out of sight for customers registered the highest percentages
- Statistical significance differences between food stores were not possible because of low number of stores

Conclusions

- ✓ Lack of awareness in these retail food stores
- ✓ Most of meat and dairy food products refrigerated on the maximum cooling temperature of compliance
- ✓ These products might show poor shelf life, quality and safety
- ✓ Monitoring of surface temperature must be frequently and accurately
- ✓ It is recommended a continues research into the Mexican food retail stores

Thank you