

# The Impact of Incubation Time and Starter Culture on the Properties of Cheese

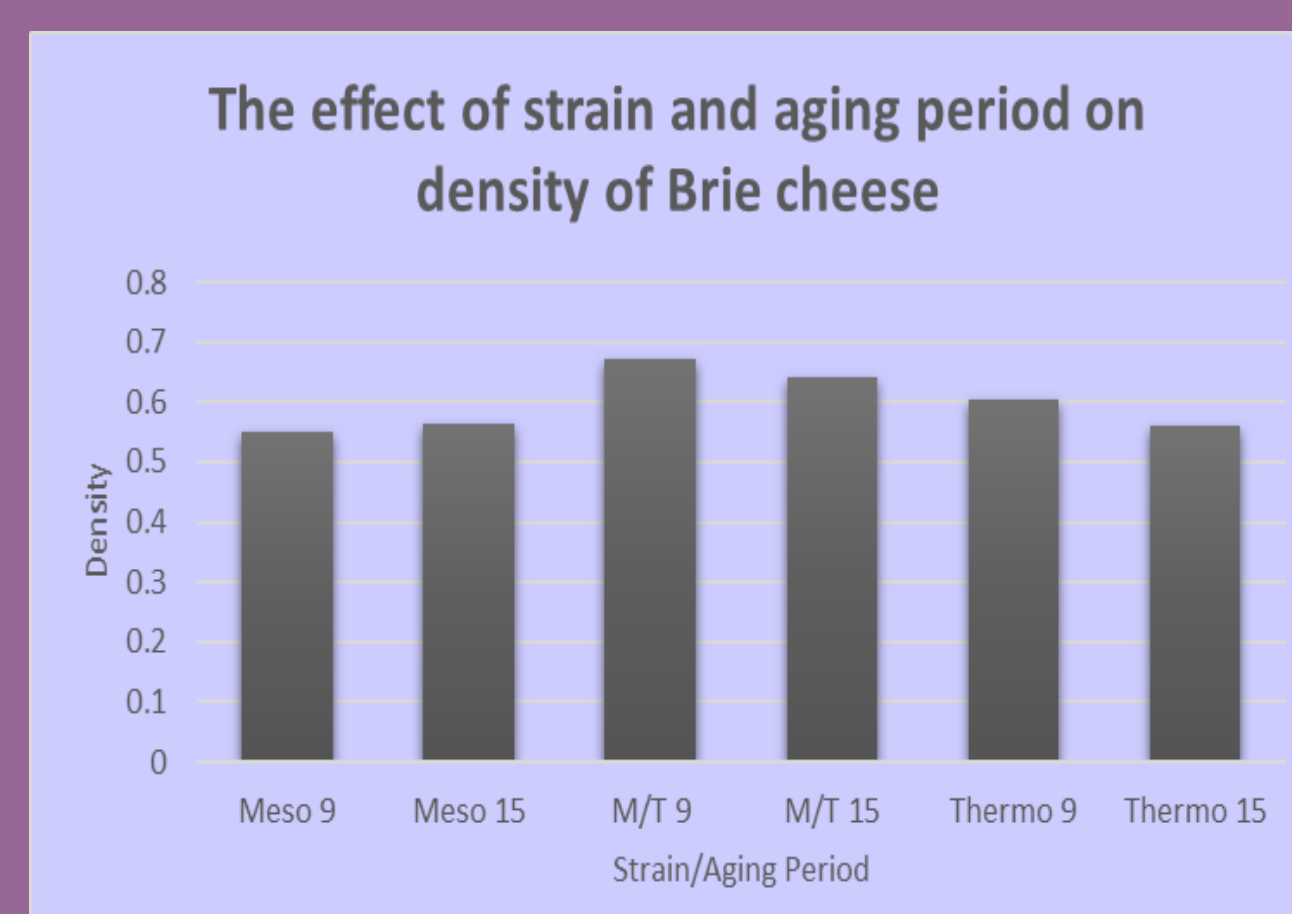
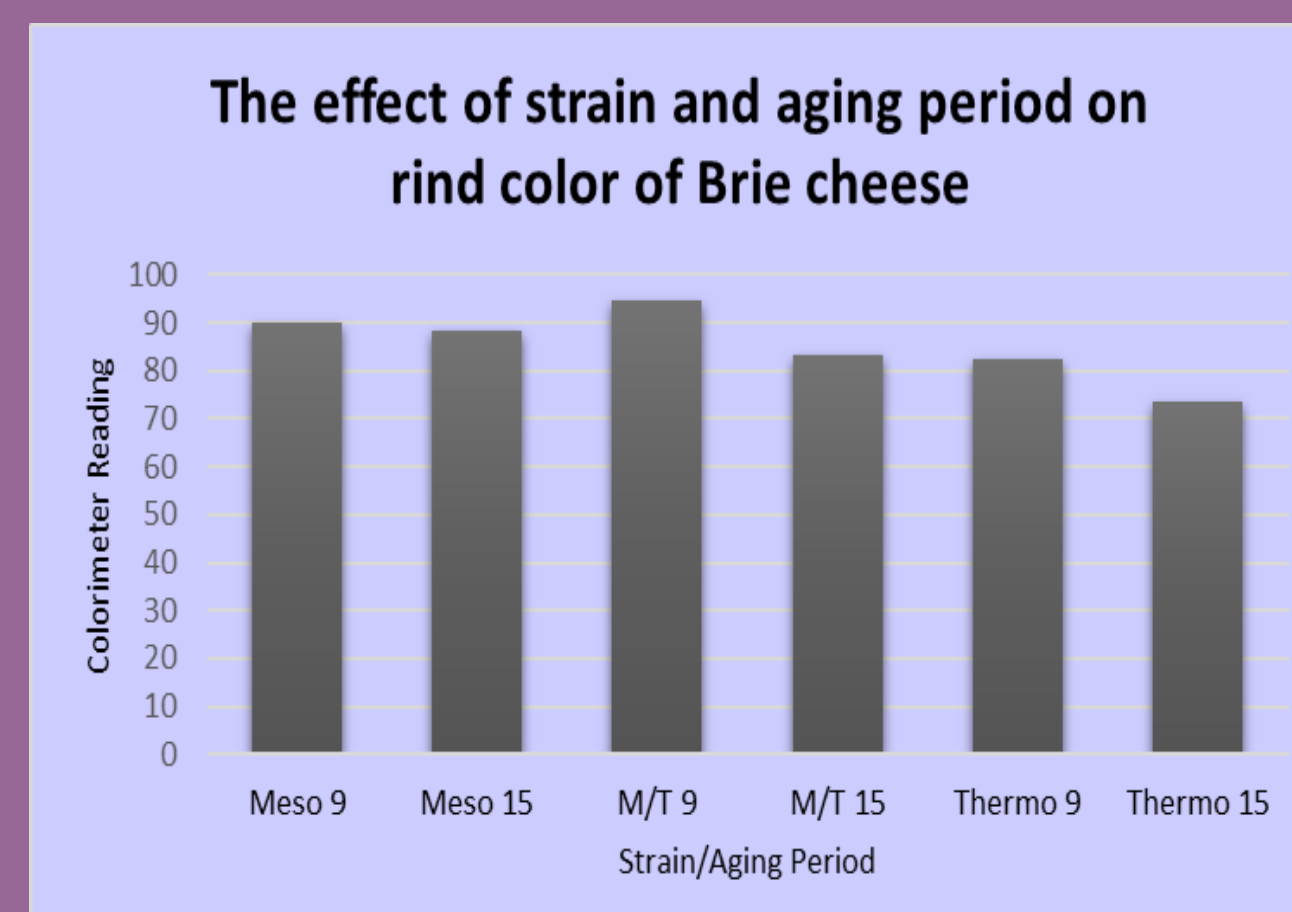
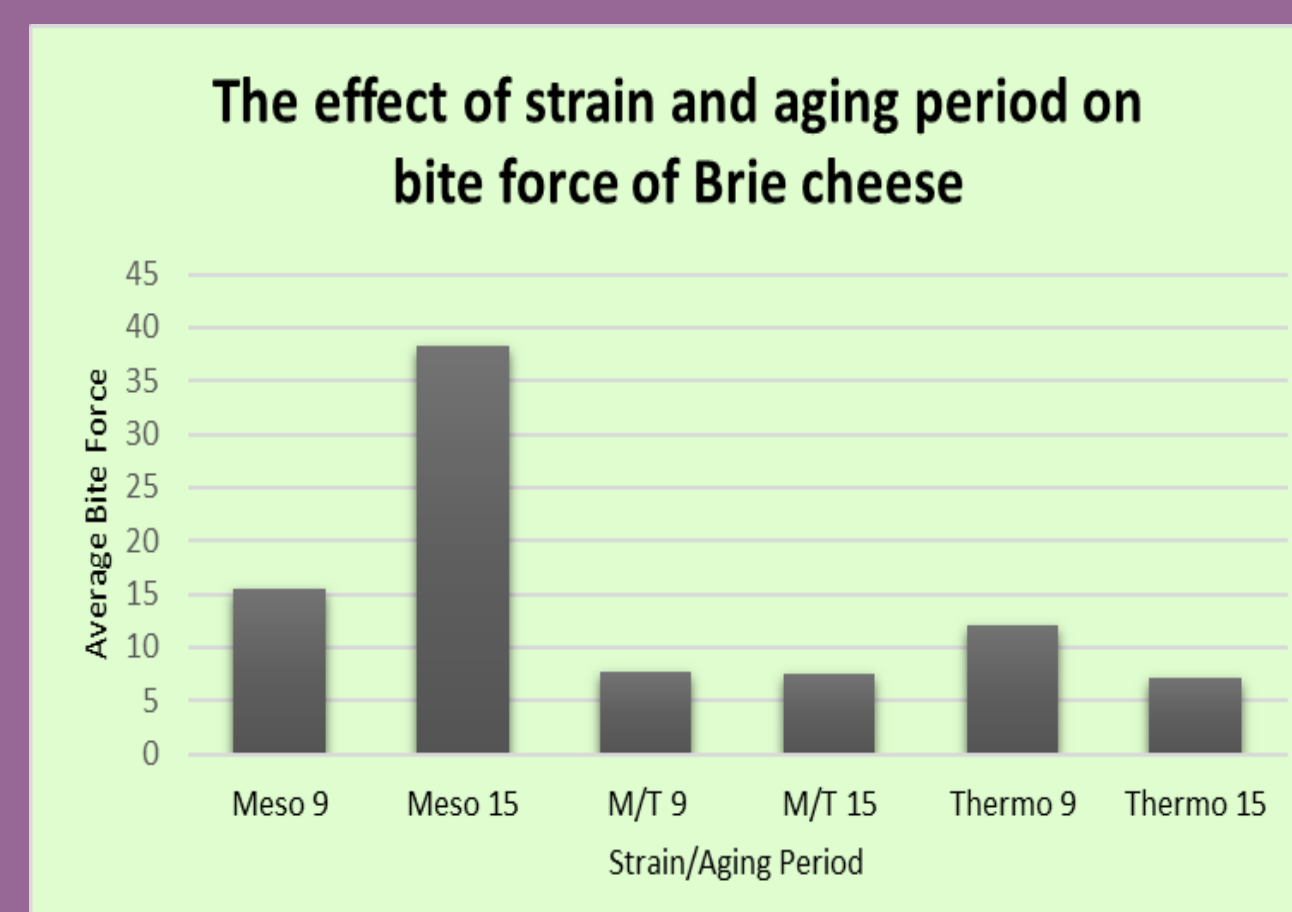
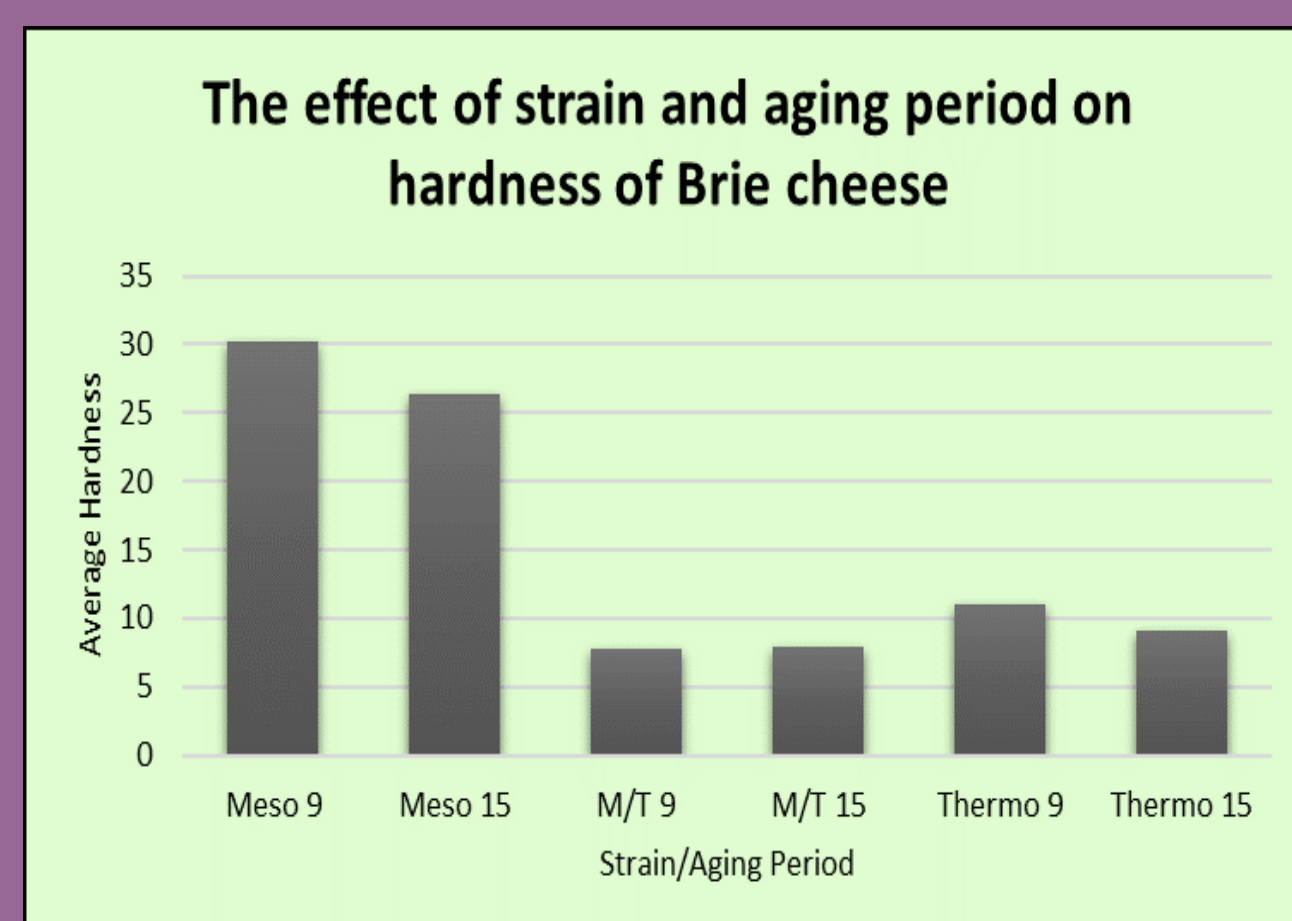
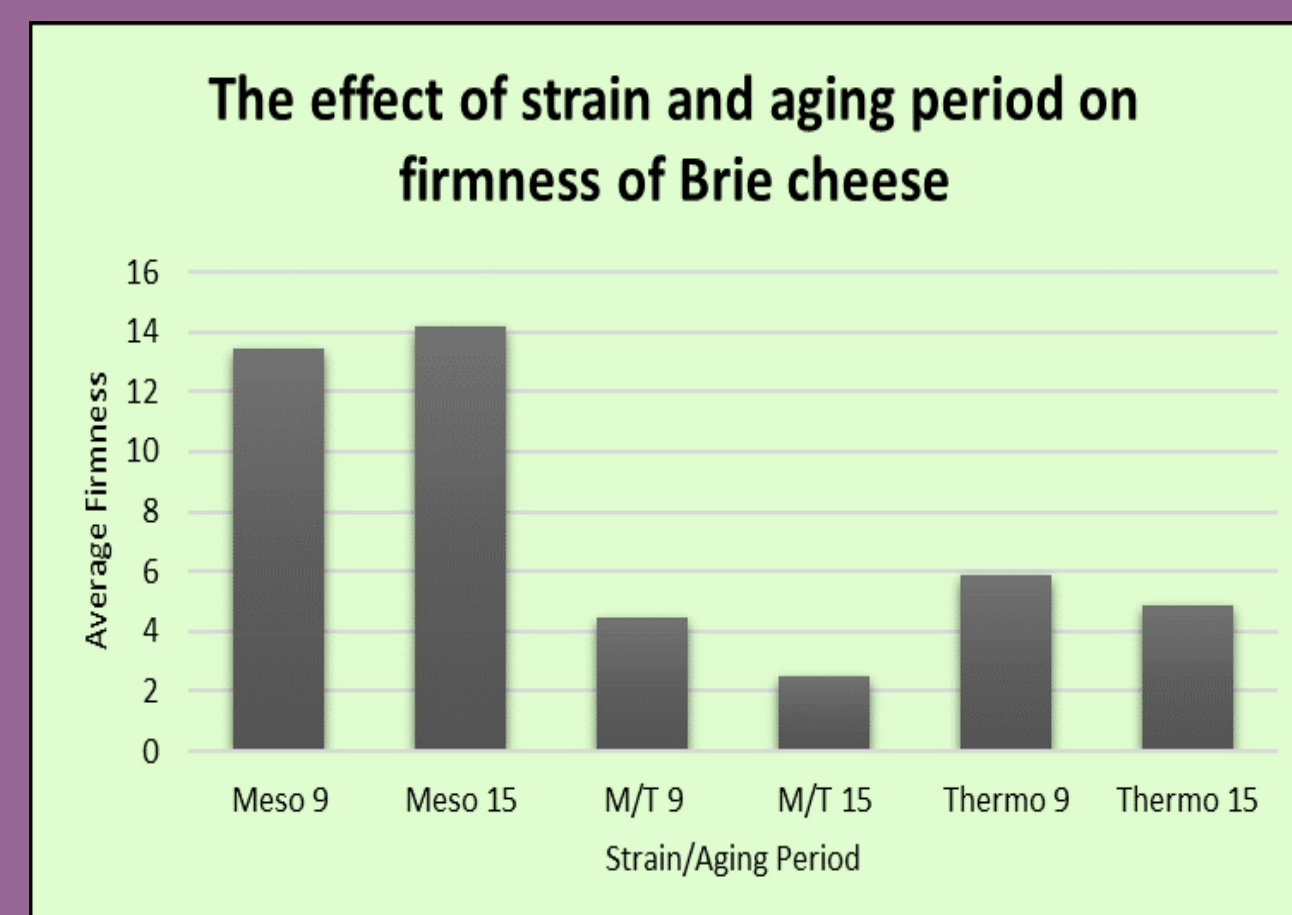
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## Introduction

- Cheese is a product that has been manufactured for thousands of years but has taken quite some time to perfect.
- Food scientists have been trying to understand and control sensory factors and their effect on cheese flavor development for some time.
- It is important to study this because sensory is relevant to food and the consumer demand of food products.
- Sensory analysis of different food products can determine its market value, which is an important issue as the popularity of craft cheeses and interest in cheese making has increased in recent years.
- How can the type of microbial starter used and the time that cheese is aged for effect its sensory characteristics?

## Methods

- A 2 by 3 full factorial design will be used to evaluate the effect of starter strain and aging time on the texture and color of the cheeses
- Three different starter cultures (Mesophilic, Thermophilic, and Mesophilic/Thermophilic combination) and Liquid Strength Rennet were used while curdling the three separate batches of milk.
- Curds were pressed into 4-inch round cheese molds
- The six cheeses were aged in an incubator at 60°F for either 9 days or 15 days
- Cheese was analyzed for:
  - Firmness via a ball probe on the texture analyzer
  - Hardness via fracture wedge on the texture analyzer
  - Bite Force via a 3mm thick flat-end blade and a shear slot fixture table on the texture analyzer
  - Color via a colorimeter
  - Density by taking the volume with a seed displacement instrument and the mass with a scale



Curds



Fresh cheese



Day 3 of Aging

Top (from left to right):  
mesophilic, thermophilic,  
meso/thermo (all 9 days)

Bottom (from left to right):  
mesophilic, thermophilic,  
meso/thermo (all 15 days)



## Results

- Results from data collection for each test were analyzed using two-way ANOVA tests.
- Data for hardness, firmness, and bite force had statistically significant differences between the different starter cultures, but not between the different aging periods.
- Data for color was not statistically significant between the different starter cultures or between the different aging periods.
- Data for density was not different starter cultures or between the different aging periods.

## Conclusion

- It is safe to say that the starter culture used does affect the textural properties of the Brie cheese, but not the aging time.
- Because the demand for craft cheeses such as Brie are increasing, the results from this study could be important in helping to develop a particular texture that would be accepted by consumers.

## References

1. Caporaso, N., Armento, V., & Sacchi, R. (2015). Volatile profile of Conciato Romano cheese, a traditional Italian cheese, during ripening. *European Journal of Lipid Science Technology*, 177, 1422-1431. <https://www.ejlst.com>
2. Karahadian, C., Josephson, D. B., & Lindsay, R. C. (1985). Volatile Compounds from *Penicillium* sp. Contributing Musty-Earthy Notes to Brie and Camembert Cheese Flavors. *Journal of Agricultural and Food Chemistry*, 33, 339-343.
3. Nasrollahi, A., Nasrollahi, S., Esmaeili, P., Kaviani, M., & Shariati, M. (2016). An introduction to flavor compound production in cheese. *International Journal of Pharmaceutical Research & Allied Sciences*, 5(1), 14-17. <http://www.ijpras.com/>
4. Ruggiello, M., Giordano, M., Bertolino, M., Ferrocino, I., Cocolin, L., and Dolci, P. (2018). Study of *Lactococcus lactis* during advanced ripening stages of model cheeses characterized by GC-MS. *Food Microbiology*, 74, 132-142. <https://doi.org/10.1016/j.fm.2018.03.012>.