



Purpose

Solar Drying of Chiapas' fresh cheese allow the use of local products and the solar process integration of technologies development in Chiapas, México. Solar Drying improves quality of dried cheese, reduces the drying time and adds value to it by prolonging its life. With the solar processing, Cheese opens a new market for solar processed products, creating jobs locally like manufacturing of solar devices, developing new technologies and new solar products. Share and spread of these solar technologies to farmers and society helps to overcome the barrier of unawareness and support an effect of dissemination, promotion and replication. This accelerates the transition to fresh cheese solar processing in Chiapas.

Experimental processes

Solar Dryer

1. Construction of the equipments
2. Installation of the equipments
3. Visits to the community for the characterization of solar dryer
4. Measurement of environmental parameters
5. Measurement of parameter in drying chamber

Fresh Chiapas' Cheese

1. Product treatment
2. Heat treatment (Solar and Conventional)
3. Measurement humidity in product
4. Determination of drying kinetic of Chiapas fresh cheese
5. Modeling and determination of the curve best fit and coefficients



Figure.4. Solar Drying And Conventional Drying Process.

Figure.1. Solar Dryer Installation.

Figure.2. Solar Dryer.

Figure.3. Solar Dry Cheese



Figure.5. One Hundred Solar Dry Cheese Maturation.

Results.

The cheese dairy in Chiapas, Mexico is a Small & Medium Enterprise operated by few families in community of indigenous origin. They have a daily production of fresh cheese and since 2009 solar dryer is used. We found that for solar processing, cheese is pressed for long time to remove moisture and more salt is added. This is the difference in the production of the fresh cheese process compared to cheese to be dried. They turn and change the sides of the cheese block in the dryer to obtain uniform heating.

The producers ensure that the solar-dried cheeses do not differ in the flavour of cheese dried traditionally. Since the Solar drying process is fast, the dryer can dry 108 cheese blocks in 30 days, instead in traditional process where 60 days are needed. The people of these communities showed interest in drying and preserving farm products through this equipment and are benefited directly. In the case of cheese the population, consume and prefer fresh cheese, but they consider important to dry cheese to sell in other places, and do business and earn some extra money for them. Even if the fresh cheese isn't sold, the producers can conserve the cheese through the solar drying and sell it later. They can store as many as 700 blocks in a room. In addition, the use of the solar dryer produces higher hygiene cheeses because this is processed in a closed chamber.

The producers received assistance and support from the Kolping Foundation to impulse a productive project of a dairy cheese on a larger scale. They recognized that they already have the equipment to dry cheese and this is a major factor for the success of this kind of project.

The dryer kinetic studies of cheese show that the drying kinetics is strongly influenced by temperature. In low temperature cheese drying process occurs at constant speed and when the temperature increases, the period decreasing speed dominates the drying process.

Conclusion

The producers claim that the dryer has worked well and recommend others to use it. Some of the most important benefits of solar drying are observed by the producers are:

The drying process is simplified and time is greatly reduced from two months to 30 days. The solar dryer provides high sanitation conditions for cheese during the process. This gives an enhancement to the quality of the product as it prevents cheese from mold and mildew on the surface of the cheese. If the solar drying dairy project is implemented on a larger scale, the producers claim growth in the cheese dairy business with an increased production in fresh and dry cheese. This economic benefit ensures use of the solar dryers for a long time.

Chiapas' fresh cheese being very important in the state, it has a potential market for selling both fresh and dry cheese. The producers being benefited by use of solar dryers, has a big scope of development. New design of solar dryer specifically for drying of cheese can be developed with the results of the drying kinetics studies.

Reference

- Roberto Berrones, Sergio Saldaña, Mariel Grajales (2009) Estudio del proceso de deshidratación del queso fresco chiapaneco mediante un secador solar de convección natural. Memoria del Congreso STS-36. XXXIII Semana Nacional de la Energía Solar Octubre de 2009, Guadalajara Jalisco, México. Pág. 739
- Hernández Montes, Villegas de Gante, Calvo Arriaga, León Velasco (2010) El queso crema de Chiapas, exploración de su aceptabilidad hacia una marca colectiva. Revista Claridades Agropecuarias. pág. 29
- Raúl Ochoa, Cesar Ortega, Omar Musalem (2007) Aprovechamiento de la energía solar térmica en el sector agropecuario. Revista claridades agropecuarias, Pág. 3.

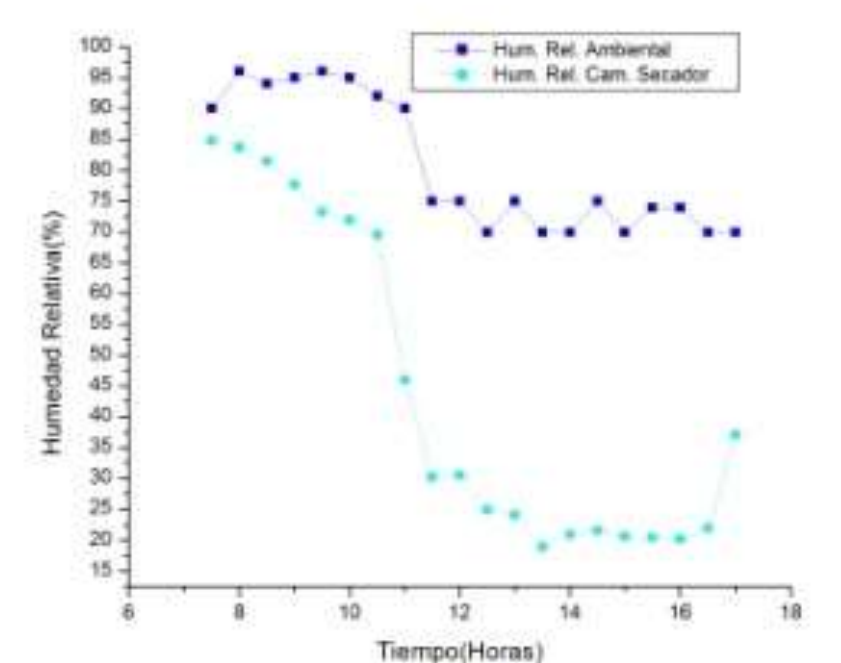


Figure.6. Humidity Variation Versus Time.

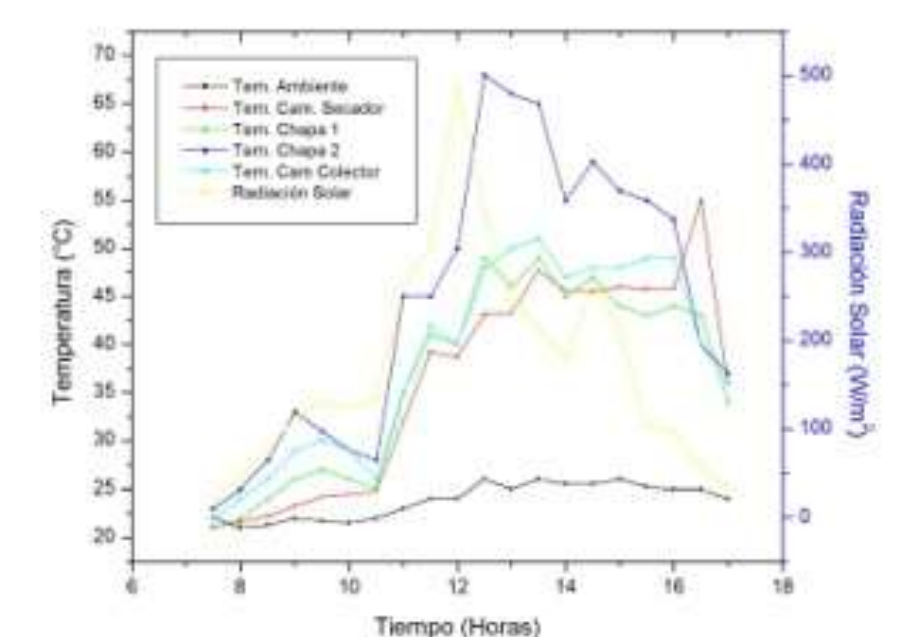


Figure.7. Behavior Of The Temperature Versus Time In The Solar Dryer

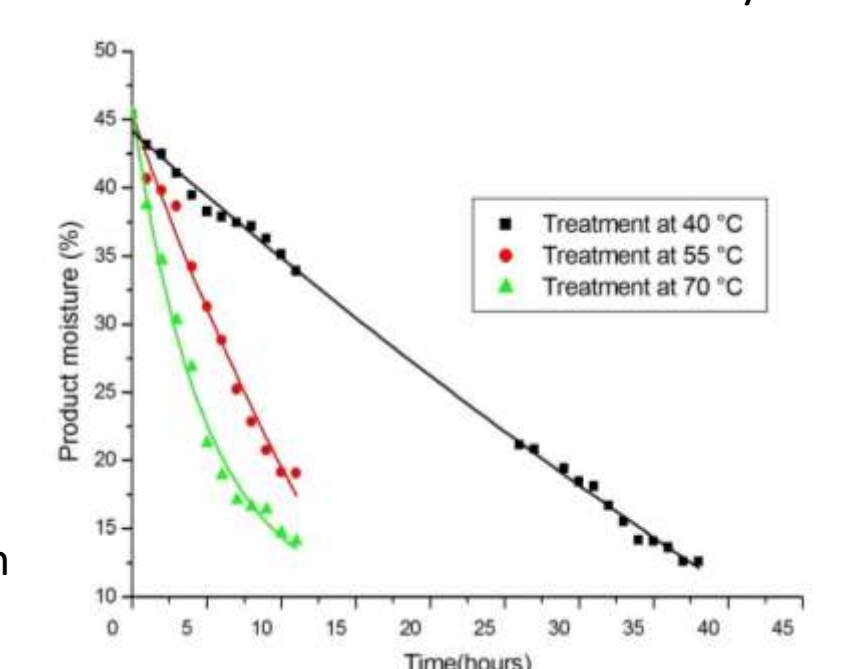


Figure.8. Chiapas' Fresh Cheese Drying Kinetic