Exercise 8

Manufacture of Tomato Salsa

FSC 41 – Introduction to Food and Dairy Processing

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Introduction:

This exercise in manufacturing tomato salsa will introduce us to some of the basic unit operations in food processing and to material balance calculations in determining the proportions of components that make up the product. We will be also introduced to GMP's (Good Manufacturing Procedures) in preparing the equipment, instrumentations and ingredients for manufacturing safe and wholesome products. By assembling and operating the equipment involved, we become more familiar with the applications and principles of operation of the equipment. During the manufacturing process of high acid foods (pH < 4.6), the container receives heat from water, steam and other heating medium. Because of the low pH of the product (acidic product), the product will have to be heated and filled only to 190 – 195 °F and hold for a few minutes to sterilize the caps.

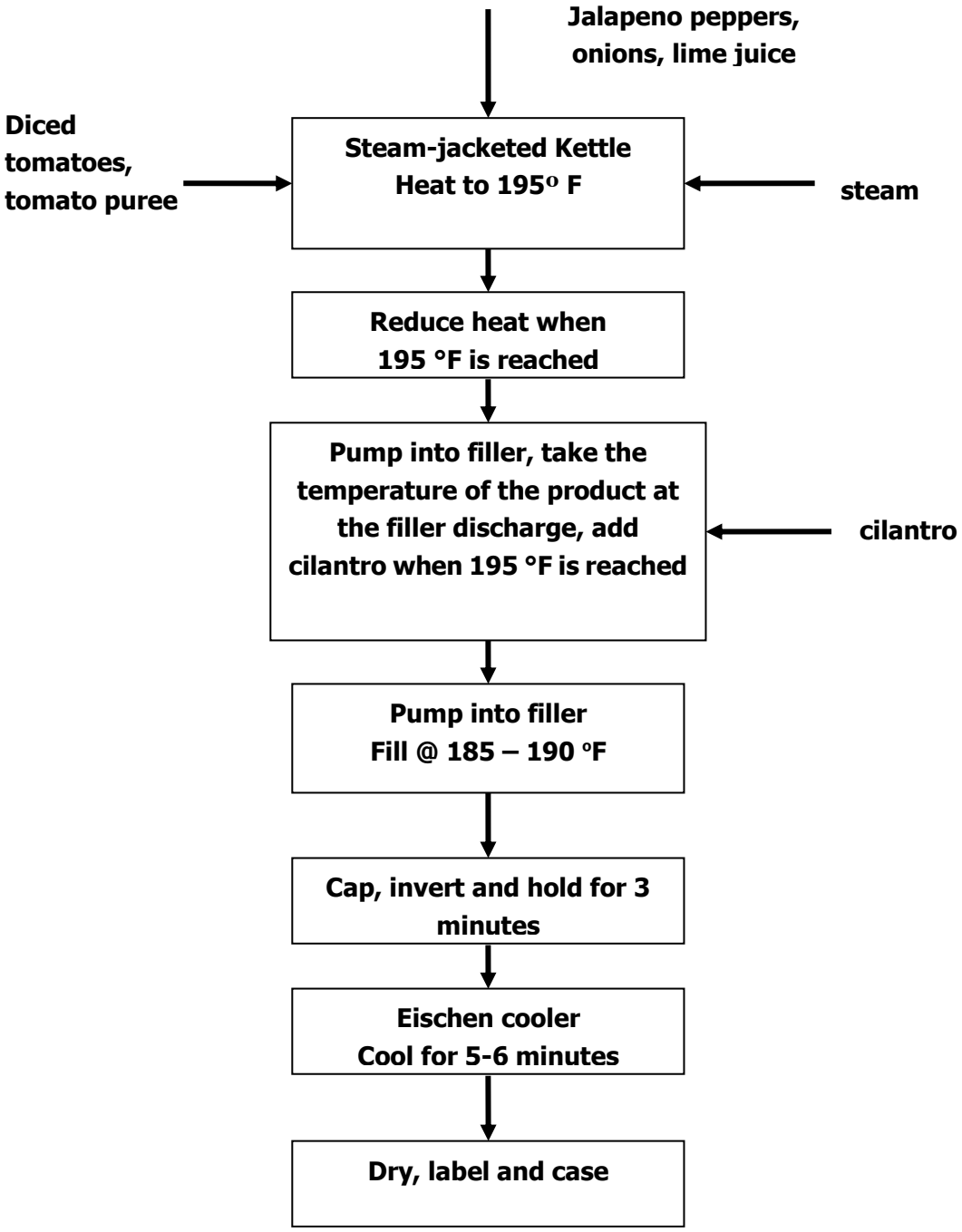
0bjective:

We will apply the knowledge and scientific principles learned in Food Science lecture to manufacturing of quality tomato salsa and will apply knowledge on material balance by determining the amount of ingredients (proportion of components) needed to produce the desired product, and estimate the amount of products to be produced. We will demonstrate that they understand these concepts by submitting a laboratory report using the format provided in the laboratory manual.

Tomato Salsa Formulation

(Batch Size = 14 gallons or 112 lbs)

INGREDIENTS	STD BATCH SIZE/QTY	PRODUCTION BATCH SIZE	TOTAL, WT LBS
Diced tomatoes*, #10cans @__6.41_lb/can	10 cans* 64.1lbs	6.6cans	42.7lbs
Tomato Puree**, # 10 cans @ __6.56__lb/can	2 cans 13.13lbs	1.32cans	8 . 55lbs
Jalapenos, # 10 cans @_6.56__lb/can	1.5 cans 9.84lbs	0.99cans	6.5lbs
Onions	36 lbs	24lbs	24lbs
Cilantro	0.75 lbs	0.495lbs	0.5lb
Lime Juice			
Jars, (ave. fill wt = 16.8 oz)			81jars(1.308oz)


Jalapeno peppers, onions, lime juice
Diced tomatoes, tomato puree
Steam-jacketed Kettle Heat to 195° F
steam
Reduce heat when 195 °F is reached
Pump into filler, take the temperature of the product at the filler discharge, add cilantro when 195 °F is reached
cilantro
Pump into filler Fill @ 185 – 190 °F
Cap, invert and hold for 3 minutes
Eischen cooler Cool for 5-6 minutes
Dry, label and case

Exercise 8 – Manufacture of Tomato Salsa

Based on the actual recipe (see Table 8.1, page 2):

Y = _81.8_ lbs

Y = _81.8_ x 16 = _1308.8_oz

Average net wt per jar = Z = _16.8_ oz

Theoretical no. of jar = Y/Z = (_1308.8_)/(16.8)= _78_ jars

ACTUAL YIELD CALCULATIONS:

Take 5 empty glass jars and lids, weigh each and take the average wt

Take 5 processed products, weigh each and take the average wt

	Empty jars with lids, gm	Filled jars with lids, gm
1	255.4	719.8
2	259.5	735.6
3	258.1	731.6
4	255.3	727.2
5	257.2	729.7
Ave	257.1	728.78

Average actual fill weight per jar = Ave filled jar wt – Ave empty jar wt

= _728.78_ - _257.1_ = _471.68_ gms/jar

1 lb = 454 gm

1 lb = 16 oz

1 oz = 454/16 = 28.375 gm/oz

Average actual fill weight per jar = _471.68__ /(28.375) = _16.6_ oz/jar

Number of actual jars produced = __51__ jars

Actual total amount of product = (No. of jars produced)x(actual wt per jar)

= _51__x _16.6_ = _847.7_ oz of tomato salsa

= _847.7__/(16) = _53_ lb of tomato salsa

Theoretical Amount of product (Y) = _81.8__ lb of tomato salsa

Product Lost = Theoretical amt of product – Actual amt of product produced

= __81.8__ - __53__ = _28.8_ lb lost

% Yield = (Actualx100)/(Theoretical) = (_53__ x 100)/(_81.8_) = _65__ %

Questions and Answers:

Where did the rest of the product go? Why is there a difference between the theoretical and actual production yields, if any?

Because some product lost during the heating and filling processing, there is a difference between the theoretical and actual production yields. During the processing, there were some materials lost because of heating,filling, or other operation. The pH of the products should below 4 or close to 4, but our product was too high the first time, and we added some lemon juice. After some time heating, the pH was closed to 4. It took a kind of long time to control the pH of the product, and long time heating would lose some material of the products. After the filling process, we cleaned the tubes which had a lot of materials, and it meant we lost too many material during the processing.

What are your suggestions and conclusions? Any room for improvement?

Long heating time can cause the loss of volatile substance, so the lower the tempture, the shorter the time, the less the loss. We can heat in a vacuum environment to decrease the loss. Not using agitator during the heating processing can keep the integrity of the pulp. The pH is hard to control exactly, and if we could control the pH close to the pH we want in a short time, we could save a lot of time and materials to improve productvity of what we producted.

Conclusion:

It was an interesting lab, and from this lab, I learnt how to make tomato salsa. I was in the thired group, and our job was doing mixing, thermal processing, material handing, pumping, cleaning and safety. Because we did the lab of producting strawberry jam before, I have a clear understanding of the process of this lab and know what I should do in each step. We took quite a long time to do the work and felt excited because we could use what we learnt to do some products, and we could do some products by ourselves. I know handle some basic skills using in this process. After the lab, everyone took a product we produced together, and we felt excited.