Pasteurisation: an introduction
August 2022

Agenda

- Housekeeping
- About Gosnells
- What is Pasteurisation?
- How do we pasteurise?
- Ensuring CCP in pasteurisation
- Comparison of pasteurisation with other methods

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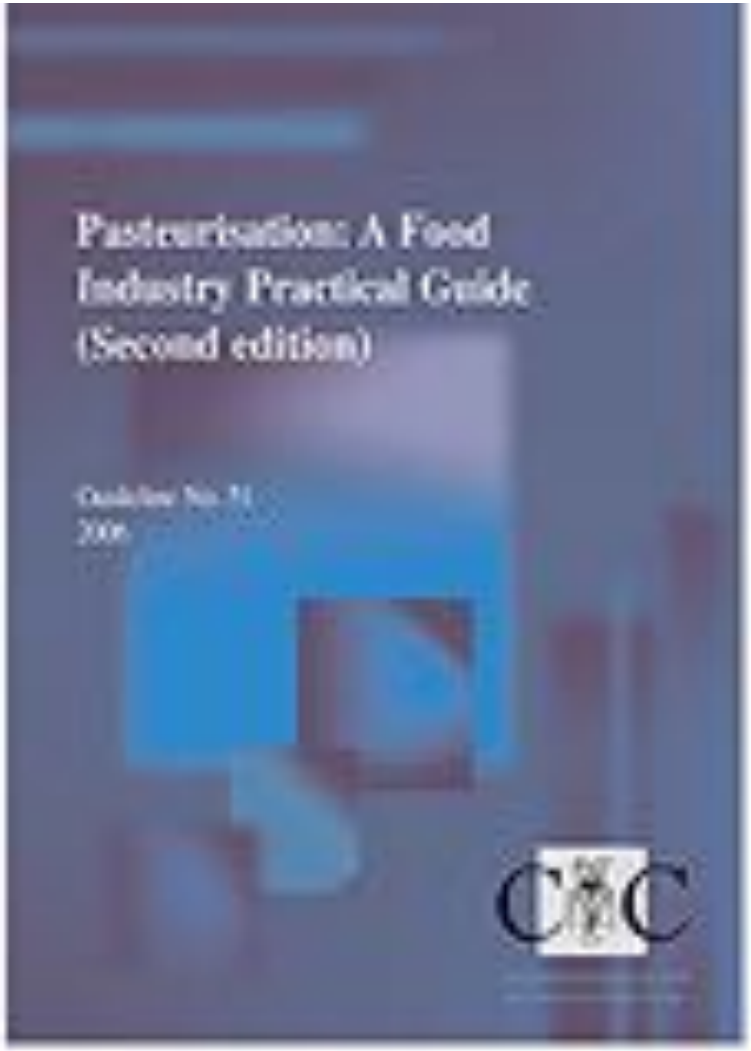
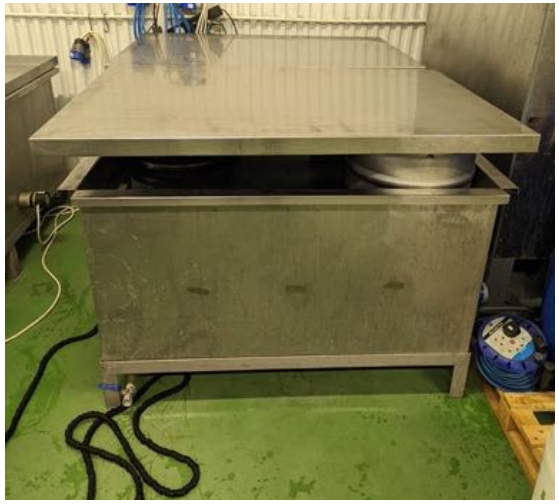
@GosnellsMead


Pasteurisation: A Food Industry Practical Guide (Second edition)




Bubbles
from
bees


GOSNELLS
OF LONDON


GOSNELLS
ORIGINAL

What is pasteurisation?

A technical definition:

" any heat treatment which is less than F_0=3, but is designed to reduce the numbers of pathogenic and spoilage organisms, and is used in combination with the other factors to make foods safe over a designated shelf life."

Pasteurisation: A Food Industry Practical Guide (2nd Edition), 2006

OK, so how do I actually pasteurise something?

Looking for a 6 log reduction

i.e. if we start with 10^6 pathogens we'll end up with >1 left

(1,000,000 pathogens to less than 1 pathogen left)

The time you have to hold the liquid at depends on the liquid and the pathogens you're worried about

Mead is generally low in pH so we are not concerned with Botulism, one of the most persistent pathogens

A worked example of using pasteurisation for a bath (batch) process

Getting technical:

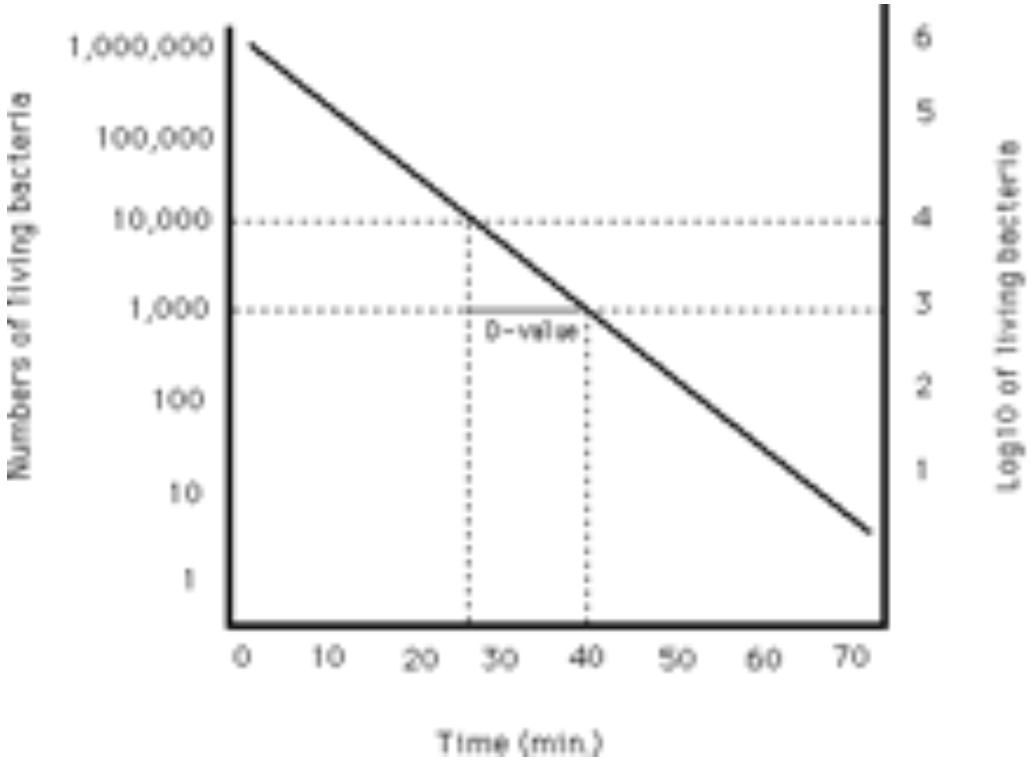
$$P^{Z}_{r} = \text{process time (D)}$$

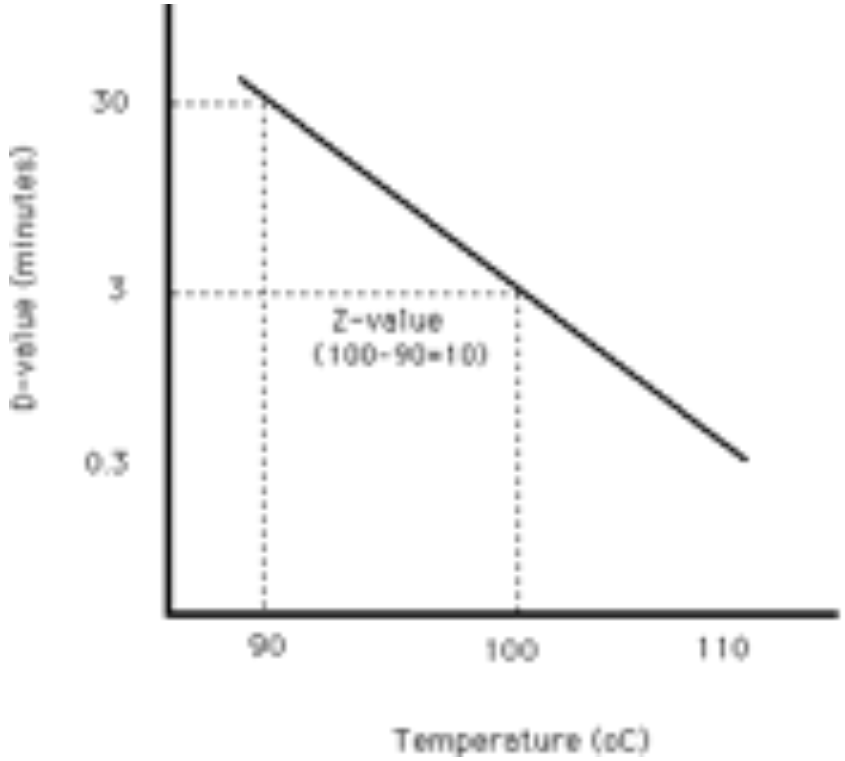
Z= the temperature change above the reference temperature that results in a tenfold decrease /increase in D value

r= reference temperature to be achieved at the slowest heating point

Process time = time required at the reference temperature to achieve the required number of log reductions of the target pathogens

Getting technical:





Getting technical:

$$P^{Z}_{r} = \text{process time (D)}$$

e.g. if the D value of a bacteria was 3 minutes at 60°C and the z value was 6°C a process time of 18 mins at 60°C would give the required 6 log reduction

Use reference tables to work out the relevant values and then back up with microbe testing

Typical D-values;
63°C – 0.55mins
i.e. c.6mins at 63°C for 6 log reduction

Typical z-values = 7 °C
i.e. c.0.6mins at 70°C for the same 6 log reduction

How this works in practice, in the meadery

1. Water baths heated to greater than the reference temperature
2. Product placed in bath
3. Testing bottle / can put in and temperature taken every 5 minutes
4. Results go into a spreadsheet that uses a formula to estimate the Pasteurisation units every five minutes until we hit the desired level

How this works in practice, in the meadery:

$$L = 10^{\left(\frac{(T - T_{ref})}{z}\right)}$$

L	=	lethal ratio or lethal rate
T	=	the temperature under consideration (°C)
T_{ref}	=	the reference temperature (°C)
z	=	the chosen z value (C°)

A worked example:

Process time	Temperature at the slowest heating point	Lethal rate at 70C	Cumulative lethality
1	60	0.046	0.046
2	61	0.063	0.109
3	62	0.086	0.195
4	63	0.116	0.311
5	64	0.158	0.469
6	65	0.215	0.684
7	66	0.293	0.977
8	67	0.398	1.375
9	68	0.541	1.916
10	69	0.735	2.651
11	70	1.00	3.651
12	70	1.00	4.651
13	71	1.36	6.011
14	72	1.85	7.861
15	75	4.64	12.501
16	70	1	13.501
17	66	0.293	13.794
18	63	0.116	13.91
19	60	0.046	13.956


nish Orange Blossom
Honey
25kg

CCP in pasteurisation and designing a good method:

- Always measure from the lowest temperature point/ err on the side of caution
- Pasteurisation is THE critical control point, it cannot fail for your process to be robust
- Back up calculations with lab analysis
- Ensure staff are sufficiently trained and understand the importance of the process

Why use pasteurisation?

- Allows the “no added sulfites” claim
- Robust, and measurable