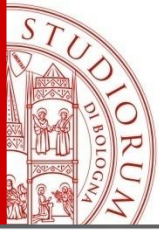


Sicurezza alimentare, GMP e GHP nelle carni «dry aged»

Federica Savini, Valentina Indio, Federica Giacometti

Dipartimento di Scienze Mediche Veterinarie - UNIBO -





Programma

01

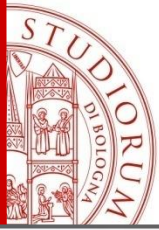
Definizioni e
parametri

02

Microbiologia
della superficie
della carne dry
aged

03

GMP
&
GHP



Programma

01

Definizioni e
parametri

02

Microbiologia
della superficie
della carne dry
aged

03

GMP
&
GHP

Carne fresca e carne maturata...

REGOLAMENTO (CE) N. 853/2004 DEL PARLAMENTO EUROPEO
E DEL CONSIGLIO
del 29 aprile 2004

che stabilisce norme specifiche in materia di igiene per
gli alimenti di origine animale

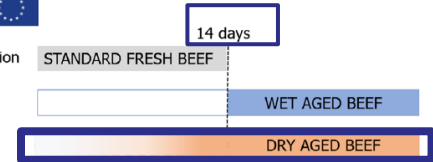
"**carni fresche**": carni che non hanno subito alcun trattamento salvo la refrigerazione, il congelamento o la surgelazione, comprese quelle confezionate sotto vuoto o in atmosfera controllata.



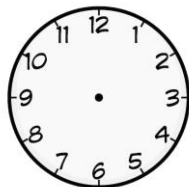
Typically, anaerobic maturation

Ageing in vacuum package

Aerobic ageing



Dry-ageing is the process carried out in aerobic conditions of hanging beef carcasses or subprimal or placing primal cuts either unpacked or packed in bags permeable to water vapour in a refrigerated room and left to age for **several weeks** or **even months** at controlled environmental conditions of temperature, relative humidity and air flow.

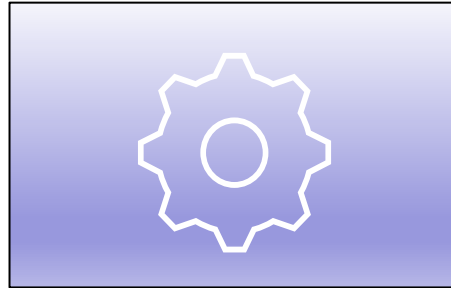


?

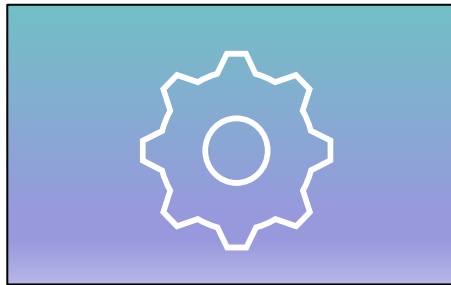


!

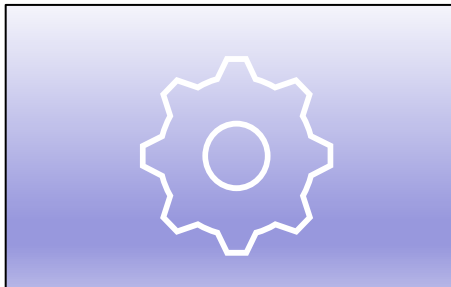
Condizioni



- Non confezionato
- Maturazione aerobia
- Evaporazione superficiale →
 - Formazione di crosta



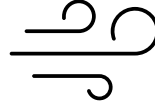


- In condizioni controllate
- Tempo
- Temperatura
- Ventilazione
- Umidità relativa



- Reazioni enzimatiche →
- Miglioramento delle caratteristiche di:
 - Tenerezza
 - Aroma
 - Sapore

Parametri di processo estrinseci

Essiccazione =  Temperatura +  Umidità relativa +  Velocità dell'aria

SCIENTIFIC OPINION

EFSA JOURNAL

ADOPTED: 6 December 2022
doi: 10.2903/efsa.2023-7745

Microbiological safety of aged meat

Guidelines for the safe
production of dry aged meat



Guidelines for U.S. Dry-Aged Beef for International Markets



?

0,5 - 3 °C

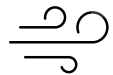
0 - 4 °C



?

75 - 85%

80 - 85%



?

0,2 - 0,5 m/s

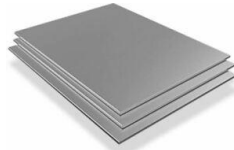
0,5 - 2 m/s

Parametri di processo estrinseci - essiccazione

> Ital J Food Saf. 2023 Aug 1;12(3):11109. doi: 10.4081/jfs.2023.11109. eCollection 2023 Aug 2.

Reduction of the microbial load in meat maturation rooms with and without alkaline electrolyzed water fumigation

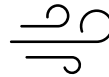
Federica Savini ¹, Federica Giacometti ¹, Sean Alberto Cuomo ², Federico Tomasello ¹, Yitagele Terefe Mekonnen ¹, Fulvia Troja ¹, Valentina Indio ¹, Marco Tassinari ¹, Alessandra De Cesare ¹, Andrea Serrano ¹



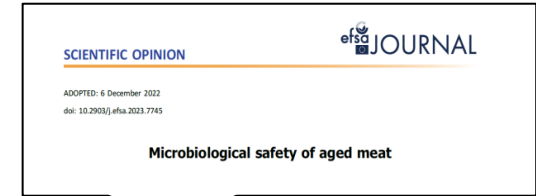
1 °C



78%



1,8 m/s



Applying the highest air flow at the start of the aging process to facilitate early crust development and reduce the surface a_w .

	Pre-trattamento Log UFC/cm ² mean (±SD)	Post-trattamento Log UFC/cm ² mean (±SD)	Riduzione microbica ΔLog UFC/cm ² mean (±SD)
<i>E. coli</i>	3,83 (± 0,27)	0	3,83 (± 0,27)
<i>Salmonella spp.</i>	3,53 (± 0,07)	0,88 (± 0,78)	2,65 (± 0,822)
<i>L. monocytogenes</i>	3,11 (± 0,29)	0,39 (± 0,67)	2,75 (± 0,88)
<i>S. aureus</i>	5,19 (± 0,44)	4,08 (± 0,64)	1,11 (± 0,22)

Parametri di processo estrinseci - OSA -



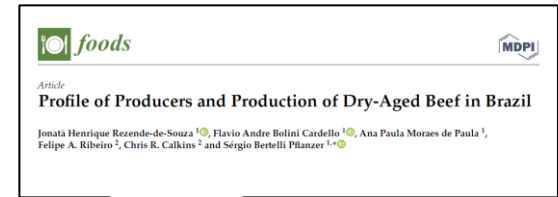
Table A.1: Conditions reported for dry-ageing beef in response to the questionnaire, provided by food business operators (FBO) or associations of FBOs

Respondents	EU/MS	Time between slaughter and ageing (d)	Duration (days)	RH (%)	Specified T (°C)	Actual T (°C)	Specified meat T (°C)	Min-max meat T (°C)	Mean meat T (°C)	Start pH ^(b)	End pH ^(b)	Start a _w	End a _w
1	EU	-	-	< 85	0-4	-	-	-	-	-	-	-	-
	EU	1-5	Usually between 21-50 but up to 70 days	80 max	0-2	0-2	0-2	0-2	-	5.80 max (core)	-	-	-
2	AT	3	21-35	72 (min. 62-76 max)	1-4	1-4	-	Start: 1-4, End: 1-4	-	5.4-5.8	-	-	-
	ES	2	21	80	2-3	-	-	2-3	-	5.8 max	-	0.98	0.81
3	ES		60	80	2	-	-	-	-	5.4	-	-	-
4 ^(a)	DE	2	21-28	80	0.5-2	-	-	-0.5 min; 4 max	-	5.9-5.7	6.2	-	-
5	BE	1-2	21-28	80 (75-85)	0-2	-	-	Start: 4° During process: 0-2°	-	-	-	-	-
6	BE	3 max	42 max	75-85	1	-	-	-	-	-	-	-	-
7 ^(a)	DE	2 to 7	21 min	90, varies depending on temperature	1-4	1-4	7 max upon receipt decreasing to 1-4	-	-	-	-	-	-
8 ^(a)	DE	1 to 2	21 max	70	2	-	-	-	2 ± 0.5	5.8	-	-	-
9 ^(a)	DE	4 to 6	21, min 30 mean	75	0.5	-	-	-	< 1	-	-	-	-
14	FR	1-3	28	-	0-4	-	-	-	-	5.7 at 24 h	-	-	-
Belgian survey	BE	1-21	14-77	Set 40-75 Read 46-84 Measured 39-95	-	Programmed -1-3	-	Read (display) T: 1-3.5 Measured T: -1.2°C-6.6	-	5.4-5.7 (core)	-	-	-

(a): Replies to the questionnaire provided by the hearing expert.
 (b): Surface unless otherwise stated.

0 – 4 °C ?/40% – 85%

1-4°C, HR 75-85%



-1 – 4 °C



<60% – ?/ >80%



0,7 – 5,2 °C



64,8 – 92 %

0,5 – 2 m/s



Table E.1: The conditions and corresponding meat parameters reported for dry-ageing beef in the scientific literature

Conventionally dry-aged beef								
Conditions				Surface parameters			References	
T (°C)*	RH (%)	Airflow (m/s)	Pre-ageing time (days)	Ageing time (days)	pH	a _w		Surface T (°C)
0	68-70	Forced ventilation cell	5	13, 36, 110, 170 and 290	5.69-6.00	0.965-0.953	-	Smaldone et al. (2019)
-0.6 ± 1.8	78 ± 9.3	-	9	14, 21, 28 and 35	-	-	-	Laster et al. (2008)
0.5 ± 0.5	85	0.2-0.5	1	0, 7, 14, 21 and 28	5.6-5.8	-	-	Kahraman and Gurbuz (2019)
2 ± 1	75 ± 10	2.5	-	0, 7, 14, 21, 28, 35	5.7-5.9	-	-	Oh et al. (2019b)
1	85	0.5	5	30	-	-	-	Kim et al. (2020)
1	85	2-7	-	28	-	-	-	Kim et al. (2019b)
1	80-85	0.2-0.3	5	40	-	-	-	Kim et al. (2019a)
1 ± 1	85 ± 10	2-7	-	28	-	-	-	Oh et al. (2018)
1 ± 0.5	80-85	0.5-1.5	12	20 and 40	-	-	-	Kim et al. (2017a)
1	78	1.5	-	17	-	-	-	Kim et al. (2017b)
1	75-85	5 ± 3	-	28	-	-	-	Lee et al. (2017)
1	73-76	0.2-0.5	-	21	-	-	-	Kim et al. (2017a,b)
1	70	-	-	14, 21, 28, 35, 42, and 49	-	-	-	Lepper-Billie et al. (2016)
1 ± 2	70-100	-	-	14	-	-	-	Knudsen et al. (2011)
1.6	-	-	2	13	5.6	-	-	Stenstrom et al. (2014)
1 ± 1	85 ± 2	0.5 ± 0.2	-	12 to 36	5.6-5.7	-	-	Hulankova et al. (2018b)
1 ± 2	83 ± 11	-	2	14, 21, 28 and 35	-	-	-	Smith et al. (2008)
2 ± 1	85	2	-	0, 20, 24, 40, and 50	-	-	-	Utama et al. (2020)
0-4	75	0	-	0, 14, 21, 28	-	-	-	Oh et al. (2019a)
1-3	75	2.5	-	0, 14, 21, 28	-	-	-	Oh et al. (2019a)
1-3	75	5	-	0, 14, 21, 28	-	-	-	Oh et al. (2019a)
1-4	80-90	-	-	3, 25, 40, 50 and 60	-	-	-	Ryu et al. (2018)
1-4	80-90	-	-	4, 11, 20, 30, 40, 50 and 60	-	-	-	Iida et al. (2016)



Conventionally dry-aged beef								
Conditions				Surface parameters			References	
T (°C)*	RH (%)	Airflow (m/s)	Pre-ageing time (days)	Ageing time (days)	pH	a _w		Surface T (°C)
2	50	0.8	-	42	5.5	0.99	-	Ribeiro et al. (2021a)
2	85	1.5	2	0, 7 and 14	5.5-5.6	-	-	Shi et al. (2020)
2 ± 1	75 ± 2	2 ± 0.5	3	0, 7, 14, 21, 28, 35, or 42	5.5	0.99 (day 0) 0.97 (day 7) 0.93 (day 42)	-	da Silva et al. (2019)
2	65/75	2.5	-	20-60	-	-	-	Ha et al. (2019)
2 ± 1	75 ± 10	2.5	-	0, 7, 14, 21, 28 and - 35	-	-	-	Oh et al. (2019b)
2	78	0.2	7	28	-	-	-	Berger et al. (2018)
2	-	-	2	14	-	-	-	Jiang et al. (2010)
2.2	50	-	-	21 and 28	5.5	-	-	DeGeer et al. (2009)
2.5 ± 0.3	87 ± 2.6	"Normal cooler conditions"	11	21	5.7	-	-	Ahnstrom et al. (2006)
2.6 ± 0.4	-	"Normal cooler conditions"	11	14	5.5	-	-	Ahnstrom et al. (2006)
2.9	90	1.8-2.5	-	35	5.6	-	-	Mikami et al. (2021)
2.9	91	-	6	14	5.6	-	-	Li et al. (2013)
2.9	-	-	2	8 and 19	5.58-5.63	-	-	Li et al. (2014)
3	49-55	0.2-0.5	-	21	-	-	-	Kim et al. (2017a,b)
3	80	0.25	-	28	-	-	-	Tittor et al. (2011)
3.5 ± 1.5	75-100	0-0.6	-	14	-	-	-	Knudsen et al. (2011)
4	75	2.5	-	28	-	-	-	Kim et al. (2019b, 2020)
4 ± 2	-	-	-	0, 7, 14, 21, 28, 42 and 63	5.5-6.8	-	-	Lee et al. (2019)
4	75	0, 2.5 and 5	-	14 and 28	5.6-6.0	-	-	Lee et al. (2019)
4	75	2.5	-	28	5.75	-	-	Lee H.J. et al. (2018)
4	-	-	-	7, 14, and 21	5.6-5.7	-	-	Gudjonsdottir et al. (2015)
4.0 ± 1.1	98.1	-	2	35	-	-	-	Smith et al. (2014)
8 ± 1	75 ± 2	2 ± 0.5	-	0, 7, 14, 21, 28, 35, and 42	5.5	0.95-0.88	-	da Silva et al. (2019)

*: The measured surface temperature when provided or when not provided the temperature setting in the chill room/chamber.

0.5 – 2.5 m/s

-0,6 - 8°C

?/50 - 90%

0 – 4°C, HR 75–85%, 0.5–2.5 m/s

Parametri intrinseci

a_w 0,95 - 0,99

pH 5,5 - 5,9



15 giorni



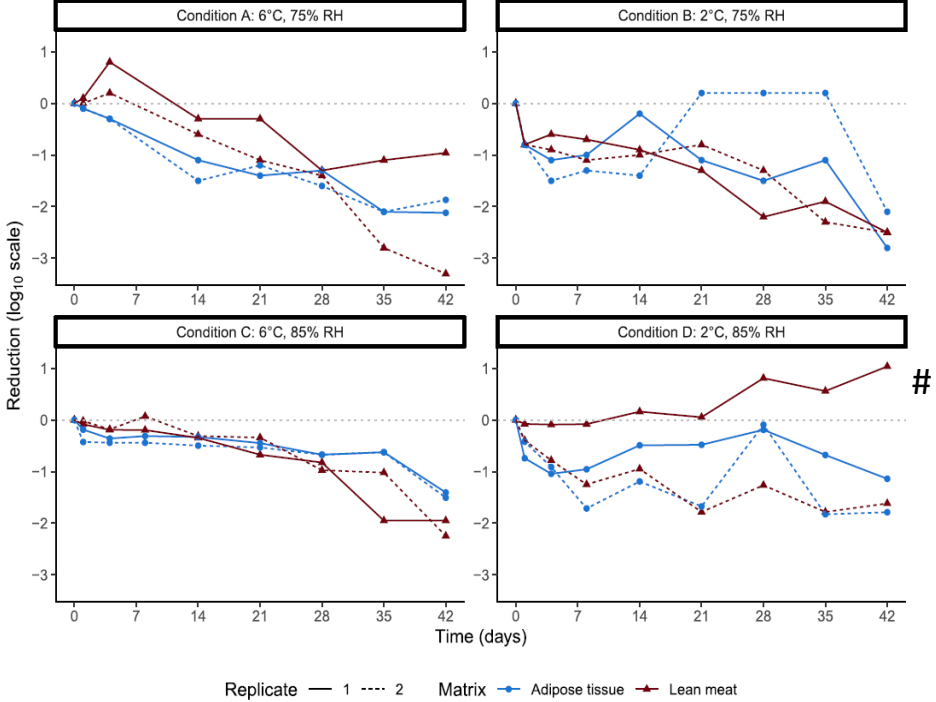
3 mesi



6 mesi



8 mesi



pH > 6

01

Definizioni e parametri

- ✓ Gli autori e le linee guida sono generalmente in accordo sul fatto che temperatura, ventilazione e UR sono parametri importanti per un processo sicuro
- ✓ Il controllo di questi parametri è pertanto necessario
- ✓ Le attrezzature devono essere progettate e costruite per l'uso specifico
- ✓ Il pH della carne e l' a_w hanno un ruolo specifico nel controllo della crescita dei microrganismi
- ✓ Il pH ha un significato nella valutazione dell'evoluzione del processo

01

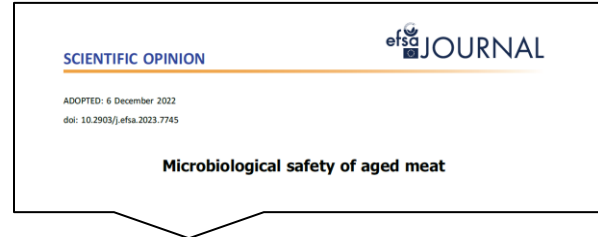
Definizioni e
parametri

02

Microbiologia
della superficie
della carne dry
aged

03

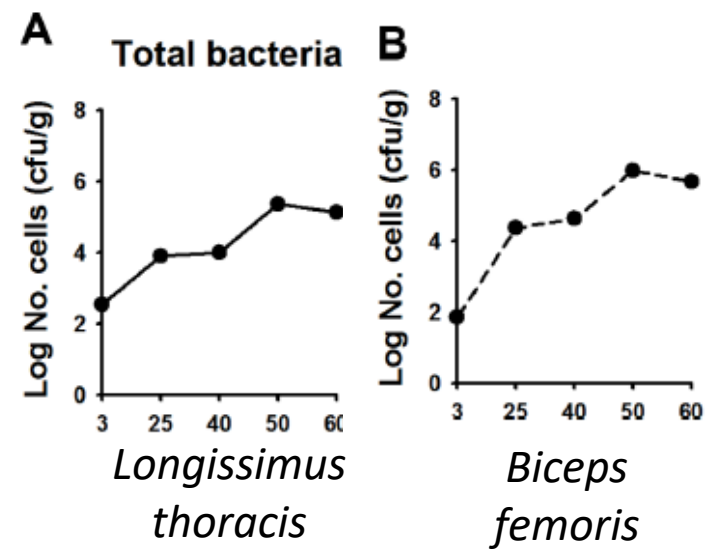
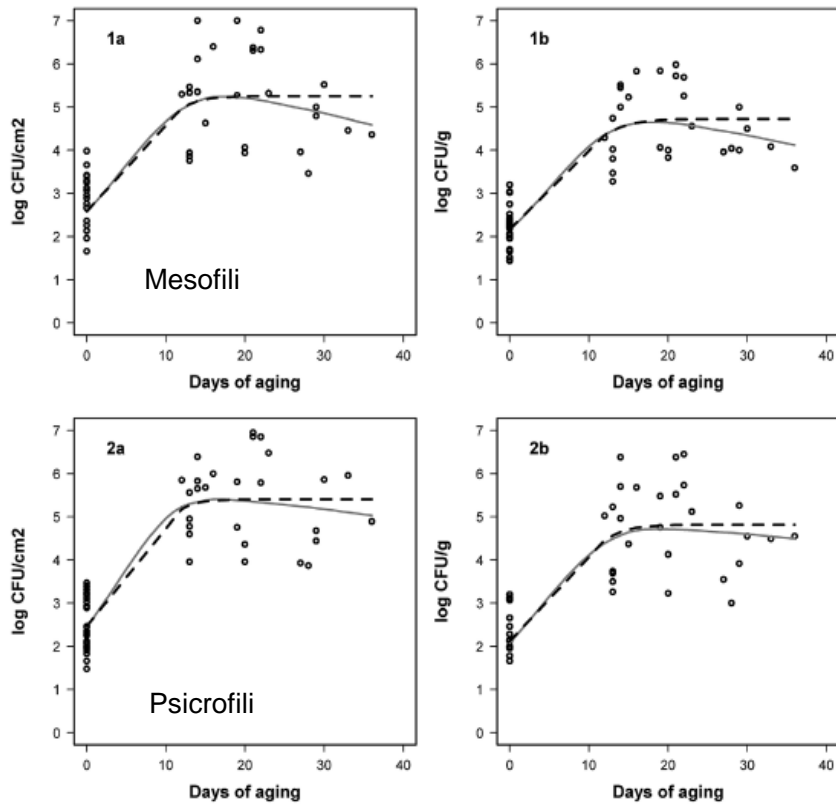
GMP
&
GHP



Regulation (EC) No 2073/2005 lays down a number of microbiological criteria that must be applied in any case:

- A food safety criterion being no detection of *Salmonella* in 25 g of minced meat and mechanically separated meat derived from dry-aged or wet-aged meat;
- Process hygiene criteria on *Salmonella*, *Enterobacteriaceae* and aerobic colony counts on carcasses of domestic ungulates;
- Process hygiene criteria on *E. coli* and aerobic colony counts on minced meat and mechanically separated meat
- *Listeria monocytogenes*??

Carica Batterica Totale



Crescita durante processo produttivo

Enterobacteriaceae

Contents lists available at ScienceDirect
Food Microbiology
 journal homepage: www.elsevier.com/locate/fm

Exploring the microbiological quality and safety of dry-aged beef: A cross-sectional study of loin surfaces during ripening and dry-aged beef steaks from commercial meat companies in Belgium

Contents lists available at ScienceDirect
LWT - Food Science and Technology
 journal homepage: www.elsevier.com/locate/lwt

The effect of dry aging on instrumental, chemical and microbiological parameters of organic beef loin muscle

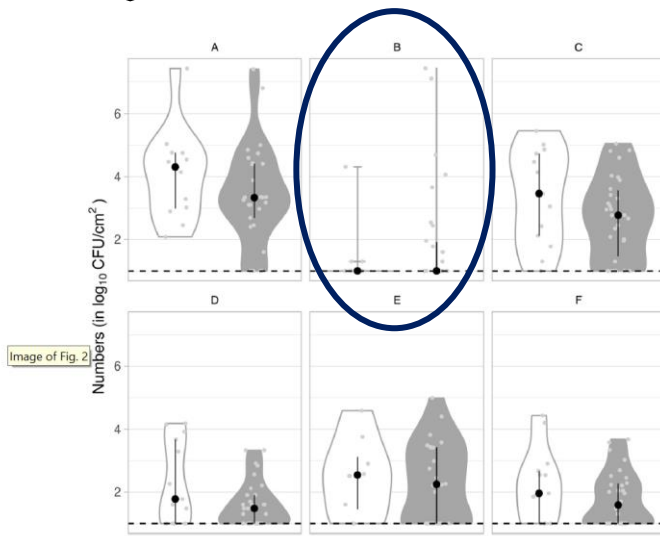
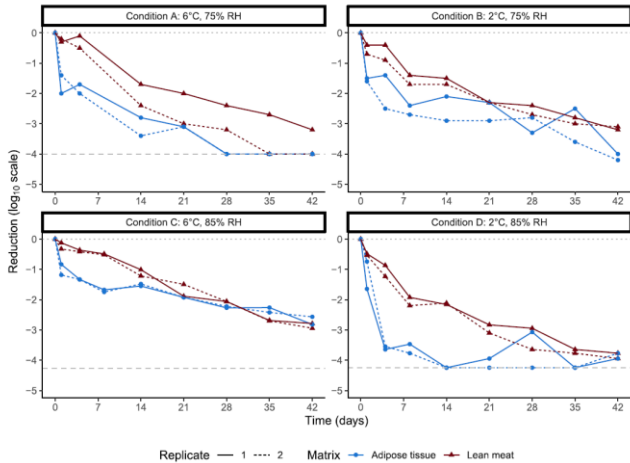


Fig. 2. Violin plot of microbiological counts on the surface of dry-aged beef loins (white, $n = 13$) and dry-aged beef steaks after trimming (grey, $n = 30$). Mirrored density plots including the median, the first and third quartile are shown. The limit of detection ($1 \log_{10} \text{CFU/cm}^2$) is shown using a horizontal dashed line. A: total psychrotrophic aerobic bacteria; B: *Enterobacteriaceae*; C: *Pseudomonas* spp.; D: *B. thermosphacta*; E: psychrotrophic lactic acid bacteria; F: yeasts.

The family *Enterobacteriaceae* were beneath the limit of detection for both the fresh and aged meat and failed to show any trend during storage (60 giorni).



Riduzione media
4 log₁₀ CFU/cm²

Non verificata crescita di
Salmonella sp. dopo 60 giorni
di maturazione



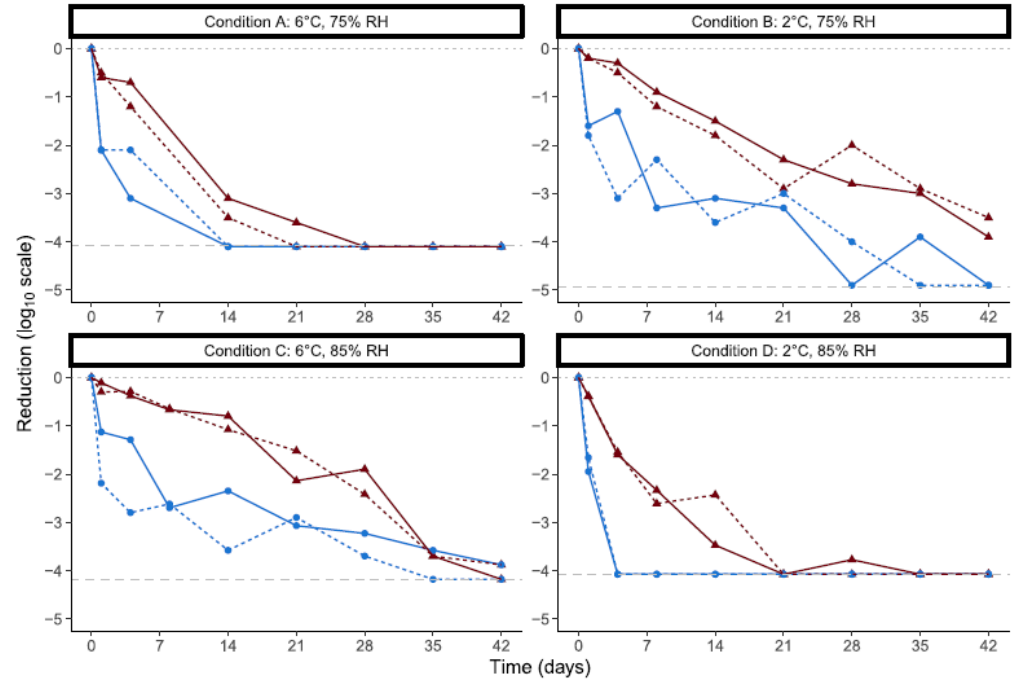
Strain	Strain ID	Reduction coefficient* (log ₁₀ /day)	D-value† (days)	Duncan grouping‡
<i>Salmonella</i> Dublin	MS14334	-0.190 ± 0.0117	5.25 ± 0.323	A
<i>Salmonella</i> Newport	MS20857	-0.179 ± 0.0122	5.59 ± 0.381	A
<i>Salmonella</i> Infantis	MS20855	-0.163 ± 0.0122	6.15 ± 0.463	A
<i>Salmonella</i> Typhimurium DT104	MS14329	-0.143 ± 0.0122	6.99 ± 0.597	A
<i>Salmonella</i> Enteritidis PT8	MS20848	-0.124 ± 0.0122	8.07 ± 0.796	B

Coefficiente riduzione
0,216 log₁₀/giorno (*S. Typhimurium*)
0,113 log₁₀/giorno (*S. Enteritidis*)

J Microbiol Methods 229 (2018) 2071–2078
<https://doi.org/10.1016/j.jm.2018.08.004>

Diversity and Characteristics of the Meat Microbiological Community on Dry Aged Beef
 Sangdon Ryo^a, Mi Ri Park^a, Brighton E. Maburaho^a, Woong Ji Lee^a, Dongjun Park^a, Soobyan Cho^a, Inho Hwang^a, Sangnam Oh^{a,*}, and Youngsoo Kim^{a,b}

Non verificata crescita di *E. coli* O157:H7 dopo 60 giorni di maturazione



Replicate — 1 ---- 2 Matrix —●— Adipose tissue —▲— Lean meat

Coefficiente di riduzione:
 0.09 -0.14 log₁₀ CFU/giorno

E. coli O157:H7 e Salmonella Dry Chilling

Journal of Food Protection, Vol. 74, No. 2, 2011, Pages 289-293
doi:10.4315/JFP-10-295
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Research Note

Effects of Simulated Dry and Wet Chilling and Aging of Beef Fat and Lean Tissues on the Reduction of *Escherichia coli* O157:H7 and *Salmonella*

3 °C

0.25 m/s

80%

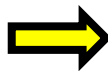


TABLE 1. The effects of chilling and aging method and tissue type on the least-squares means of *Escherichia coli* O157:H7 counts over time from *E. coli* O157:H7-inoculated fat and lean tissue subjected to dry chilling and aging or wet chilling and aging^a

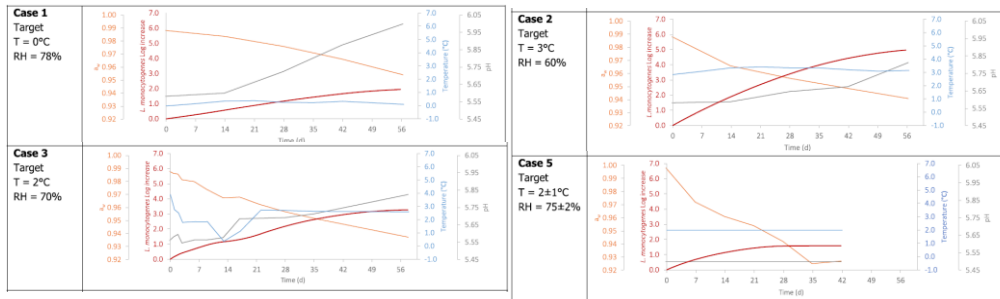
Time	Chilling and aging method		SEM ^b	P value	Tissue			P value
	Dry	Wet			Fat	Lean	SEM	
0 h	5.79	5.88	0.25	0.63	5.64 y	6.03 x	0.25	0.04
24 h	4.72 A	4.03 B	0.15	<0.01	3.96 y	4.79 x	0.15	<0.01
36 h	4.60 A	4.06 B	0.09	<0.01	3.94 y	4.72 x	0.09	<0.01
48 h	4.14	4.02	0.19	0.49	3.83 y	4.33 x	0.19	0.01
7 days	2.87 B	3.84 A	0.31	0.04	2.72 y	3.98 x	0.31	0.01
14 days	2.55 B	3.50 A	0.20	<0.01	2.53 y	3.52 x	0.20	<0.01
21 days	1.86 B	3.40 A	0.32	<0.01	1.95 y	3.32 x	0.32	<0.01
28 days	1.03 B	3.67 A	0.43	<0.01	2.31	2.39	0.43	0.86

TABLE 2. The effects of chilling and aging method and tissue type on the least-squares means of *Salmonella* counts over time from *Salmonella*-inoculated fat and lean tissue subjected to dry chilling and aging or wet chilling and aging^a

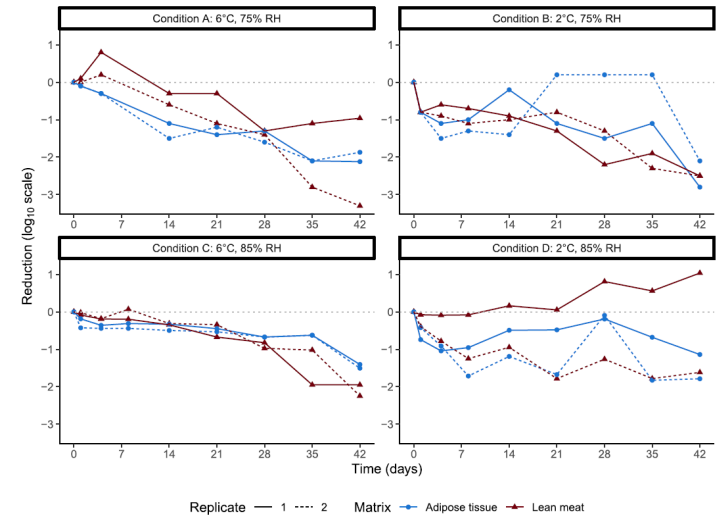
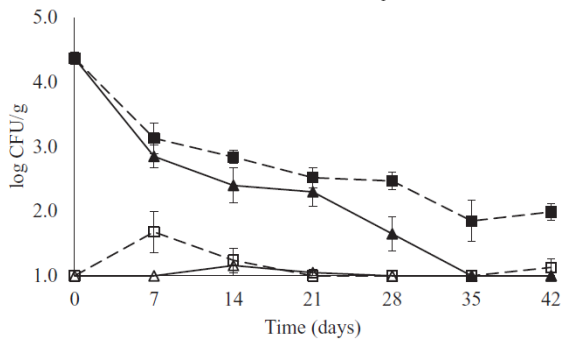
Time	Chilling and aging method		SEM ^b	P value	Tissue			P value
	Dry	Wet			Fat	Lean	SEM	
0 h	5.90	5.91	0.23	0.92	5.74 y	6.06 x	0.23	0.02
24 h	4.83 A	4.55 B	0.11	<0.01	4.34 y	5.04 x	0.11	<0.01
36 h	4.62	4.37	0.18	0.20	4.29 y	4.70 x	0.18	0.04
48 h	4.28 A	3.92 B	0.11	0.02	3.62 y	4.58 x	0.11	<0.01
7 days	3.35	3.55	0.16	0.38	2.98 y	3.91 x	0.16	<0.01
14 days	2.61	3.15	0.24	0.12	2.48 y	3.27 x	0.24	0.03
21 days	1.82 B	3.44 A	0.25	<0.01	2.49	2.67	0.25	0.62
28 days	1.25 B	3.67 A	0.23	<0.01	2.01 x	0.92 y	0.23	0.04



Listeria monocytogenes

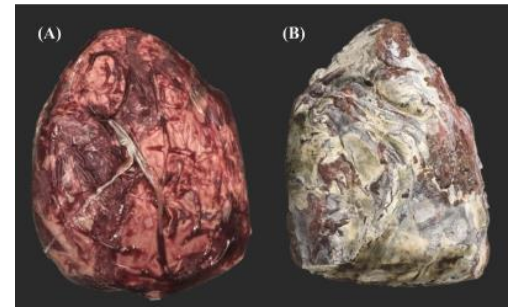
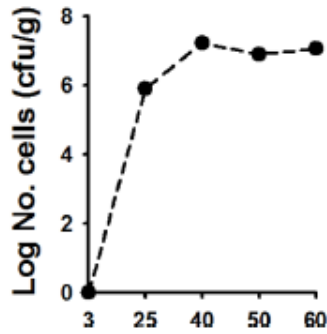
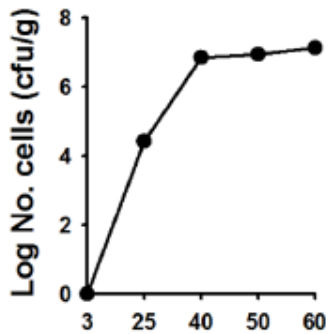


L. monocytogenes potrebbe crescere in condizioni di refrigerazione (0 – 4°C)

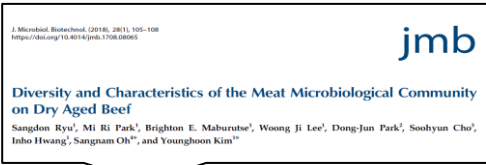


Ammuffimento

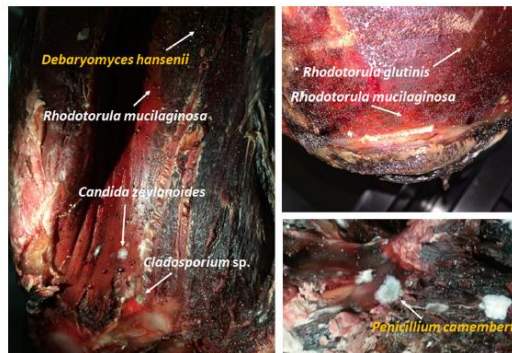
Yeast/mold



🌡️ 2,9 °C
 💧 90%



🌡️ 1 - 4 °C
 💧 80 - 90%



What if mould grows on the meat during the dry ageing process?
 If mould grows, it means **your process has failed** because of one or more of the following reasons:

- Temperature and/or relative humidity** have exceeded the upper limit of your range – the meat has been stored too warm and too moist for too long.
- Lack of airflow** across all parts of the ageing chamber.
- Meat not set up in the chamber so that all surfaces receive a **flow of cold, dry air**.

For Corrective Action:

- If the moulding is extensive then you should **discard it to waste**.
- If there are only small areas where the airflow has not penetrated you can trim them to waste and make the meat wholesome for sale.

Ammuffimento

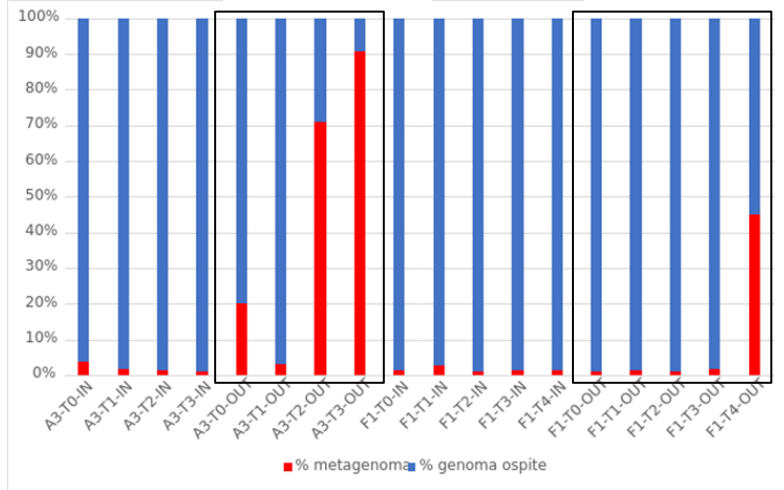
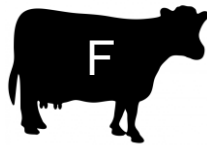
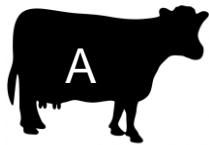


Reg 178/2002
Art 14

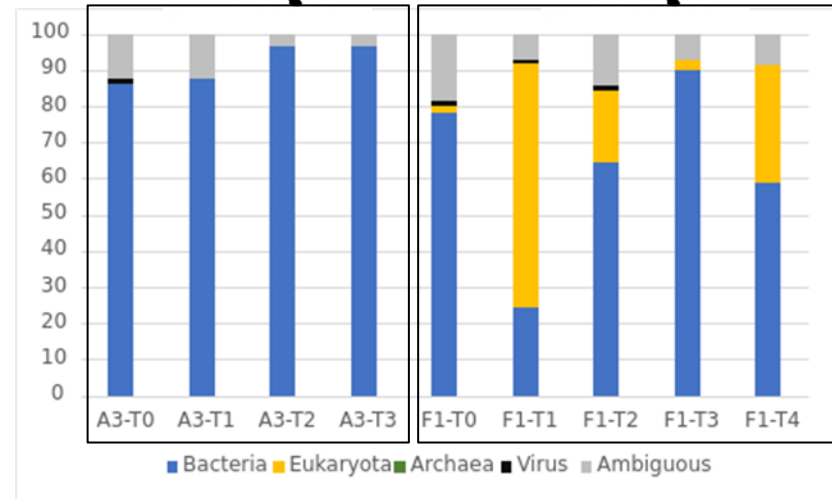
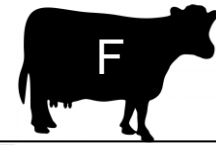
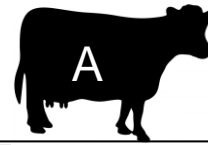


La nostra esperienza - Metagenomica

3 Costate di Frisona Italiana - fresca non confezionata -
 3 costate di Black Angus - fresca sottovuoto-
 maturate per 90 giorni e campionate a 30, 45, 60 e 90 giorni

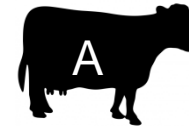
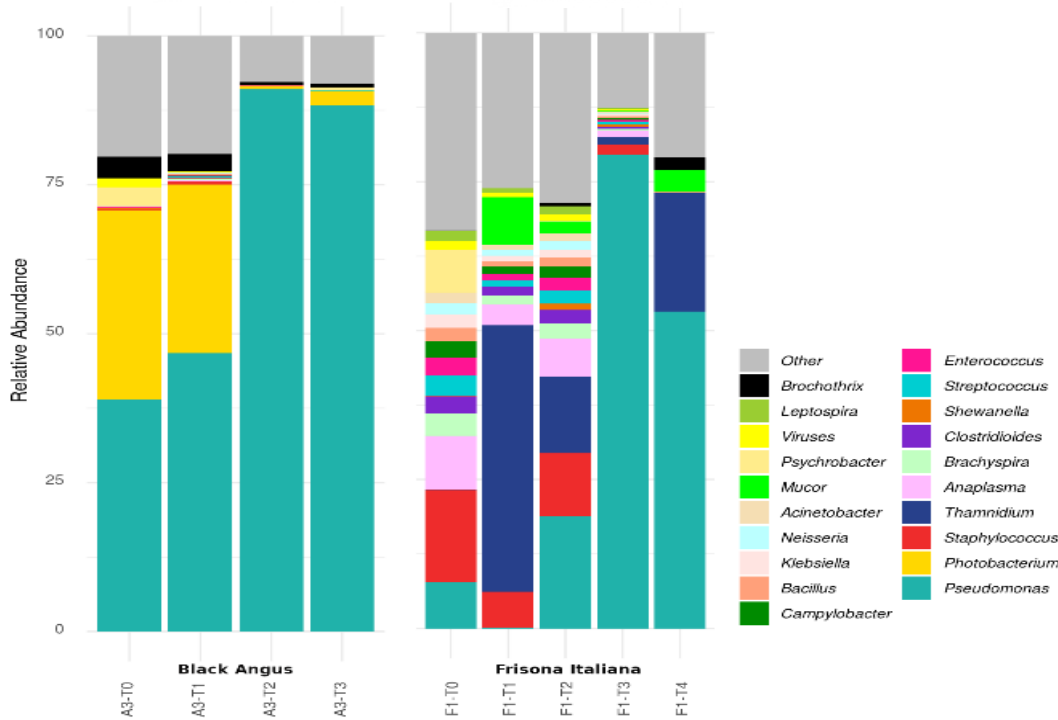
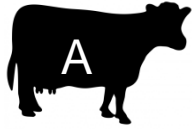


Genoma estratto



Composizione dei domini

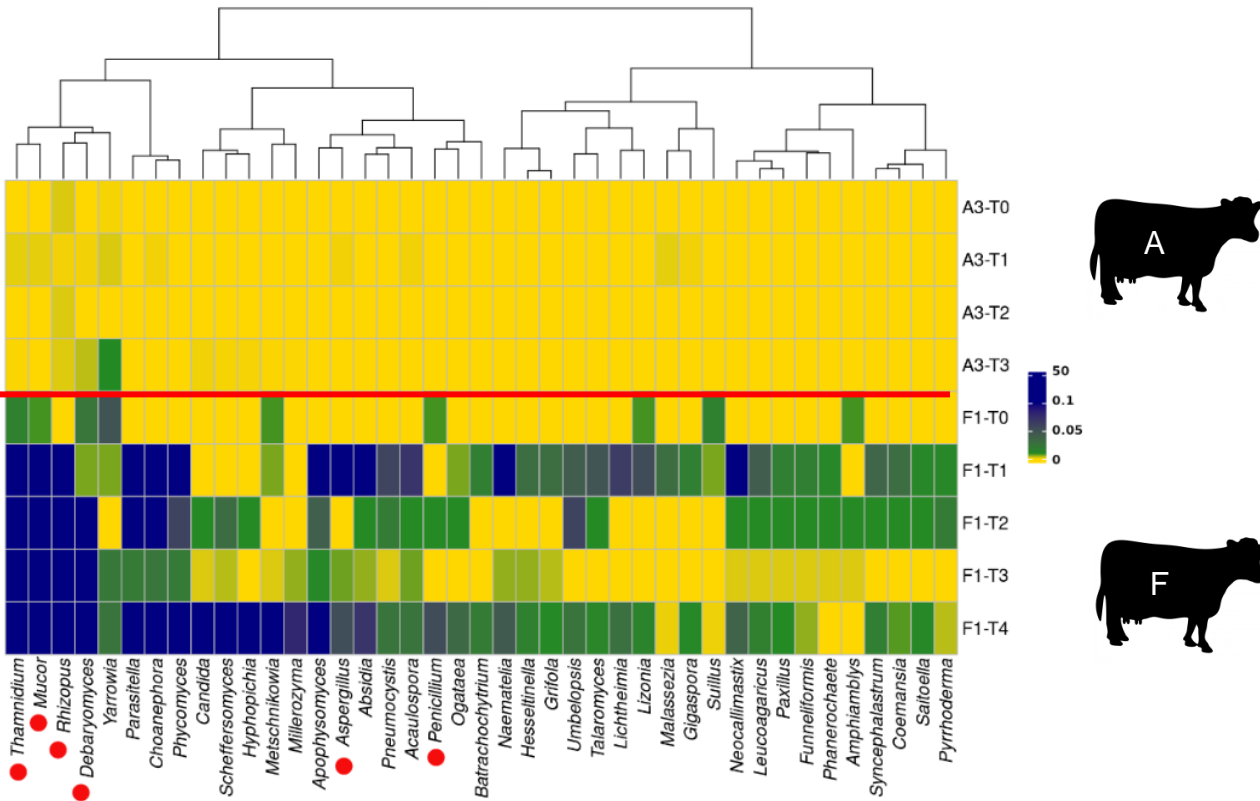
Generi più rappresentati



Minore variabilità
Alta presenza di *Photobacterium*
Preponderanza di *Pseudomonas* da T0



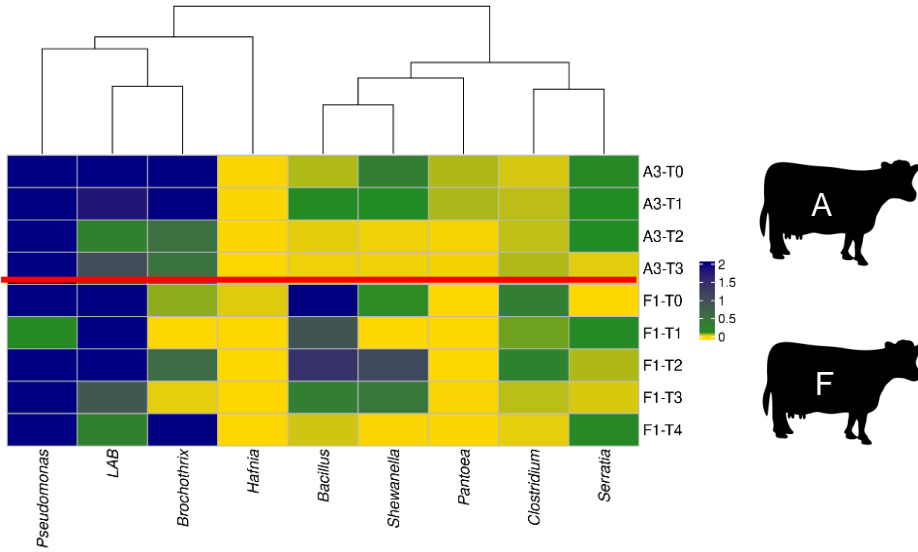
Maggiore variabilità
Pseudomonas in crescita da 45 gg
Pseudomonas preponderante da 60 gg



Assenza di ammuffimento visibile

Componente degradativa

Abbondanza totale non discriminativa rispetto alla razza

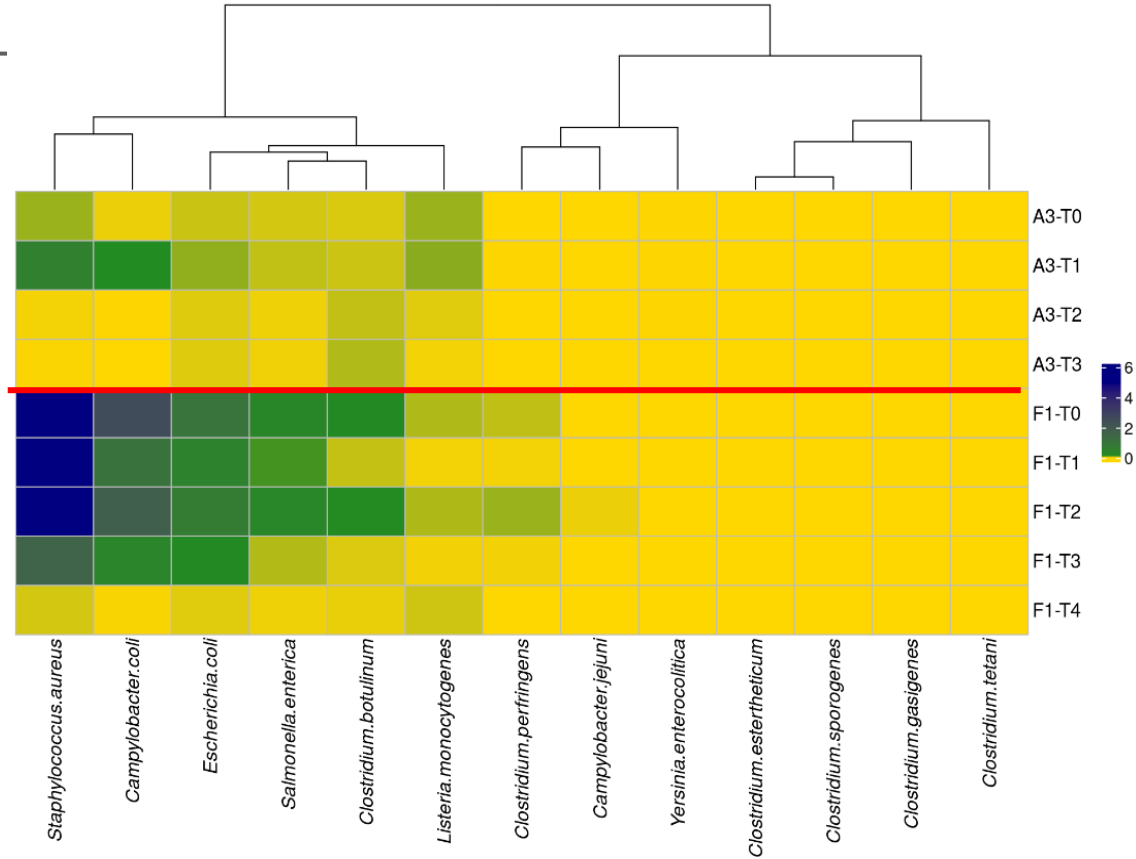
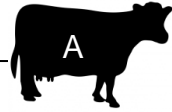


Pseudomonas
Brochothrix



Batteri patogeni

Staphylococcus aureus
Campylobacter coli
Listeria monocytogenes



02

Microbiologia della superficie della carne dry aged

- La carica batterica esterna aumenta normalmente durante la maturazione della carne, ma senza spoilage delle parti profonde: la carica batterica totale non è un buon indicatore di igiene del processo.
- Gli enterobatteri diminuiscono durante il processo così come i microrganismi patogeni appartenenti alla Famiglia: il contenuto atteso è inferiore a quello della carne fresca.
- Le muffe sono in grado di moltiplicare, ma non di produrre tossine; se le condizioni sono controllate non si verifica l'ammuffimento della carne.
- Gli anaerobi non sono in grado di moltiplicare.
- Non ci sono dati pubblicati per *Yersinia enterocolitica* e per *S. aureus*, per *Campylobacter*, e *Clostridium*.

02

Microbiologia della superficie della carne dry aged

- L'EFSA riporta che a 3°C e 75% UR le simulazioni effettuate predicono un aumento di 2 Log₁₀ in 35 giorni - sovrastima;
- La bibliografia riporta (tranne in un caso) la decrescita di *Listeria* durante il dry aging;
- I processi devono essere validati perché non ancora standardizzati.

01

Definizioni e
parametri

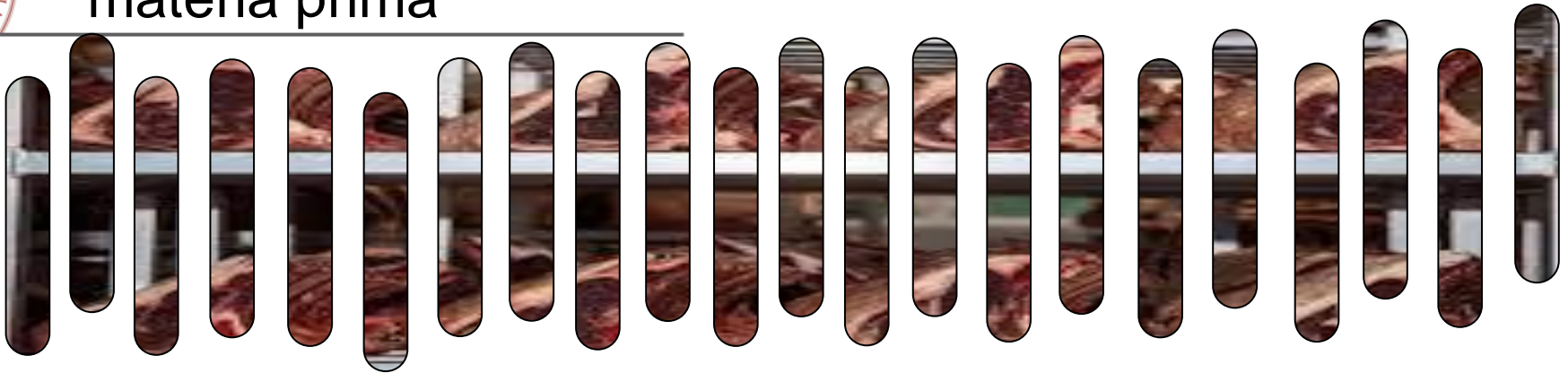
02

Microbiologia
della superficie
della carne dry
aged

03

GMP
&
GHP

GMP e GHP– Ricevimento e preparazione della carne materia prima



Utilizzare carne fresca entro 5
giorni dalla macellazione (MLA
2016)

Se si utilizza carne sottovuoto
preferire carne entro 10 giorni
dalla macellazione (MLA 2016)

pH compreso tra 5.5 e 6.2
(EFSA 2023); (<6 UNIBO)

Temperatura della carne < 5 °C
(MLA 2016); <7 °C (Reg.
853/2004)

GMP e GHP– Ricevimento e preparazione della carne materia prima

Tagli più adatti: verificare l'assenza di fessurazioni o cavità superiori ai 5mm

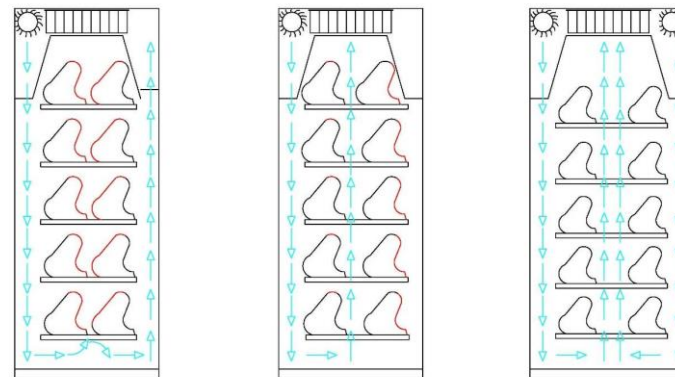


GMP e GHP – Caricamento della carne

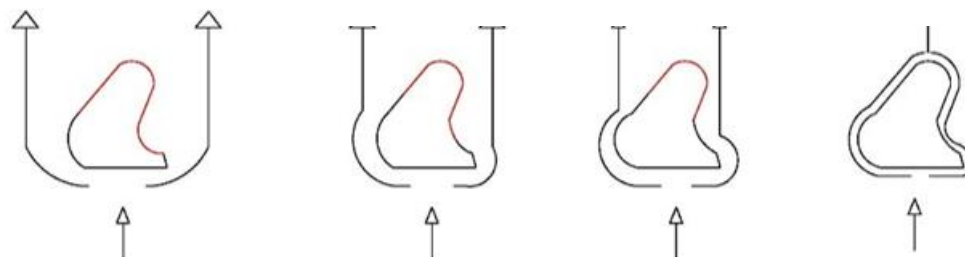
Utilizzare solo celle appositamente progettate.

Le griglie devono permettere un adeguato passaggio dell'aria.

Le attrezzature dovrebbero permettere il filtraggio dell'aria o un adeguato rinnovo.



Caricare quando i parametri operativi impostati sono stati raggiunti



Posizionare la carne su ogni griglia ad una distanza di almeno 3 cm una dall'altra.

Non posizionare sulle griglie oggetti che possano ostacolare la circolazione dell'aria



GMP e GHP – Caricamento della carne

Posizionare la carne su ogni griglia ad una distanza di almeno 3 cm una dall'altra.

Non posizionare sulle griglie oggetti che possano ostacolare la circolazione dell'aria



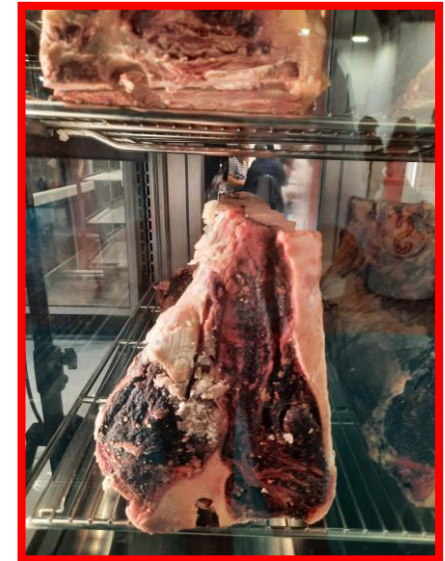
GMP e GHP – Caricamento della carne

Se si decide di maturare la carne appesa ai ganci, questi vanno inseriti dall'osso e disinfettati prima di essere utilizzati.



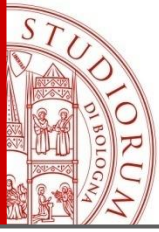
GMP e GHP – Maturazione della carne

- Controllare durante la maturazione la comparsa di irregolarità di superficie, ed eventualmente stuccarle con grasso bovino
- I pezzi freschi da inserire in maturazione vanno caricati in basso per permettere lo sgocciolamento. Procedendo nel tempo vanno spostati in alto.
- Durante la maturazione verificare che non siano presenti muffe sulla superficie della carne.
- Pulire e disinfettare periodicamente le celle in tutte le parti, comprese le griglie.



- Effettuare la rifilatura della carne in un'area separata, facendola seguire da una disinfezione di superfici e strumenti utilizzati.
- Le rifilature non devono essere consumate se non previa cottura a cuore.
- La carne viene consumata cruda o cotta?
L. monocytogenes....
- Il tempo di conservazione della carne maturata sezionata è di 4 giorni a temperatura di refrigerazione (2 - 4°C), fino a 18 giorni se sottovuoto.





Grazie per l'attenzione

Federica Savini, Valentina Indio, Federica Giacometti