Results for today; Ideas for tom

Microbial interventions for carcases and carcase parts

January 2005

This information sheet should be read in conjunction with Meat Technology Update Newsletter 2/03 – Pathogen reduction interventions for carcases. The table below outlines some of the intervention technologies that are approved for application to beef carcases and/or carcase parts, and some technologies for which approval is currently being sought in the United States. For most of them, there is a reasonable amount of scientific and/or technical literature to support the claims for microbial reductions and their listed advantages and limitations.

Technology	Documented applications	Treatment time	Approx. microbial reduction	Advantages	Disadvantages, limitations	Regulatory status	Tradename, distributor or proponent
Organic acids (eg, acetic, lactic)	Carcases, primals, livers, lips, cheekmeat, tongue.	10-30 s, depending on T°C	1-2 logs	Applied by spray or immersion. Much literature on effectiveness	If used on primals, they may be wet for packaging; possible discolouration of lean, organoleptic problems; concerns about acid-resistant pathogens.	USDA approved - Not EU approved	Ecolab-CHAD FPE
Trisodium phosphate	Carcases, livers, lips, cheekmeat, tongues	10 s	0.7-1.5 logs		May have issues with phosphate removal and expensive disposal.	USDA approved – 21CFR182.1778	
Peroxyacetic acid	Carcases, primals	10 – 30 s	1.4 log	Low concentration	If used on primals they may be wet for packaging; possible discolouration of lean	USDA approved 21CFR173.370; FSANZ – Std 1.3.3	Ecolab-CHAD (Inspexx®)
Ozonated water	Carcases, primals	15 – 60 s	1-2 logs	Ozone dissipates quickly	If used on primals they may be wet for packaging; possible discolouration of lean at high concentrations, potential oxidation of fat	USDA approved – 21CFR173.368; FSANZ – Std 1.3.3	US companies - Pacific Ozone, Clean Air Water Sys., Ozone Safe Food
Irradiation (gamma rays)	Primals, ground beef	Several mins	2-6 logs	Able to treat packaged food	Expensive to install - central treatment facility only; consumer acceptance issues.	USDA approved – 21CFR179.26	Steritech

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Technology	Documented applications	Treatment time	Approx. microbial reduction	Advantages	Disadvantages, limitations	Regulatory status	Tradename, distributor or proponent
Irradiation (electron beam)	Primals, ground beef	Seconds		Able to treat packaged food	Expensive to install - central treatment facility only; consumer acceptance issues.	USDA approved – 21CFR179.26	SureBeam (no longer trading)
High pressure	Primals, ground beef, processed meats	0.5 – 5 min	Up to 4 logs	Increase shelf life by reducing initial microbial count	Expensive; systems not yet large enough; meat colour/texture changes		Flow
Pulsed electric fields (PEF)	Ground beef	<1 s	1 log		Works best for liquids so limited meat applications at present		PurePulse Technologies
Pulsed light	Primals	<1 – 10 s			Probably not suitable for opaque foods; not yet commercially viable for foods		PurePulse Technologies – suspended operations
Ultrasound	Primals	0.25 – 3 min	0.5-2 logs	Possible to treat VP food.	High power equipment required. Commercial development incomplete		Dr Hielscher, Etrema
Natural antimicrobials (ie. bacteriocins, nisin, reuterin etc)	Primals, processed meats, ground beef	Residual effect	1-2 logs	Spray application, then VP chilled storage, Used as a surface coating (in alginate).	Few published studies		Microgard
Hot water/steam pasteurisation	Carcases, primals	10-15s at 75-85°C.	1-3 logs	Can use in combination with chemicals for greater effect	If used on primals, they may be wet for packaging; possible discolouration of lean	No restrictions	

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Technology	Documented applications	Treatment time	Approx. microbial reduction	Advantages	Disadvantages, limitations	Regulatory status	Tradename, distributor or proponent
Acidified sodium chlorite	Carcases. Has potential for VP primals, pork tongues, beef trim	Up to 60s	Claimed to be up to 4 logs	Not affected by organic load.	If using strong acids as the activator, may need to consider storage and operator safety	USDA approved – 21CFR173.325; permitted by FSANZ	Vibrex - Grayson Australia, Zydox - Zychem Technologies, Sanover - Alcide Corporation (US)
Activated lactoferrin	Carcases, primals, ground beef		0.7-2.5 logs	Can be used on VP beef; natural product	If used on primals, they may be wet for packaging	USDA approval – 21CFR170.36; no specific EU regulation; permitted in Japan and Korea	Activin aLF Ventures DMV International
Cetylpyridium chloride (CPC)	Carcases, hide, trimmings	15-30 s at 1% CPC	1.5-2 logs on hides 2.1 logs on beef tissue	Effect on hide maintained up to 4 hrs (1 study); does not impact flavour, texture, appearance, or the odour of foods	Residual levels if used on meat at 1% CPC.	Currently undergoing USDA review	CHAD – wash cabinet Safe Foods Corp (Cecure)
Electrolysed water	Carcases, poultry, surfaces	Spray or dip		Salt is the only chemical used	Initial capital needed – but may be substantially cheaper than other methods.		Primacide - Electric Aquagenics Unlimited
Acidic calcium sulphate	Ground beef, ready-to-eat products			Makes pathogens (*Listeria*) more sensitive to heat eg. during temp abuse/cooking.	An additive not yet approved	Under consideration by USDA	$Safe_2O$