

The efficacy of teat disinfectant products – Which product should I choose?

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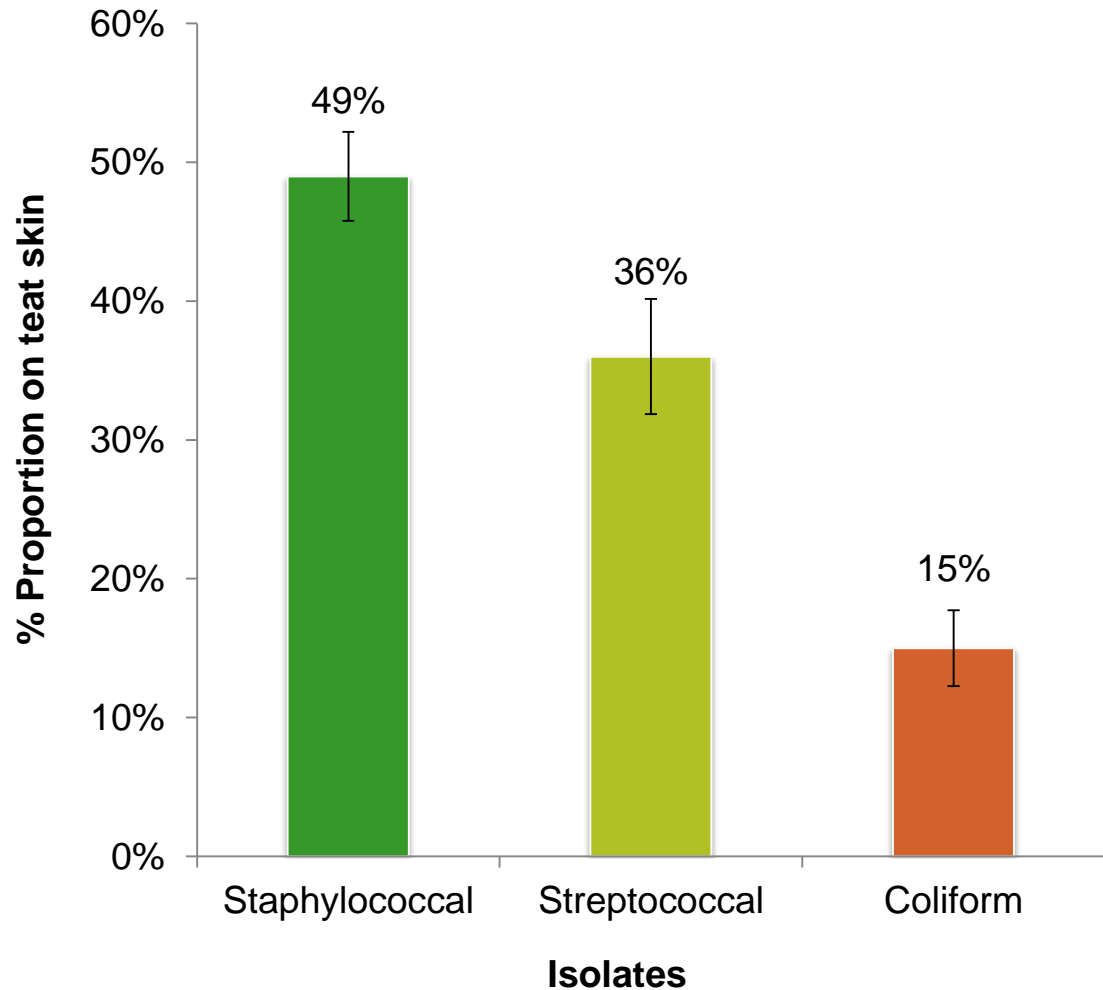
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Introduction

- Teat disinfection most important step in mastitis control
- Post milking teat disinfection will reduce clinical infections by 50%
- Approx. 100 teat disinfectant products available in Ireland
- Little knowledge on effectiveness of these products
 - Aim: evaluate effectiveness of all commercially available teat disinfectant products against mastitis-causing bacteria isolated from the environment of an Irish dairy herd

Proportion of isolates found on teat skin

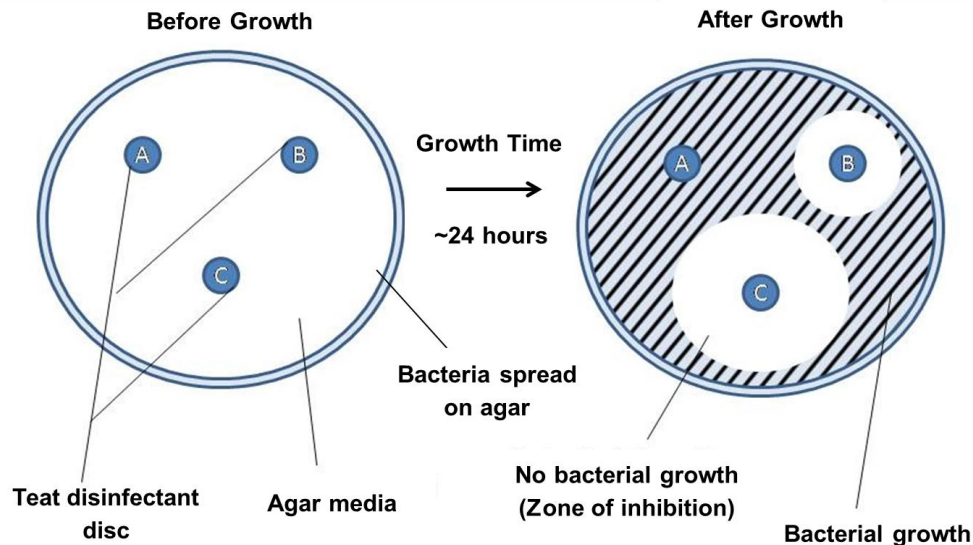
- Staphylococcal isolates most prominent group of bacteria on teat skin & in clinical quarter milk samples in Irish dairy herds



Two test methods used to evaluate teat disinfectant products

Disc Diffusion

- In lab test - Measures ability of antimicrobial agent to inhibit bacterial growth-previously used for antibiotic testing



Teat Swabbing

- Field test-Teat skin swab sample collected before and after teat disinfectant application



Materials and Methods-Disc Diffusion

- 99 teat disinfectant products sold in Ireland
- All products tested under the same conditions
 - bacteria isolated from cows teat skin
- 9 replicates of each test - results consistent
- The wider the zone of inhibition the more effective the product against that specific bacteria

Results – Disc Diffusion

- The disc diffusion method - effective method to evaluate/screen a large number of teat disinfectant products
- The most effective teat disinfectant product will have the largest zone of inhibition.
 - Therefore, choosing an all-round effective product against all 3 bacterial strains, a product with an average zone of inhibition of 19 mm or greater would be expected to be the most effective.
- Limitation of the disc diffusion test method:
 - Does not account for organic matter on teats, presumption that teats are clean
 - Field trials are required to fully determine the ability of products to reduce IMIs and measure the impact on teat condition

A sample of products tested

Table1: List of teat disinfectant products in alphabetical order, active ingredients and zones of inhibition against *Streptococcus uberis*, *Staphylococcus aureus* and *Escherichia coli*

Product	Ingredient (w/w)	<i>Str. uberis</i>	<i>Staph. aureus</i>	<i>E. coli</i>
Arkshield	5% Lactic acid & 0.3% Chlorhexidine	22	19	15
Arrabawn Udder Guard	0.5% Chlorhexidine	17	15	16
Bacto-Lac	5% Lactic acid & 0.05% Chlorhexidine	19	16	14
Barri-max	2.4% Lactic acid	20	16	14
Biolac PrePost	0.25% Lactic acid & 0.03% Salicylic acid	20	16	11
Biolac PrePost	0.25% Lactic acid & 0.03% Salicylic acid	21	15	12
Bisept	0.05% Chlorine dioxide	19	19	12
Blue Barrier Spray	Lactic acid & 0.6% Chlorhexidine	22	22	20
Blu-gard N Spray	3.46% Lactic acid	20	16	11
C-Dip	0.53% Chlorhexidine	18	16	16
Chlorhexsan Dual RTU	1.6% Lactic acid & 0.4% Chlorhexidine	16	15	13
Co-op Source Duo Teat Shield	2% Lactic acid & 0.3% Chlorhexidine	18	17	15
D 4 Iodine	0.5% Iodine	21	16	11
Dairy Pro UltraDip	3% Lactic acid	17	16	12
DairyLac SA	3% Lactic acid	19	15	12
Deosan Mastocide	0.5% Chlorhexidine	19	17	17
Deosan Summer Teat Care	0.425% Chlorhexidine	17	17	18
Deosan Super Iodip	0.5% Iodine	20	15	12

Products with the highest bacterial imbibition for Streptococcus uberis, Staphylococcus aureus and Escherichia coli

Streptococcus uberis		Staphylococcus aureus		Escherichia coli	
Product	Inhibition	Product	Inhibition	Product	Inhibition
Lactic Lather	28	Lactic Lather	25	Valiant	22
Topsan SC Plus	25	Blue Barrier Spray	22	Kenomix SD	21
Kenomix	23	Valiant	22	Hexaklene R	21
Maxadine C	23	Dual Dip Supreme	21	Blue Barrier Spray	20
Valiant	23	Kenomix SD	21	Lactic Lather	19
Arkshield	22	Topsan SC Plus	21	Dual Dip Supreme	19
Blue Barrier Spray	22	Uddergold	20	Kenomix	19
Dual Dip Supreme	22	Arkshield	19	Supergold	19
Flexigard Spray	22	Bisept	19	Flexigard Spray	18
Gold Glycodip XL ^	22	Flexigard Spray	19	Surespray	18

14 Products in alphabetical order with an average inhibition of 19 mm or greater when Staph. Strep. and E. Coli are considered.

Products with lower inhibition levels can also be recommended
Check if products are compliant with registration before purchasing

Product	ingredients	inhibition
Arkshield	5% Lactic acid & 0.3% Chlorhexidine	19
Blue Barrier Spray	Lactic acid & 0.6% Chlorhexidine	21
Dual Dip Supreme	2.5% Lactic acid & 0.6% Chlorhexidine	21
Flexigard Spray	4% Lactic acid	20
Hexaguard	0.74% Chlorhexidine	19
Hexaklene R	0.5% Chlorhexidine	19
Kenomix	0.0157% Chlorine dioxide	20
Kenomix SD	0.0157% Chlorine dioxide	21
Lactic Lather	1.6% Lactic acid & Hydrogen peroxide	24
Supergold	0.5% Chlorhexidine	19
Surespray	0.5% Chlorhexidine	19
Uddergold	0.32% Acidified sodium chlorite	19
Valiant	0.038% Sodium chloride	22

Levels of product ingredients as an indicator of effective products for post milking teat disinfection

- Chlorohexidine :
 - 0.5% or greater as main ingredient
 - 0.3% when combined with lactic acid
- Lactic acid:
 - 4% or greater as main ingredient
 - 2.5% when combined with chlorohexidine
- Chlorine dioxide:
 - 0.015 % or greater as main ingredient
- Iodine:
 - 0.5% as main ingredient

Results – Disc Diffusion

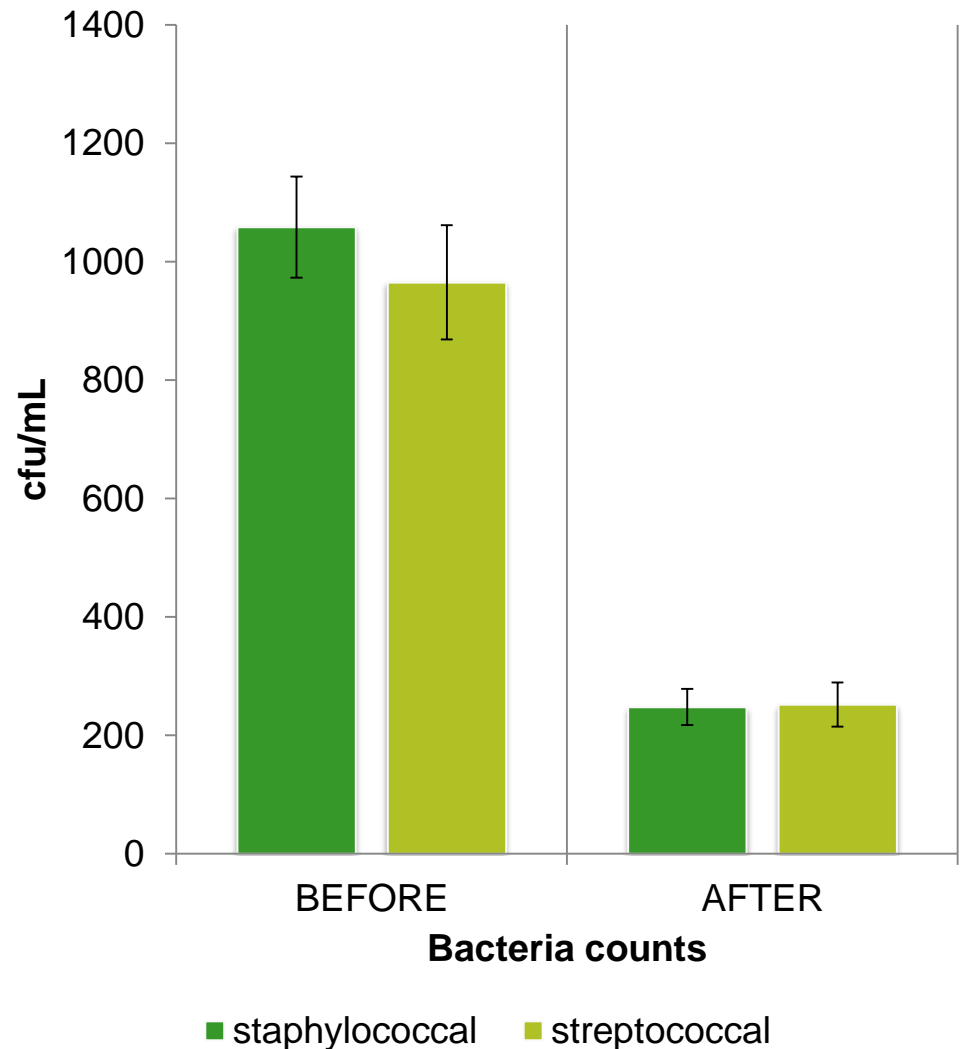
- All teat disinfectant products tested were effective against the main mastitis-causing bacteria (Staphylococcus aureus, Streptococcus uberis and Escherichia coli)
- Different products/ingredients more effective against specific strains of bacteria within the study.
- In this study the strains chosen were isolated from cow's teats in an Irish dairy herd.
- Iodine traditionally considered to be the most effective teat disinfectant
- This study has shown that there is a range of alternative teat disinfectant products comparable to iodine-based products.

Materials & Methods – Teat Swabbing

- In field test
- Teat skin swab sample collected before and after teat disinfectant application
- Determines reduction of bacterial load on the skin surface

Bacterial reduction on teat skin after disinfection

- Overall reduction:
 - 76% for staphylococcal
 - 73% for streptococcal
 - 60% for coliform
- Bacterial reduction differed:
 - Depending on bacteria isolated
 - Teat disinfectant product



Streptococcal isolates on the teat skin			Staphylococcal isolates on the teat skin		
Products tested on cows teat skin Result shown as a percent reduction of bacteria on the teat skin			Products tested on cows teat skin Result shown as a percent reduction of bacteria on the teat skin		
Product	% Reduction	Pre /Post	Product	% Reduction	Pre/Post
Lactic Lather	90	Pre	Dual Dip Supreme	100	Pre/Post
Virolac Film	78	Pre/Post	Super Cow Teat Foam	95	Pre/Post
Masodine 1:3 Concentrate	74	Pre/Post	C-Dip	83	Post
Super Cow Teat Foam	72	Pre/Post	Sure spray Duo	82	Pre/Post
Gold Glycodip XL	71	Pre/Post	Blue Barrier Spray	79	Post
Lacto-Mil	70	Pre/Post	Masodine 1:3 Concentrate	78	Pre/Post
Arrabawn Udder Guard	66	Pre/Post	Kenolac SD	78	Post
Flexigard Spray	61	Post	Gold Glycodip XL	76	Pre/Post
Hexa-cel RTU	61	Pre/Post	Protect Pre Post	72	Pre/Post
Kenomix	61	Post	Lacto-Mil	67	Pre/Post

11 Products recommended by manufacturers for pre-milking teat disinfection, with the highest average bacterial reduction for Staph and Strep. on teat skin .

Product	Main ingredients	% reduction
Lactic Lather	1.6% Lactic acid & Hydrogen peroxide	95
Super Cow Teat Foam	0.6% Diamine	84
Dual Dip Supreme	Lactic acid & 0.6% Chlorhexidine	76
Lacto-Mil	5% Lactic acid	69
Arrabawn Udder Guard	0.5% Chlorhexidine	62
Sure spray Duo	2% Lactic acid & 0.3% Chlorhexidine	62
Protect Pre Post	3% Lactic acid & 0.25% Chlorhexidine	59
Lacto-cel	2.4% Lactic acid	58
Hexa-cel RTU	0.52% Chlorhexidine	57
Lactospray	2.4% Lactic acid	57
Duo-cel	2.5% Lactic acid & 0.3% Chlorhexidine	56

Results – Teat Swab Method

- The application of teat disinfectant to teats using this method accounts for organic matter on teats & teat temperature!
- Method maybe more useful if choosing products for pre-milking disinfection
- Some products less impacted by the presence of organic matter e.g. supercow teat foam (avg. disk diffusion = 15 mm as compared to 95% reduction for Staph on teats with swab method) - advantage if pre-dipping only
- Limitation
 - Results could be influenced by the levels of organic matter on teats prior to disinfection application

Guidelines when choosing a teat disinfectant

- Check if product are registered (PCS or IMB)
 - The listing of products in this report is not an indication of the regulatory status of the product
- Choose a product that is effective against the specific bacteria identified on farm
- Check if Pre/post or post disinfection products only
- Never spray/disinfect teats pre-milking without drying teats with paper - residues
- Correct dilution and water quality may impact on disinfectant efficacy (i.e. hard water) - RTU best
- Adding additional emollients may impact on product efficacy
- Consider the possibility of residues

- More information:
 - <https://www.teagasc.ie/animals/dairy/milk-quality/>

Residues

- Potential of some teat disinfectant to result in residues in milk must also be considered when choosing a teat disinfectant product.
e.g. iodine and chlorine dioxide products
- All products which contained chlorine dioxide, chlorite, or chloride resulted in chlorate detection in milk, if product comes into contact with milk- no chlorates detected with chlorhexidine, lactic acid or iodine-based products



Thank you