

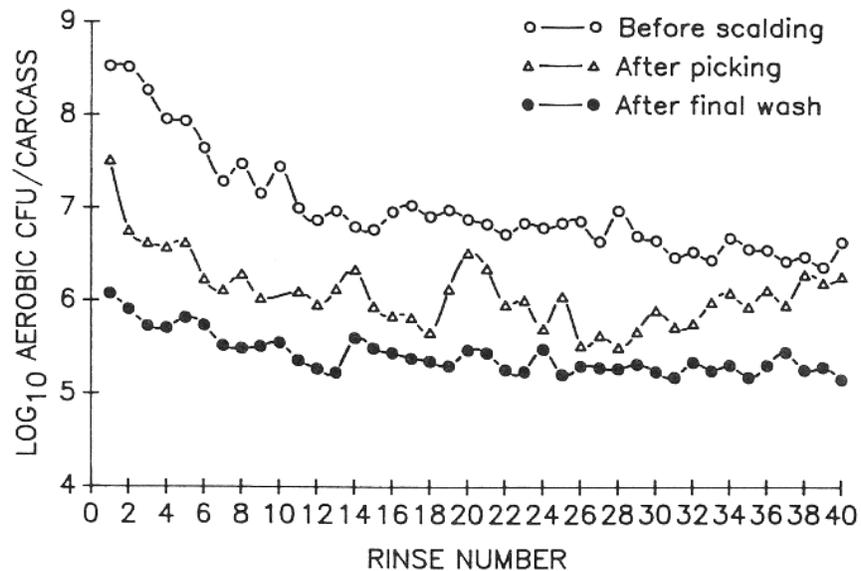
Limits on the Effectiveness of Antimicrobial Treatments

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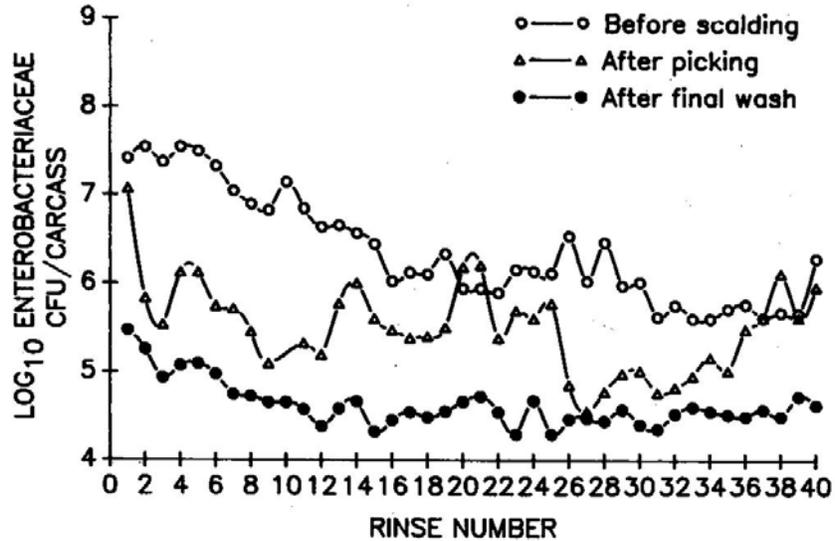


Why can't we remove or kill all of the bacteria on poultry carcasses?

Bacteria in consecutive carcass rinses
(Lillard, 1989)



**Bacteria in consecutive carcass rinses
(Lillard, 1989)**



**Recovery of Bacteria in
Consecutive Carcass Rinses**

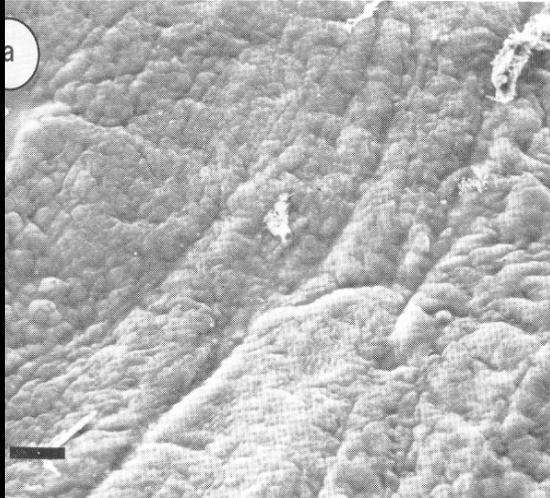
<u>Study</u>	<u>Bacteria</u>	<u>Rinses</u>
Mead and Thomas, 1973	Coliforms	5X
Rigby, 1982	Sal MPN	4X
Lillard, 1988	Aerobes, Entero	10X
Izat et al., 1991	Sal MPN	4X
McNab et al., 1993	Aerobes	5X

= 32 comparisons of consecutive rinses
(1 significant difference, $P \leq 0.05$)

**Why do bacteria
persist on carcasses?**

1. Bacteria in feather follicles
(Barnes, 1960s)

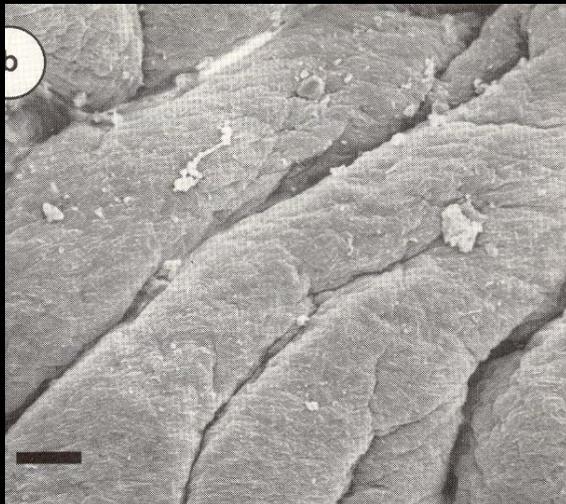
Subcutaneous bacteria
(Avens and Miller, 1973)



Thomas and
McMeekin, 1984

Chicken breast
skin before water
immersion

Bar = 30 μ m



Thomas and
McMeekin, 1984

Chicken breast
skin after 30 min
in water at 20° C

Bar = 30 μ m

No follicles, lots of places to hide



Follicles Don't Make Any Difference

- Defeathered, chilled, stored carcasses
- Aerobes, coliforms, *E. coli*, spoilage, *Salmonella*, *Campylobacter*
 - Buhr et al., 2003
 - Cason et al., 2004
 - Buhr et al., 2005

2. Physical attachment

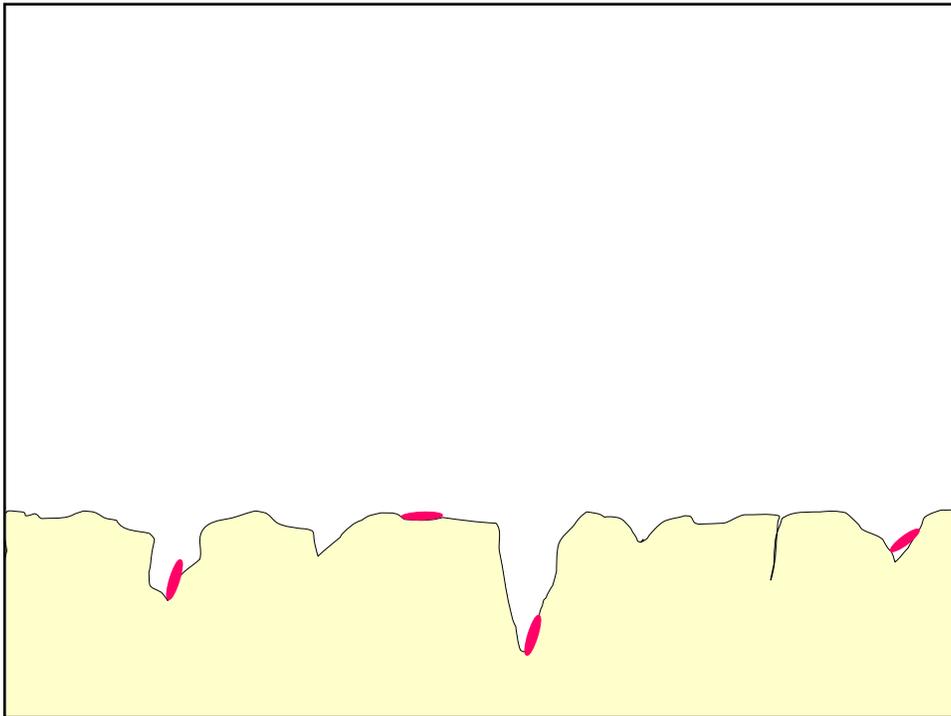
- biofilms
- surface changes
- clump effect

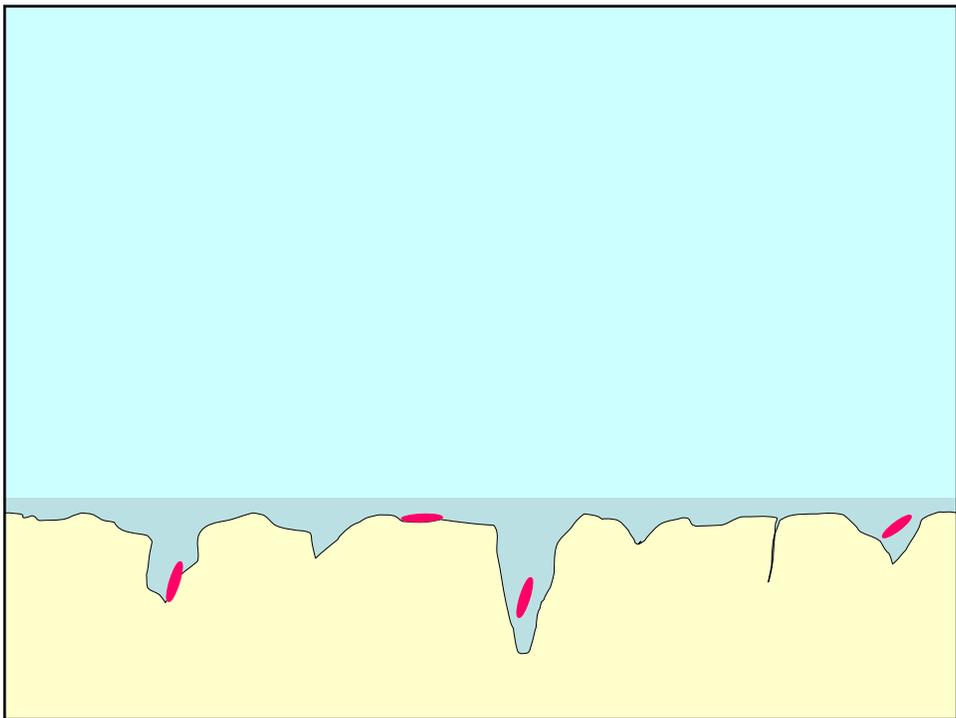
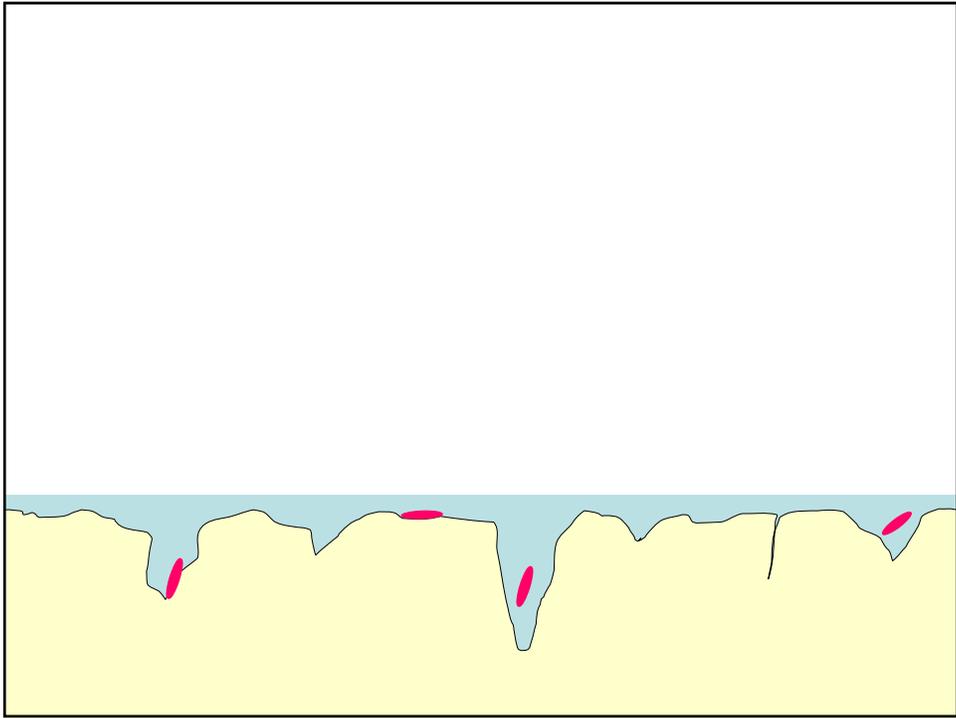
3. Surface chemistry

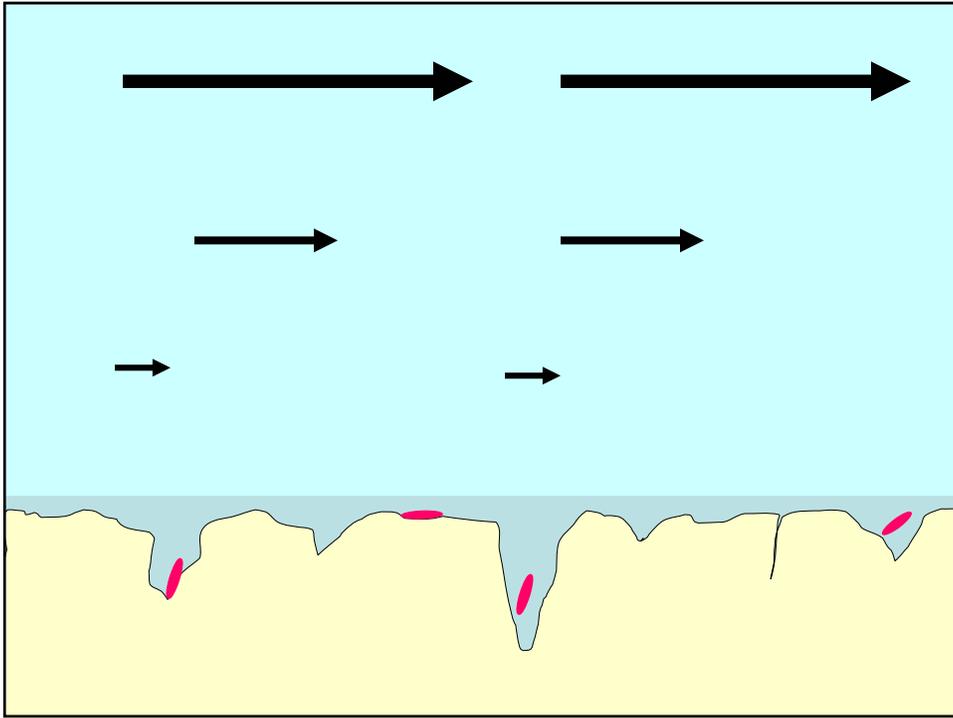
- fats
- oils
- proteins
- carbohydrates
- receptors

4. Surface physics

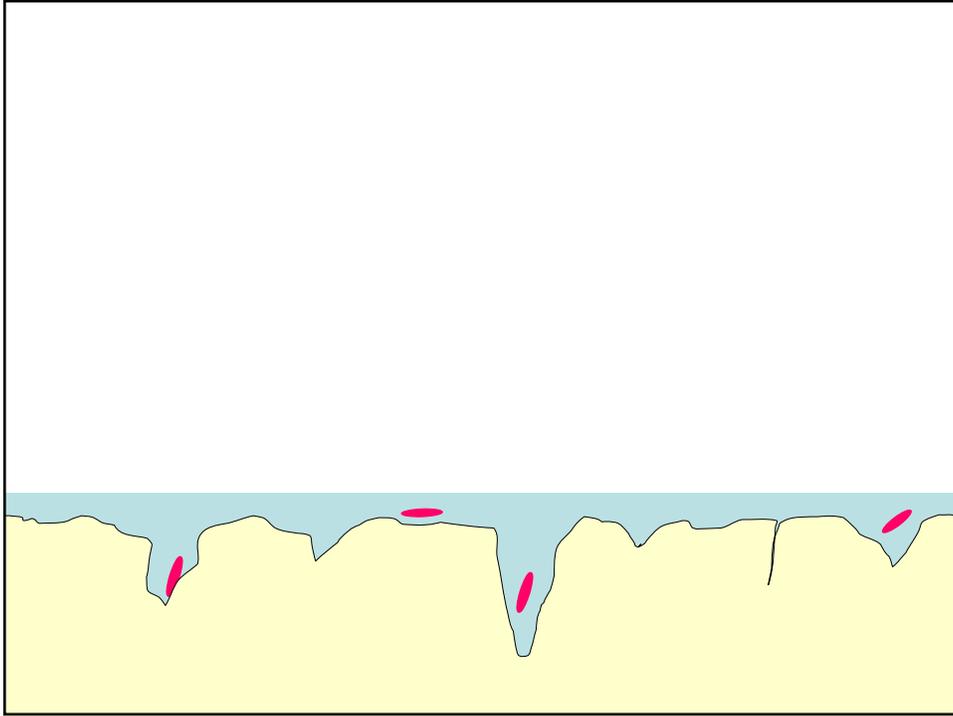
- surface tension
- water layers
- shear forces
- exchange/equilibrium



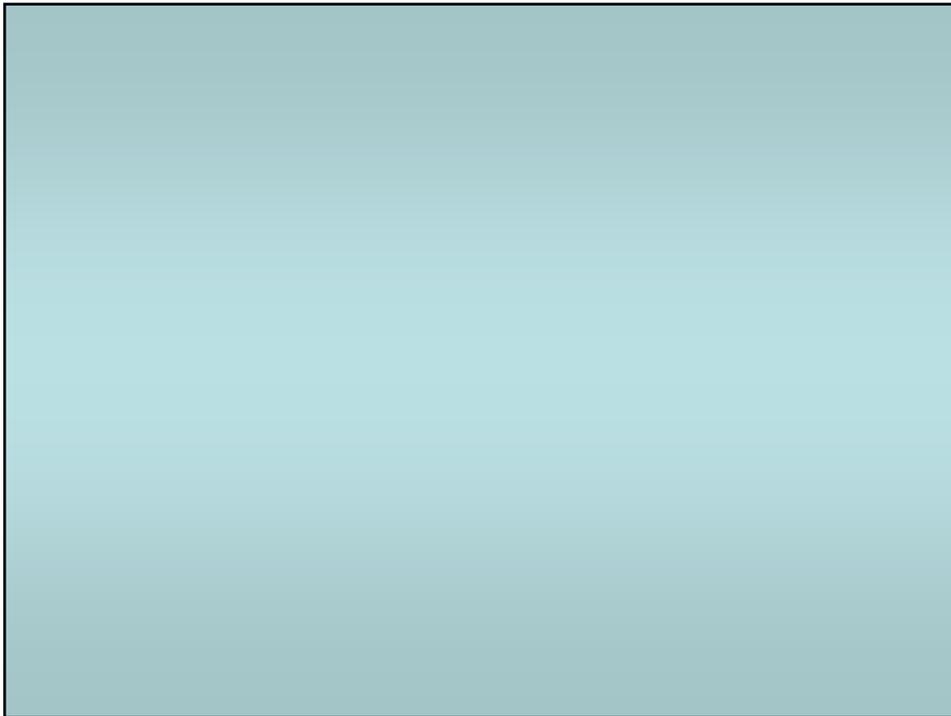
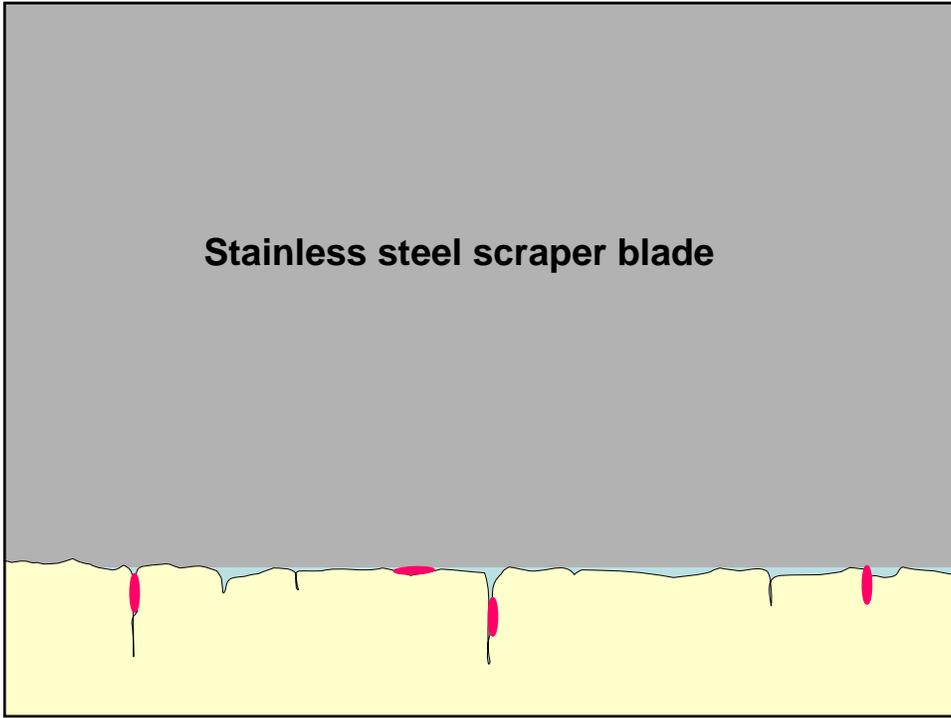




- **Bubbling**
- **Ultrasound**
- **Brushing**
- **Scraping**



Stainless steel scraper blade



**New approaches are needed
to improve the efficacy of
antimicrobial treatments**