

WG3

P9: Meta-analysis of the efficacy of cattle hide interventions to reduce microbiological contamination in beef



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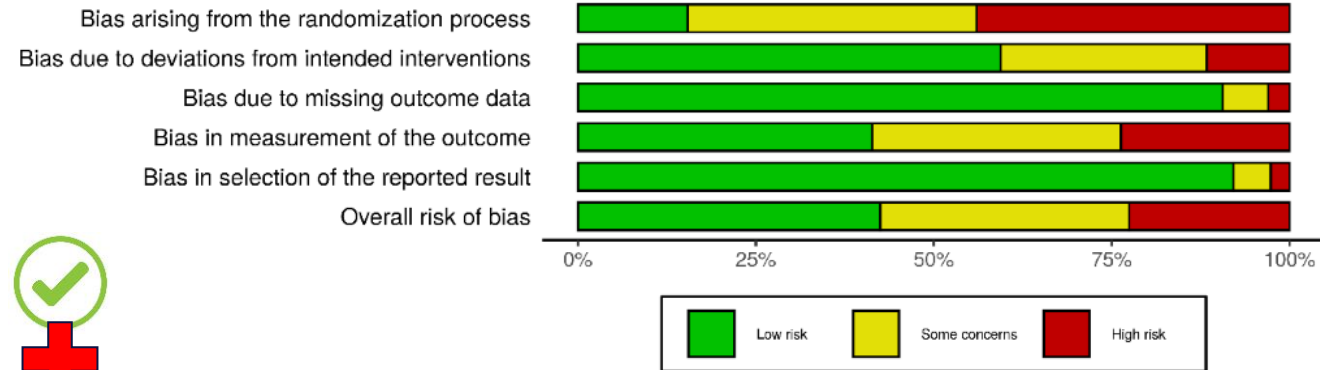
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- Interventions at abattoir level to control microbiological hazards are an essential part of meat safety assurance systems
- Cattle hide interventions can be seen as a 'proactive' method to deal with sources of beef carcass contamination.
- A systematic review has already performed to identify literature investigating the efficacy of processing interventions to control microbiological contamination in beef was performed.
- Risk of bias performed to see which studies are suitable for meta-analysis.
- Meta-analysis was performed when an intervention group had more than three trials with a low risk of bias.
- A mixed-effects model was used to create pooled summary statistics and then presented as Forest plots. Tests for heterogeneity of study groups were additionally performed.

- 266 relevant studies were identified.
- 42.5% (113) were of low risk of bias and available for meta-analysis.
- Interventions that had extractable data were:
 - Hide cleanliness assessment – 4 papers
 - On hide interventions (i.e. hide water washes, shellac)– 7 papers
- Insufficient number of studies to assess:
 - Hide clipping
 - Bacteriophage treatment
 - Chemical washes
- Meta-analysis grade:
 - Significant positive effect
 - Non-significant positive effect
 - Significantly homogenous studies



Using hide cleanliness scores led to:



Aerobic colony count (ACC) reduction:

- 0.90 log CFU/cm², 95%CI 0.54-1.26, I²=88.4%
- 4 papers, 20 trials



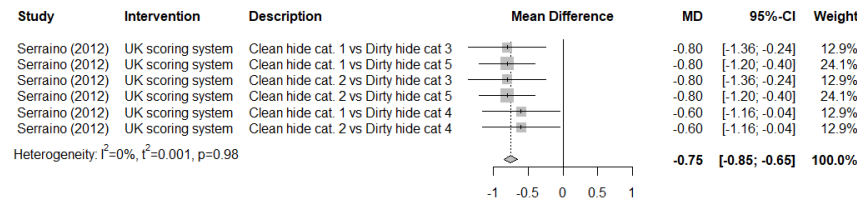
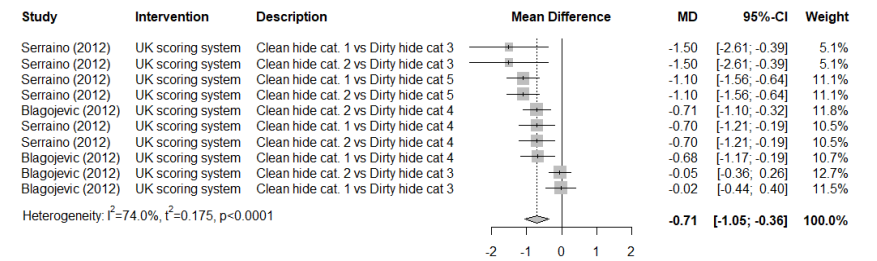
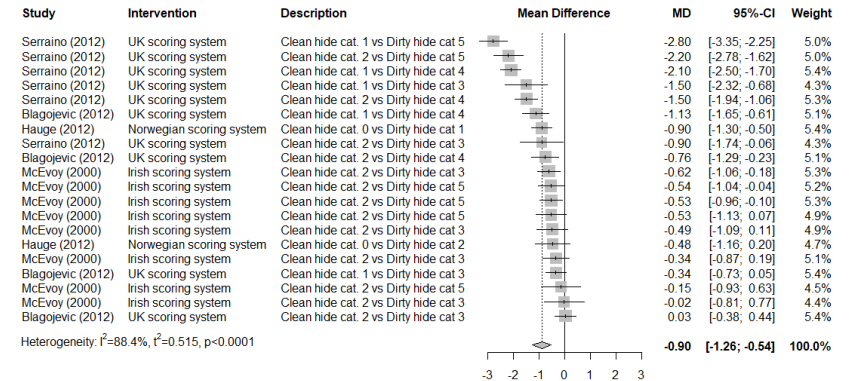
Enterobacteriaceae counts (EBC) reduction:

- 0.71 log CFU/cm², 95%CI 0.36-1.05, I²=88.4%
- 2 papers, 10 trials



E.coli reduction:

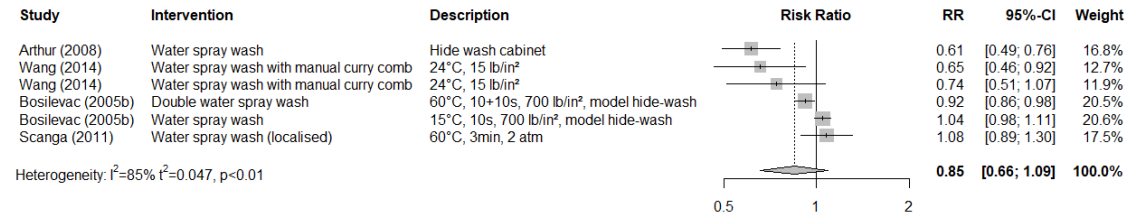
- 0.75 log CFU/cm², 95%CI 0.65-0.85, I²=0%
- 1 paper, 6 trials



- Hide water washes may led to reduced pathogen prevalence on hides:



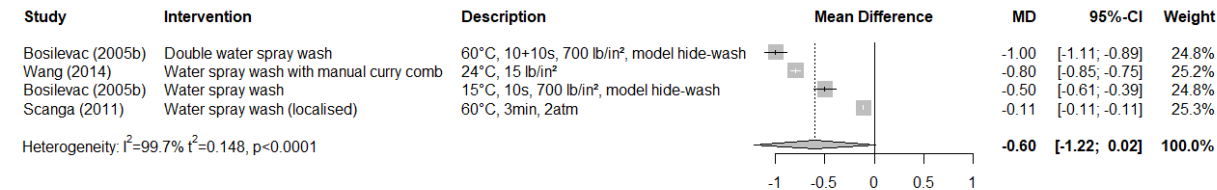
- STEC: Relative Risk (RR) 0.85; 95%CI 0.66-1.09, $I^2=85%$
- 4 papers, 6 trials



- Hide water washes may led to a mean reduction of aerobic bacteria on hides:



- ACC: 0.60 log CFU/100cm², 95%CI -0.02-1.26, $I^2=99.7%$
- 3 papers, 4 trials



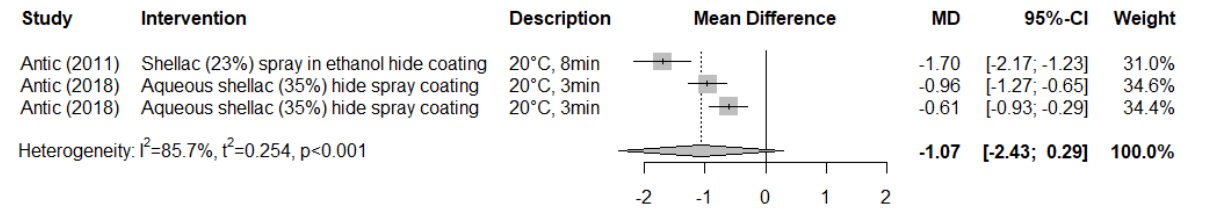
- How useful are hide water washes as a standalone intervention?

- Shellac microbial immobilisation treatment of cattle hides may lead to:

- ACC reduction:



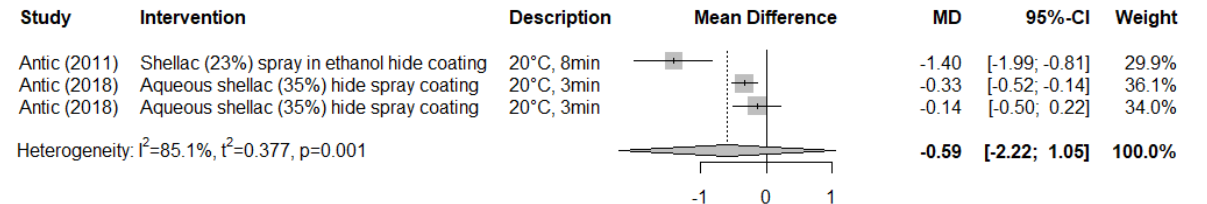
- 1.07 log CFU/cm², 95%CI -0.29-2.43, *I*²=85.7%
 - 2 papers, 3 trials



- EBC reduction:



- 0.59 log CFU/cm², 95%CI -1.05-2.22, *I*²=85.1%
 - 2 papers, 3 trials



- Show the potential for reduction, but need more research...

- 6 controlled trials under commercial abattoir conditions compared. Investigating:
 - Shellac spray hide coating
 - Cetylpyridinium chloride spray wash
 - Sanitizer spray wash
 - Sodium hydroxide spray wash

- Together these studies showed:

- ACC reduction:

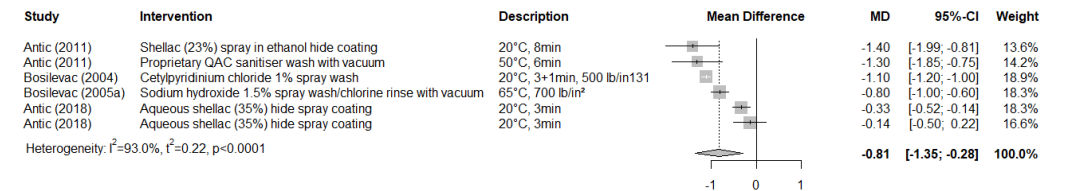
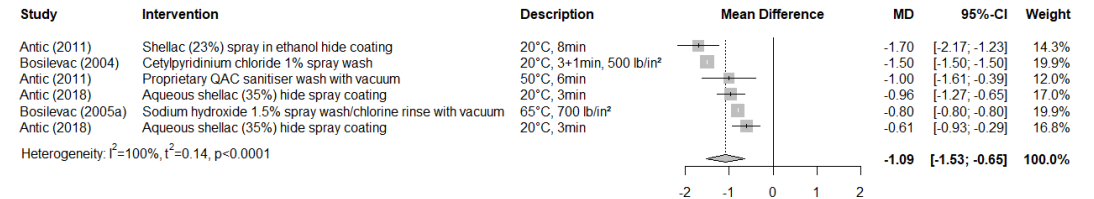


- 1.09 log CFU/cm², 95%CI 0.65-1.53, *I*²=100%
- 4 papers, 6 trials

- EBC reduction:



- 0.81 log CFU/cm², 95%CI 0.28-1.35, *I*²=93.0%
- 4 papers, 6 trials



- Cattle hide interventions can control microbial contamination on beef carcasses
 - Especially **hide cleanliness assessments**
- However:
 - Low number of studies with low risk of bias
 - Not all studies had extractable data
 - High heterogeneity of studies
- Only one MA shown here was homogenous with a positive effect.
- Recommendations:
 - More research is needed
 - Methodologies and data recording needs to be harmonised

