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# In vitro inhibition of B. hyodysenteriae by M. multacida: a probiotic strategy for swine dysentery

**Resume:**

Swine dysentery (SD) is a costly gut disease that affects growing and finishing pigs around the world, caused most frequently by a bacterium called Brachyspira hyodysenteriae (BHYO). There is currently no commercially available vaccine, so disease control still depends on antibiotics and biosecurity, which has pushed researchers to look for other ways to protect pigs from this disease. One promising approach is using probiotics to help combat the harmful bacteria naturally. Thus, the aim of this study was to test whether a naturally occurring gut bacterium called Mitsuokella multacida (MM) could stop the dysentery-causing bacteria from growing in a lab setting. Some groups had just one type of bacteria growing by itself: BHYO alone, live MM (LMM) alone, or heat-killed MM (KMM) alone. Other groups had BHYO growing together with either LMM or KMM. Right after mixing these bacteria (0 hours) and again one day later (24 hours), we took a small sample from each group and placed it on lab culture dishes containing sheep blood. Blood breakdown on these dishes is used as a lab marker to tell whether the dysentery bacteria is active and harmful, since it never forms visible colonies (clusters of bacteria) on its own. We repeated this test three separate times to make sure the results were reliable. After growing the bacteria, we checked two things on the culture dishes: whether colonies grew, and whether the bacteria showed signs of damaging red blood cells. The results were the same in all three repeats. BHYO alone never grew visible colonies, but it reliably showed complete red-blood-cell-damaging activity, both at 0 and 24 hours. Live MM alone consistently grew visible colonies and showed a partial, non-harmful red-blood-cell-damaging pattern. Heat-killed MM, on its own, did not grow colonies and showed no activity either, as expected since it was no longer alive. When BHYO was mixed with heat-killed MM, no colonies grew, but the complete damaging activity was still present, meaning the dead bacteria had no protective effect. When BHYO was mixed with the live version of MM, colonies grew with the same partial, non-harmful pattern seen with live MM alone. This suggests that LMM can block the harmful activity of the SD bacteria in the lab, pointing to a possible natural, non-antibiotic strategy to help protect pig herds. Further testing in live animals is still needed to confirm whether this protection also works inside the pig's gut.