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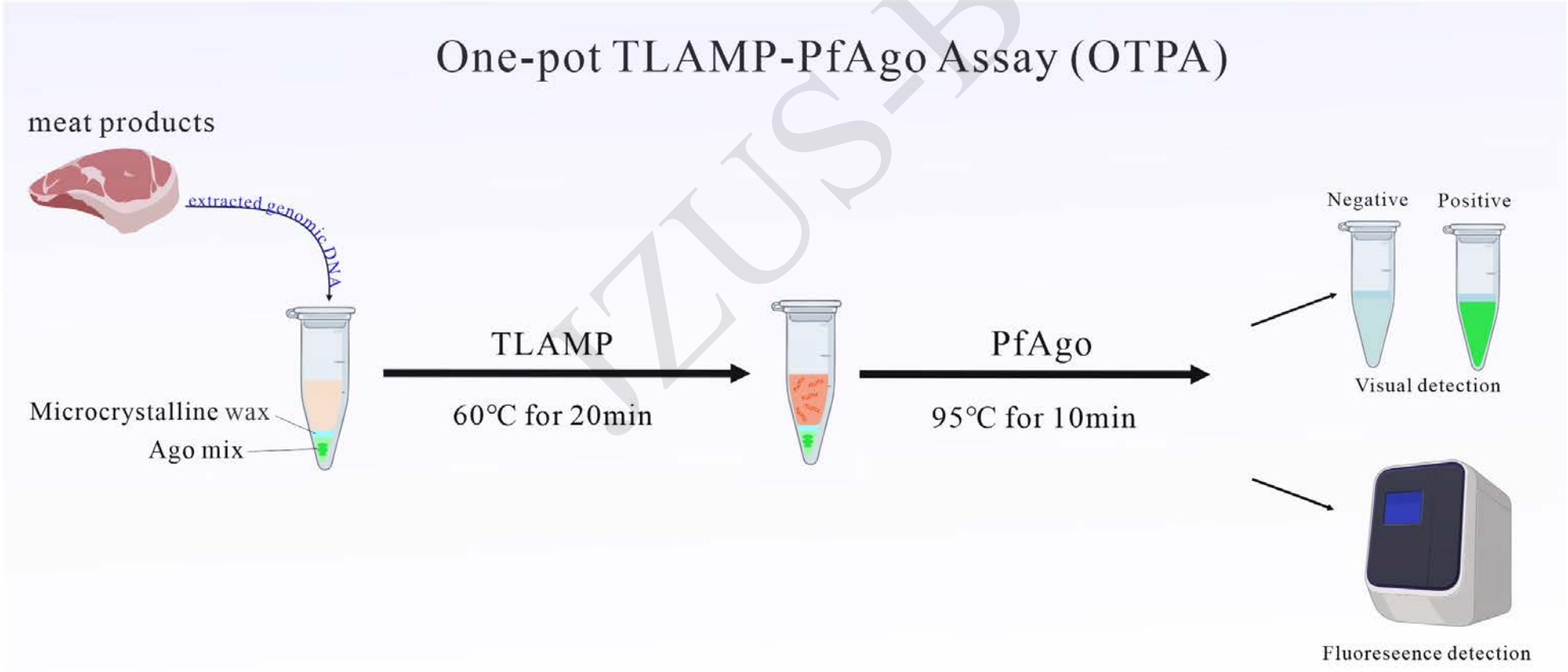
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DNA-based one-pot rapid biosensing platform integrating turn-back loop primer-accelerated LAMP and *Pyrococcus furiosus* Argonaute for meat visual authentication

Key words: Loop-mediated isothermal amplification (LAMP); Turn-back loop primer-accelerated LAMP (TLAMP); *Pyrococcus furiosus* Argonaute (PfAgo); Meat authentication; One-pot assay; Point-of-care testing (POCT)

Research Summary

In this study, we developed a one-pot biosensing platform integrating turn-back loop primer-accelerated LAMP and *Pyrococcus furiosus* Argonaute for rapid and visual authentication of meat species.



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Background & Challenges

Meat Adulteration: A Global Food Safety Issue

•High-value meats are often replaced with cheaper alternatives (e.g., horsemeat, pork)

•Limitations of conventional detection methods:

- Morphology & chromatography: subjective, labor-intensive
- Spectroscopy: matrix interference
- Immunoassays: insufficient sensitivity

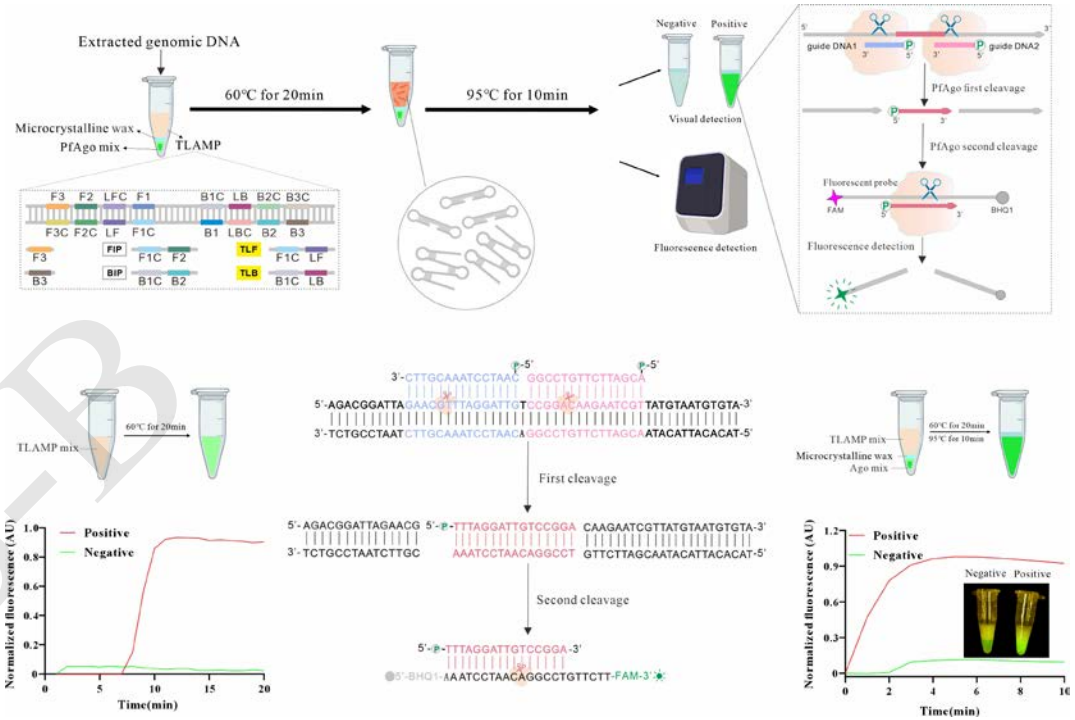
•DNA-based methods offer high specificity and sensitivity, but traditional PCR requires thermal cycling and laboratory settings

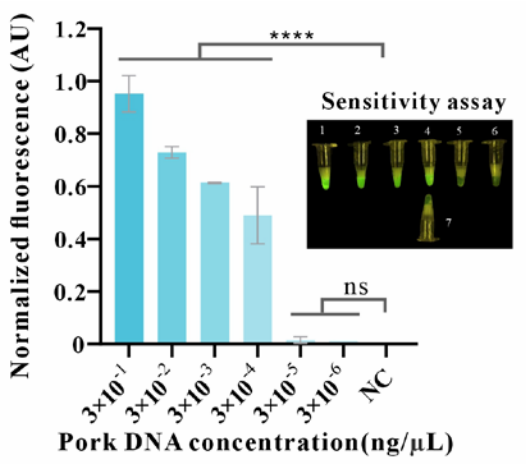
Urgent Need:
Rapid, portable, visualized, and on-site detection technologies for meat authentication

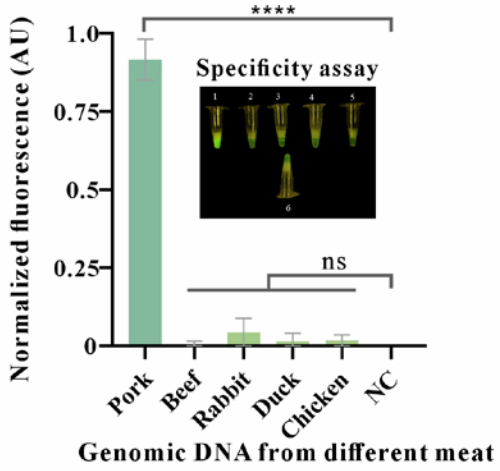
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Innovation points

- **OTPA: One-pot TLAMP + PfAgo Assay**
- **TLAMP: rapid isothermal amplification**
- **PfAgo: sequence-specific recognition to avoid non-specific signals**
- **Heat-activatable microcrystalline wax barrier: Physically separates amplification and detection reactions**
- **Prevents contamination by eliminating lid-opening steps**
- **Enables true "one-pot" closed-tube operation**
- **Limit of detection: Pork DNA: 3×10^−4 ng/μL; Beef DNA: 2×10^−4 ng/μL**
- **Specificity: No cross-reactivity with chicken, duck, rabbit, sheep, or horse**
- **Time-to-result: 30 minutes**
- **Visual readout: Direct observation under blue light**







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