MAXIMIZING BOVINE EMBRYO SURVIVAL AND DEVELOPMENT IN VITRO THROUGH NOVEL BIOMIMETIC HYDROGEL CULTIVATION

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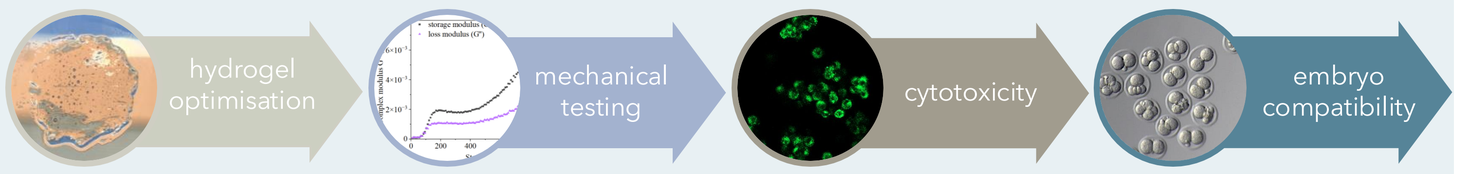
1 Introduction

- Assisted reproduction technology (ART), including *in vitro* fertilisation (IVF), is widely used in cattle breeding[1].
- However, *in vitro* embryo culture has several major drawbacks, including low success rates, with only 20–40% blastocyst maturation, due to factors such as epigenetic changes[2].

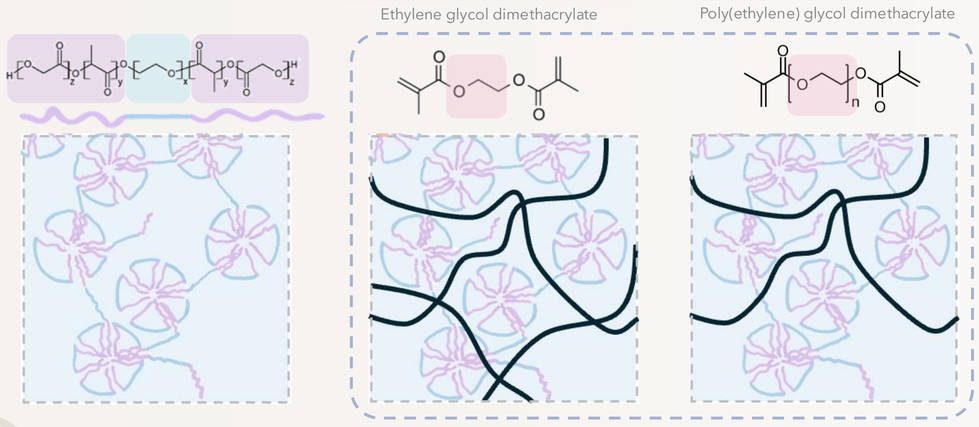
Employing a three-dimensional (3D) culture can provide sufficient mechanical support, increasing embryo yield and improved survival rates.

2 Methods

A non-toxic, photocrosslinkable 3D cultivation hydrogel system suitable for bovine embryo cultivation was developed. The main component of the hydrogel, the copolymer of lactic and glycolic acid, and poly(ethylene glycol), PLGA-PEG-PLGA (ABA), provides thermosensitivity, photocrosslinking provides additional mechanical stability, and stabilised fibroblast growth factor-2 (FGF2-STAB®) supports blastocyst development.



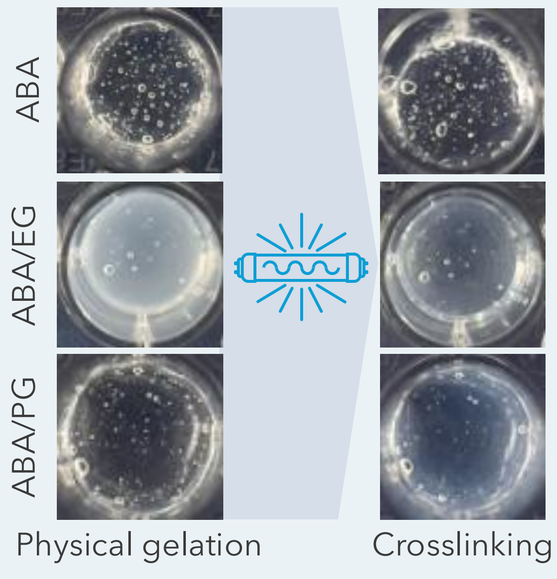
Pure PLGA-PEG-PLGA (ABA) | PLGA-PEG-PLGA + crosslinkers: EGDMA (EG), PEGDMA (PG) | Fibroblast growth factor-2 FGF2-STAB® | Washing with cultivation media | Seeding of embryotic cells

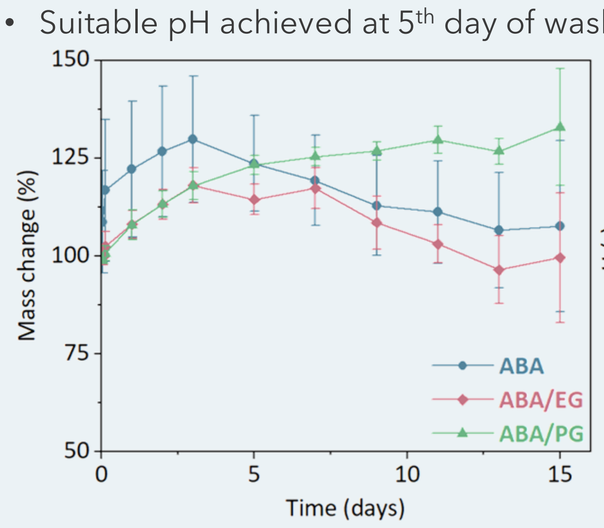


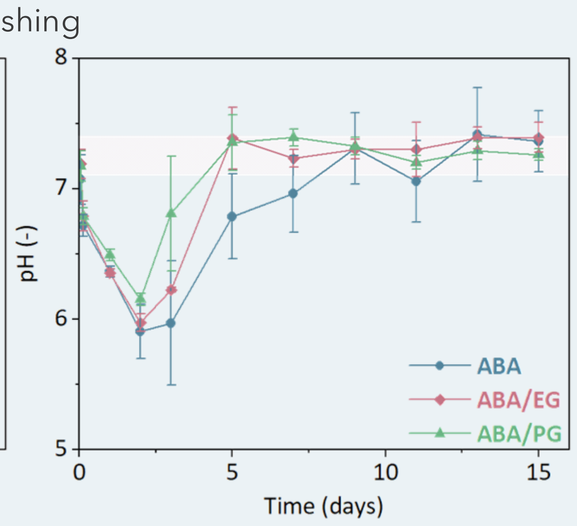
3 Results

hydrogel optimisation

- Hydrolytic stability tested in M16 embryo cultivation media
- Suitable pH achieved at 5th day of washing

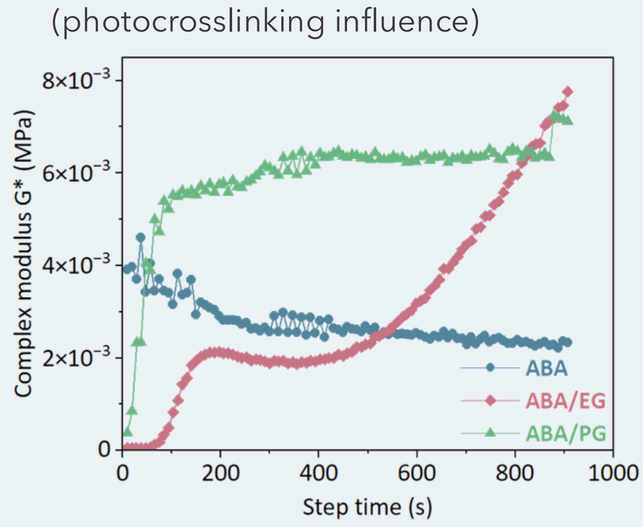




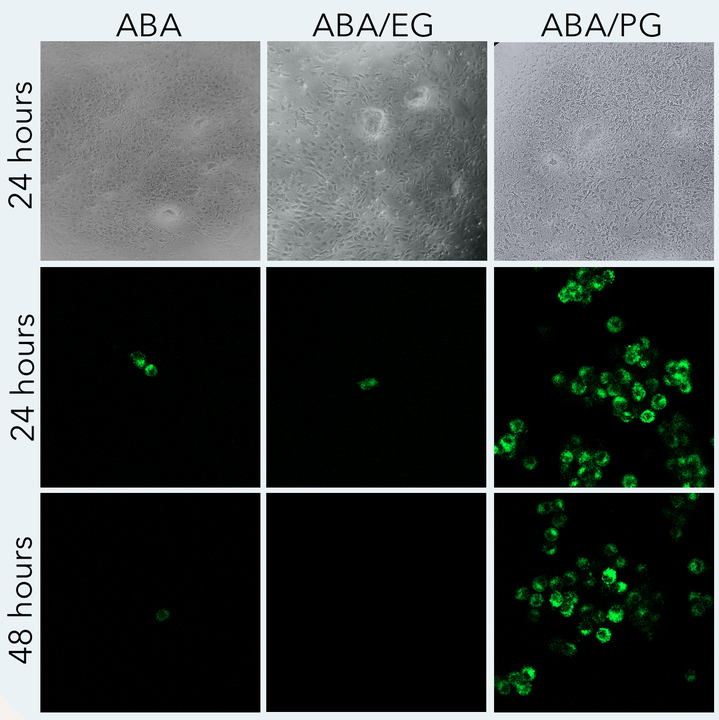


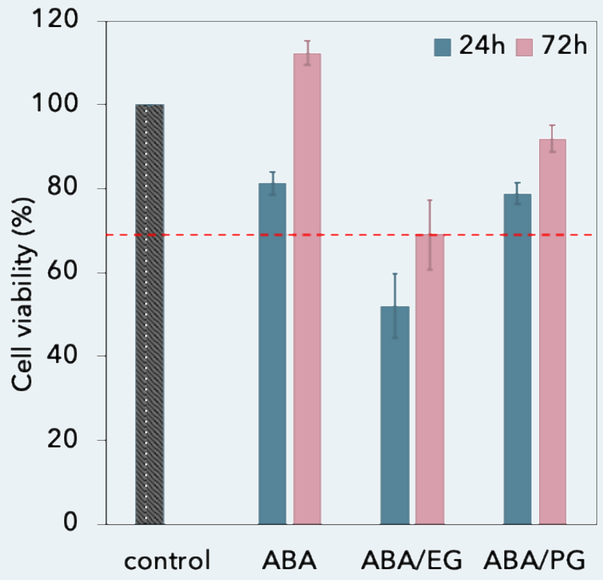
mechanical testing

- Rotational rheometry (photocrosslinking influence)



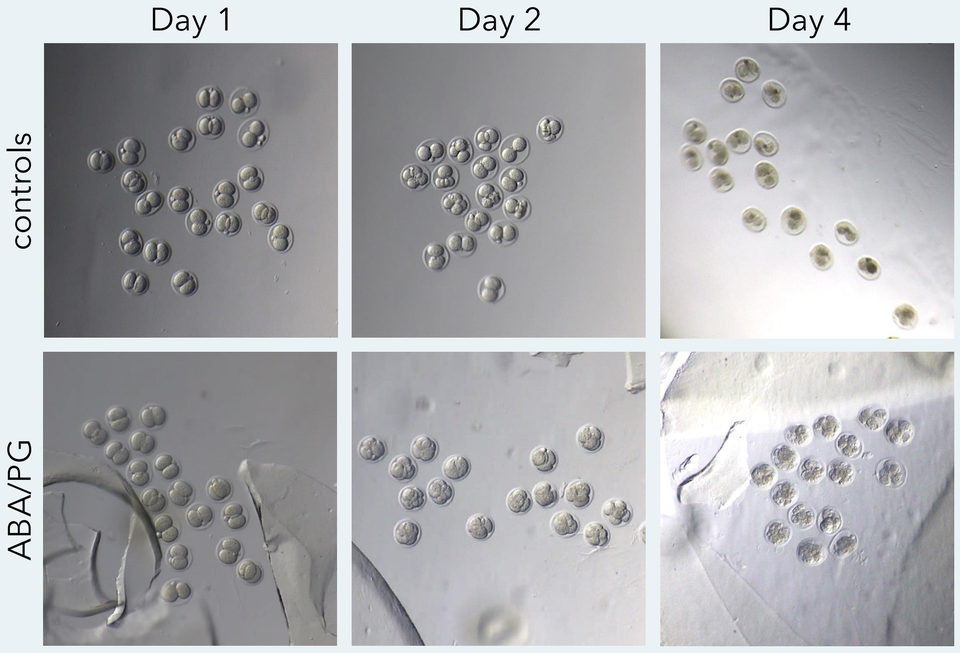
cytotoxicity





- XTT assay, L-929 mouse fibroblasts
- EN ISO 10993-5 standard

embryo compatibility



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5 Conclusion

The photocrosslinked hydrogel system offers a stable, non-toxic, and promising 3D cultivation medium for oocytes with potential applications in cattle- and human-assisted reproduction.

REFERENCES
[1] R. Santymire et al. (2014) Adv. Exp. Med. Biol., 753: 119-134.
[2] L. Ferré et al. (2020) Animal, 14 (5): 991-1004.

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