

# REAL TIME pH MEASUREMENT OF IN VITRO FERTILIZATION MEDIA ALLOWS MORE EFFICIENT AND ACCURATE MONITORING OF MEDIA AND INCUBATOR PERFORMANCE

Pam Jarmuz BSc, Brent Barrett PhD and Denny Sakkas PhD.  
Boston IVF, Waltham, MA



## BACKGROUND

- Measuring the pH of IVF culture media accurately is extremely difficult because the pH of media droplets under oil is difficult to continually access.
- The aim of this study was to assess IVF culture media continually while mimicking the conditions for drop culture, used routinely in IVF for culturing embryos.

## METHODS

- Different commercial IVF embryo culture media were assessed over time using a real time pH monitoring device developed by Blood Cell Storage Inc. (BCSI).
- The pH SAFE (Sterile, Automated Fluoroscopic Evaluation) System is a non-invasive system developed for platelet storage and is an optical pH sensor that interprets the biochemical changes occurring in the platelet solution.
- The platelet pH monitoring device was adapted for use in incubator environments to read pH in a small plastic well device that allows the measurement of small volumes of media under oil.
- The device consists of an optical reader (SAFE Sens IVM) (Fig. 1a), the fiber optic probe (1b) and the disposable sensor (1c) which can be loaded with media and overlaid with oil.
- The real time monitoring of pH allowed the user to set the readings at 1 or 30 minute intervals to examine media changes when challenged with changing environments.
- Different commercial media were measured using 35, 50 and 100µl of media covered with 35µl of oil with the recommended levels of CO<sub>2</sub>.

Fig. 1a



b



c



## RESULTS

- The pH assay was validated in our laboratory for intra- and inter- assay variability
- Sensor variability was tested over 5 days using 5 different sensors with the same media and oil lots. The mean pH  $\pm$  SD was  $7.27 \pm 0.03$  with a coefficient of variation of 0.4%.
- It was also validated for analytical and functional sensitivity.

Fig. 2a

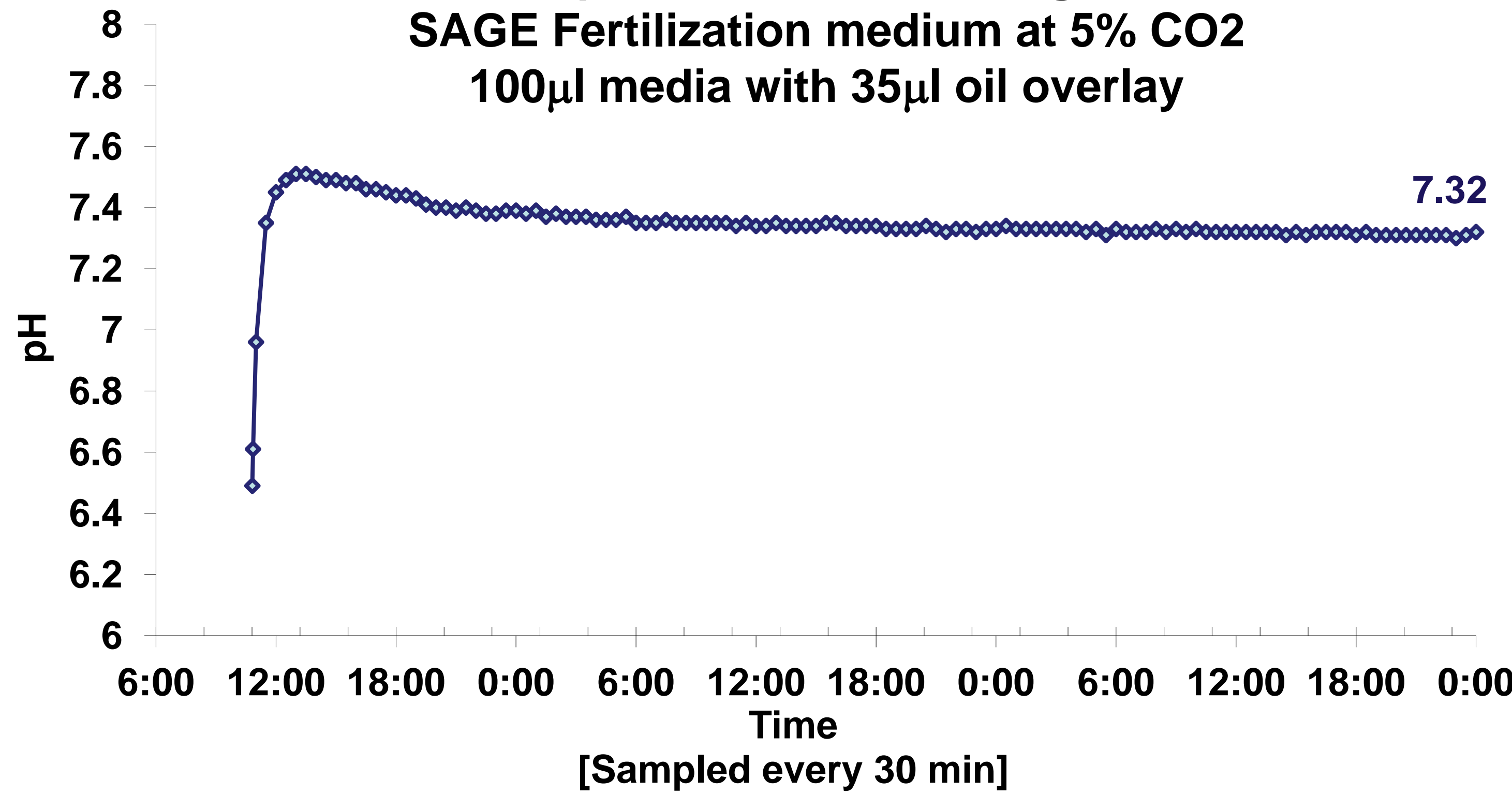


Fig. 2b

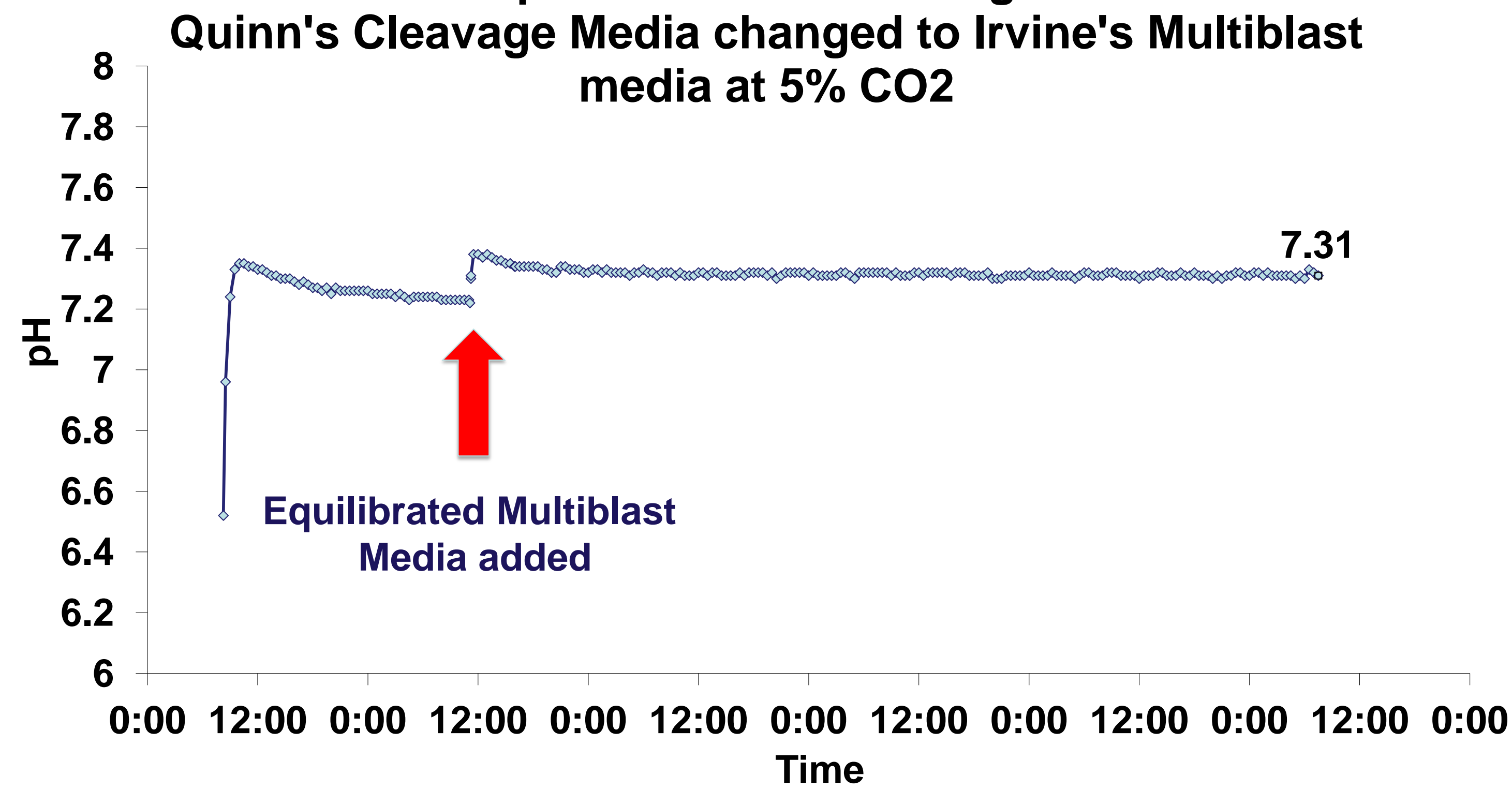


Fig. 2c

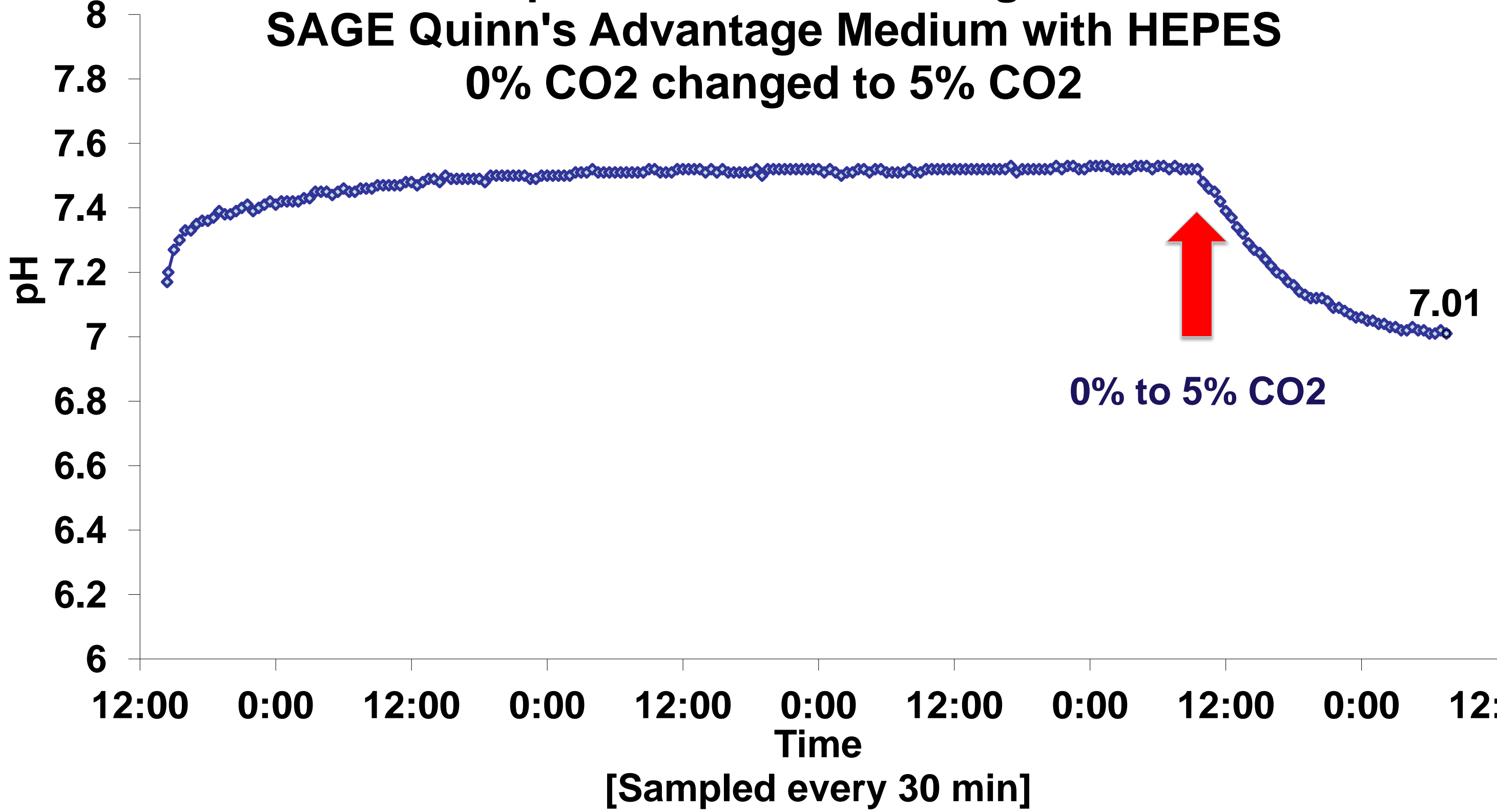
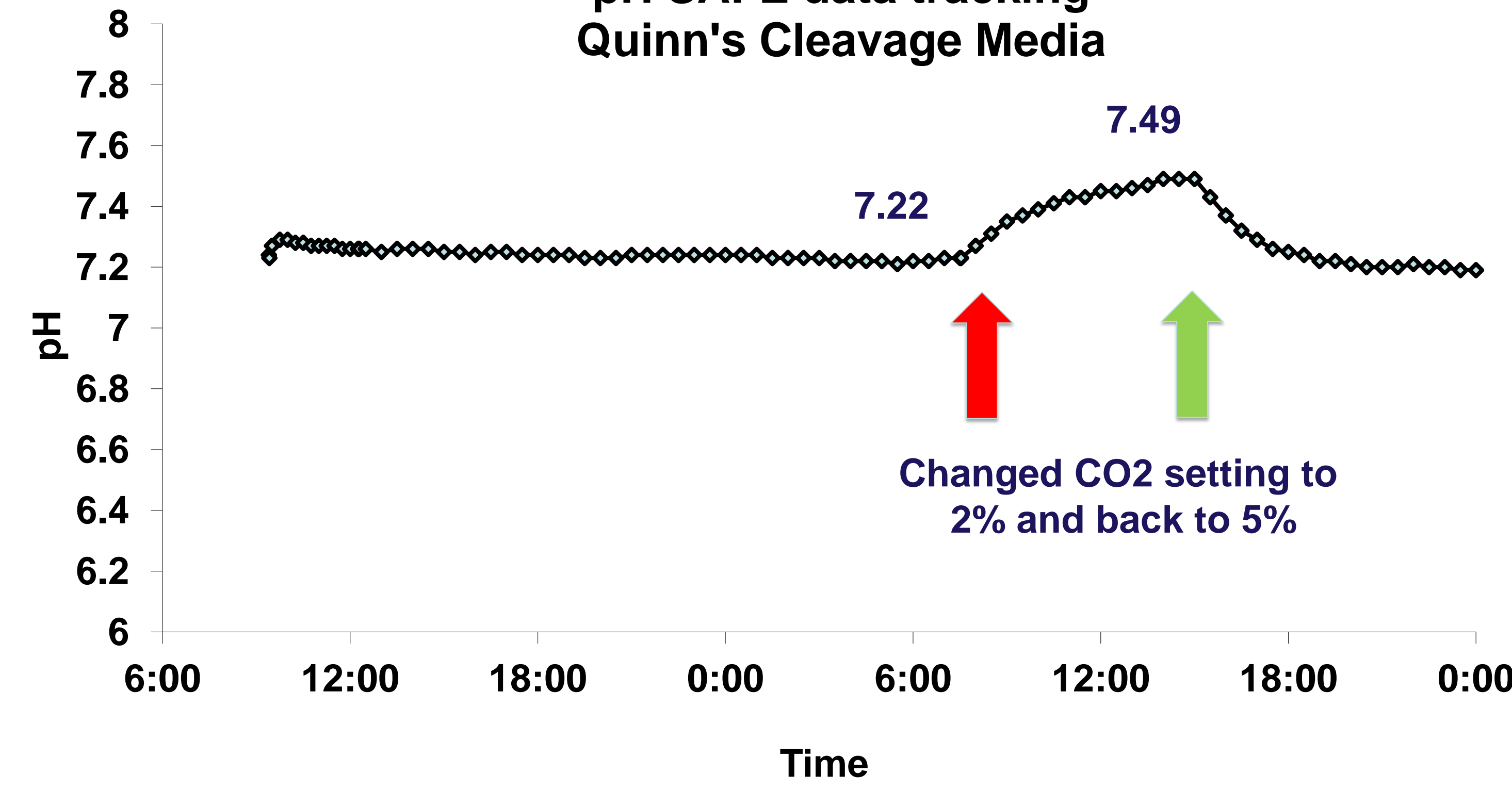


Fig. 2d



## RESULTS

- Fig 2.
  - a) shows pH stability of one commercial media over 3 days at 5% CO<sub>2</sub>.
  - b) shows a change in pH of two different commercial media when changed within the same Sensor.
  - c) Shows the rapid change in HEPES buffered media when introduced into a 5% CO<sub>2</sub> environment
  - d) Shows the change in media when the CO<sub>2</sub> environment is changed from 5% to 2% and back to 5%.
- The different volumes of commercial IVF media samples validated the expected range of the lot numbers prior to their use in clinical IVF and showed no difference related in volumes.
- The recovery times of different volumes of media under oil when removed for 5 min from an incubator and replaced into a 5% CO<sub>2</sub> showed that pH drift was minimal and remained in the expected lot number ranges.
- When challenged with variations in CO<sub>2</sub> all media experienced a rapid drift to unacceptable pH ranges.

## CONCLUSION

- Real time pH monitoring allows a strict Quality Control of different media lots and incubators. It also provides the clinical user with a means for challenging the response time of media to fluctuations in environment.