

**New reproductive technologies to increase the sustainability of milk and beef production
Questions and Answers (18 March 2021)**

#	1
Question	For Stephen M: has the economics of the new technologies been evaluated ie do they improve farm profits?
Answer(s)	Research to evaluate the effect of automated heat detection on the profitability of Irish dairy farms has not been done yet.

#	2
Question	What about heifers you are trying to get in calf is it the same as cows?
Answer(s)	We have not evaluated any automated heat detection technology for heifers. While the technology can work for heifers, there are some practical considerations to think about. Heifers are often kept far away from the farm yard or on an out block. Will the equipment work in the location that it is planned to keep the heifers.

#	3
Question	Stephen has mentioned that Flow cytometry cell sorter is still a bit slow, are you aware of any other platforms/technologies working on speeding up this selection?
Answer(s)	Flow cytometry based methods are the only ones that are commercialized. There are others that are being researched, but are not yet validated.

#	4
Question	<ol style="list-style-type: none"> 1. Is there a protocol for quickly reaching 30% replacements with sexed semen without affecting 6 week calving rate? 2. What is the best way to rate these breeding/health monitoring technologies?
Answer(s)	<ul style="list-style-type: none"> • For 1: Use sexed semen during the first week to 10 days only. Target heifers and most fertile cows. Conduct AI at the appropriate time (14 to 20 h after heat onset). Sexed semen straws need to be handled more carefully than conventional semen. Thaw for 45 seconds at 35 to 37C, and only that two straws at a time. To mitigate any risk, fixed-time AI can be used on mating start date. • For 2: First consider if there is a need for automated heat detection on your farm. If submission rate target is not being achieved or the labour required for heat detection is no longer available, then these devices may have a role. • Important considerations for a particular device should include initial cost and running costs, adaptability with milking parlour and automating drafting, ease of use, estimated lifespan and the availability of a warranty, and the quality of the backup service provided.

#	5
Question	David, do you think that female puberty also would follow the same pattern?

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Answer(s)	<p>Yes, nutrition during early life has a strong influence on sexual development in the heifer calf also. Like the bull calf the evidence suggests the earlier the better and there is little or no advancement in age at puberty, through improving nutrition, once heifers have reached 8 months of age. Please see the recent papers from our own group below and also some nice work in this area at Texas A&M.</p> <p>Kelly AK, Byrne C, McGee M, Perry GA, Crowe MA, Sauerwein H and Kenny DA. 2020. Effect of calthood nutrition on metabolic hormones, gonadotropins and estradiol concentrations, and on reproductive organ development in beef heifer calves. <i>Journal of Animal Science</i>, 2020, Vol. 98, No. 10, 1–13.</p> <p>Heslin J, Kenny DA, Kelly AK, McGee M. 2020. Age at puberty and pregnancy rate in beef heifer genotypes with contrasting nutritional intake from 8 to 13 months of age. <i>Animal Reproduction Science</i>. 212:106221.</p> <p>Kenny DA, Heslin J and Byrne CJ. 2018. Early onset of puberty in cattle: implications for gamete quality and embryo survival. <i>Reproduction, Fertility and Development</i>, 2018, 30, 101–117.</p>
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#	6
Question	How will your IVP differ from what Ovamass did 30 years ago
Answer(s)	No twinning, and changes to the IVP procedures have reduced the incidence of large offspring syndrome.

#	7
Question	Has any work been done on once a day milking as a means of triggering cyclicity in anoestrous cows (instead of hormonal intervention)?
Answer(s)	While once a day milking should help with improving body condition score and hasten the return to cyclicity, it does not guarantee submission for AI. Hormonal intervention with timed AI will induce cyclicity and will guarantee submission for AI.

#	8
Question	A question for both Stephens: A Danish study a few years ago showed differences between bulls as Sexed semen candidates, any ideas from your current work to explain this?
Answer(s)	We always see variation between bulls. Some bulls have no reduction in fertility after sorting, whereas others have a big reduction. The exact reasons are not well understood. This underlines the importance of using a large team of bulls as a risk mitigation strategy.

#	9
Question	Will it be economically viable to harvest embryos from the slaughter house.

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Answer(s)	One of the reasons to conduct the study is to examine the postnatal phenotypes of these commercial beef embryos, including final carcass value. This information can then be used to work backwards to derive a calf value, and ultimately an embryo value.
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#	10
Question	If the technology keeps progressing, do you think that age at 1st calving will be further brought forward. eg if heifers can be fed to hit puberty 2 months earlier.
Answer(s)	Certainly better nutrition of the female calf will advance puberty consistently. We showed that by growing AA x Fr heifer calves at ~1 kg v 0.5kg per day between 4 and 9 months of age that average age at puberty was brought forward by ~2 months and that 90%+ of the well fed heifers were pubertal at 15 mths compared to ~30% of the moderately performing heifers. The latter caught up over the following month to 6 weeks but not ideal if you want to calve your heifers ahead of the cows.