#	1
Question	Are the results from these trials available to view? and will results from those to be conducted in the future be made available too?
Answer(s)	The trials are either on-going and haven't started yet. When they are completed, data collected and analysed, the results will be published in peer review papers where they can be viewed by the public.

#	2
Question	Do dietary additives interfere with "organic" labelling? Is it different for e.g. seaweed or olives Vs Bovaer or halides?
Answer(s)	I don't think so as prior to any feed additive to be accepted as a methane mitigation it will have to be assessed for residues in meat or milk products – this will be an issue for red seaweed which contain bromoform and iodine as Ben mentioned. EFSA will ensure food safety of any feed additives before they become registered for use in the EU and will assess for residues.

#	3
Question	Is succinic acid a feed additive that can reduced methane emissions?
Answer(s)	Not to my knowledge but I am aware that there is interest in using it in trials as this is a natural product and would be effective in moving fermentation in the rumen towards propionate production which would be consistent with lower methane emissions.

#	4
Question	Interesting presentation Sinead, is there any work looking at the effect of grass quality (& variety) on methane emissions, can better quality varieties reduce methane emissions?
Answer(s)	In general, the greater the grass quality the lower the methane emissions. Data from this year indicates high quality spring grass will lower methane emissions. The reasons for this need further research but may be related to higher levels of digestibility and nitrate within spring grass. Once The factors responsible for this are identified it may be possible to identify/breed grass cultivars with these traits.

#	5
Question	This is a general question for all presenters - is the welfare impact of additives and the other methane emmission reduction options under investigation being evaluated. This, in my opinion, will have an impact on evenual consumer acceptability of whatever systems are eventually recommended and thus should be a very important component of all this research and the optimal time to do the research is simultaneously with the research on the various methodologies.
Answer(s)	In breeding programs, selection is undertaken for several traits simultaneously (e.g., 18 traits in the national dairy cow breeding index) to minimise any repercussions of selection on other traits; however, this does not preclude any

	deleterious trends for traits not explicitly or implicitly included in these breeding goals (e.g., the erosion of dairy cow fertility during a period when fertility was not in the dairy cow breeding index)

#	6
Question	Ben, are the methane emissions factors used in our national inventories in-line with what you are finding in your trials?
Answer(s)	Trials conducted last year suggest that the inventory is accurate for the late Summer/Autumn period. Whereas this year's data suggest the inventory calculations are over estimating methane in the spring. The true accuracy of the inventory calculations will become clearer as we collect more data from multiple lactations at grass.

#	7
Question	For Ben: What was the differences between the 2 Moorepark farms - possible cause of the methane estimate difference.
Answer(s)	The two farms differed for a number of differing factors including calving date, genetic merit and grazing management. The factors driving differences in methane emissions in dairy cows at grass are largely unknown and it is likely there are a multitude of differing processes driving differences in methane emissions across lactation. We are in the process of collecting a sufficiently a large database to assess these relationships.

#	8
Question	Hi everyone, do ye think methane emissions would be higher or lower on mixed species swards given that emissions are lower from young leafy grass in Spring?
Answer(s)	There has been mixed results on this internationally - in some cases MSS results in lower methane intensity as it increased milk output/solids. MSS will be tested against PRG in Teagasc next year.

#	9
Question	For Ben: Is there any work being done on genetically modification of grasses to achieve methane reduction?
Answer(s)	There is work being conducted in New Zealand looking at breeding high metabolizable energy ryegrass which has shown reductions of 15-30% reduction for methane emissions. Future work in Teagasc will look into assessing potential differences in methane output between differing grass and clover cultivars.

#	10
Question	Question for Donagh, Has the potential impact in reduction of greenhouse gasses of increasing longevity to get an extra lactation from highly productive cows been investigated? Would increased lactation numbers reduce replacement rates for the same or better output in terms of milk etc.

Answer(s)	In a stable herd, greater cow longevity has to reduce replacement rate (i.e., the literal definition of replacement rate); you can work out culling rate mathematically as 1/(number of lactations achieved). So therefore if you increase the number of lactations achieved per cow from 4.2 (current in dairying) to 5.5 (target) the proportion of the herd culled annually reduces from 24% to 18%. In a stable herd, this then is the replacement rate. However, what we all know has happened in dairying is that the herd size is expanding so the number of heifers entering the herd (i.e., this is not replacement rate as you are more than "replacing") is increasing. The goal of the maternal dairy, beef and sheep breeding goals is to increase lifetime calorific/valuable output through greater output per parity times more parities.

#	11
Question	Hi David, for Donagh - is there a way of gathering great methane data or a proxy for methane data that we could use to speed up the breeding element further?
Answer(s)	Milk spectroscopy (for dairy cows and sheep) and maybe lasar techniques. We'll soon be collecting methane data on approx 700 beef cattle annually and potentially more which is a great start so may not need a proxy. Combined the ruminant industry is a multi-billion euro industry (which is under threat) so the notion of doing something "on the cheap" through proxies should be replaced by a strategy to generate high quality data from pertinent environments. For example, assuming the output from the Irish dairy, beef and sheep sector is 8 billion kg milk, 550,000 tonnes of beef meat and 55,000 tonnes of sheep meat, then the charge per kg output per €1 million cost of phenotyping animals for a breeding programme would be just 0.013 cents, 0.18 cents and 1.8 cents, respectively.

#	12
Question	Donagh Berry's excellent Research and Presentation enhances Ben Lart's earlier and equally excellent Presentation: Could we now hope that their findings could be included in the new CAP Programmes?Or is it too much to expect that Brussels will close down it's "Centre of Stone Age Science" anytime soon?!.......
Answer(s)	It is up to us to present the FACTS as to what is achievable. Regrettably we should have started the work earlier to be more forceful on our assertions. The last thing we need is for scientists to engage in debates that are not founded in science

#	13
Question	Great Talks Sinead, Ben &Donagh: My Q: to the chair As U know Ireland exports about 85% of it pasture products which in all markets replaces product with a higher C-footprint. In effect the more such product Ireland exports the lower the world C-eq emissions, (and the more we cause global cooling!). Are there any plans to calculate how much this reduction in World C-eq tonnage is, in Teagasc plans?? Tim G..
Answer(s)	Answered during webinar

#	14
Question	lots here about emissions per kg of product, which is valid re. carbon leakage debate, which the envir lobby do not want to engage with. but what about absolute emissions which is what the anti animal agri lobby - but also the official targets - focus on?
Answer(s)	From a breeding perspective, my current thinking is on methane output per lifetime (not as a ratio). If you include all the relevant traits in a breeding goal then you will improve the ratio itself; for example, we do not include protein% in our dairy cow breeding goal or feed conversion ratio in our beef breeding goal (we include the component traits) yet our evidence is quite clear that we are improving these metrics. Rightly or wrongly, breeders are focused on providing more efficient animals for the environment the animal is likely to be exposed to in the future. It so happens that our success in this has contributed to greater profitability for the dairy sector leading to new entrants and an expanding dairy herd.

#	15
Question	If all the grass is young and leafly could that have other health issues for cows with reduced fiber?
Answer(s)	High quality grass is generally thought result in sub-acute ruminal acidosis, especially in the spring when grazing second rotation grass. Research however, indicates that changes in ruminal PH and digestive efficiency are minimal.

#	16
Question	could methanogen levels be used to look at how grass quailty effecs methane levels
Answer(s)	Differences in grass quality will likely lead to differences in methanogen levels given grass quality has a large effect on the amount of methane emitted per kilo of feed eaten. Future research will look into this area.

#	17
Question	How does high quality grass compare in methane production with high quality grass silage?
Answer(s)	There is limited research conducted directly comparing high quality grass silage to high quality grazed grass for methane emissions. In general, grazed grass will reduce methane emissions compared to grass silage. Increases in the feed value of either grass or grass silage will reduce methane emissions.

#	18
Question	Sinead/Ben: Are there potentials / risks with additives or alterations in forage strategies when it comes to milk quality/processability?
Answer(s)	Research has indicated that some additives can result in residues in the milk and also have a negative impact on animal health. Therefore, it is very important

	that any potential additives identified for pasture-based systems, are evaluated thoroughly to ensure they do not impact on product quality/ animal health.

#	19
Question	Are the animals that are achieving the higher value in the milk recording reports the cows that are better for gas
Answer(s)	Cow producing more milk solids will on average produce more methane. They will, however produce less methane per kilogram of milk solids output on a daily basis. On a lifetime basis, selecting heavily for milk solids production will have negative effects on fertility and lifetime productivity, reducing the overall efficiency of the system (increase methane/kg of output over the animals lifetime).