



Oide

Tacú leis an bhFoghlaim
Ghairmiúil i measc Ceannairí
Scoile agus Múinteoirí

Supporting the Professional
Learning of School Leaders
and Teachers



Leaving Certificate Agricultural Science

" Cross Cutting Themes on a Modern Farm - Part 2"
Webinar Resource Booklet



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Keywords for this Webinar

Keyword	Definition
Acre	Unit of land measurement used in British Imperial system. One acre is equal to 0.4047 Hectares (Ha)
Aeration slurry system	Keeps slurry in the perfect state for spreading at all times
Agitate	To stir or mix (e.g. slurry -to mix its constituents for even distribution and ease of spreading)
AI straw	The straw is where semen is stored for Artificial Insemination
Animal behavioral specialist	Animal behaviorists study the way animals behave and try to determine what causes certain types of behavior and what factors can prompt behavior change
Antibiotic resistance	Antibiotic resistance happens when germs like bacteria and fungi develop the ability to defeat the drugs designed to kill them.
Artificial intelligence	Artificial intelligence is the simulation of human intelligence processes by machines, especially computer systems.
Chemical Nitrogen	Nitrogenous fertilizer industry includes the production of synthetic ammonia, nitric acid, ammonium nitrate, and urea. Synthetic ammonia and nitric acid are used primarily as intermediates in the production of ammonium nitrate and urea fertilizers.
Colostrum	Colostrum, or first milk, is the first form of milk produced by the mammary glands of humans and other mammals immediately following delivery of the newborn. It may be called beestings when referring to the first milk of a cow or similar animal. Most species will begin to generate colostrum just prior to giving birth.

Consultant vet	Vet employed that focuses on prevention instead of curing of diseases
Cow comfort	Cow comfort relates to the cow's overall well-being including her physiological and emotional needs. Many aspects of the cow's environment and management affect cow comfort.
Cow Cubicle	a space-saving system which allows more animals to be housed in a given area than if they were in loose yards.
Cycling (Oestrus)	The cycle of reproductive activity shown by most sexually mature nonpregnant female mammals
DMD Value	DMD (Dry Matter Digestibility) is an accurate and reliable test of forage feeding value. The DMD result is used to estimate energy of the silage, as well as expected live weight gains/milk yields and planning supplementation rates. DMDs of 70% and over are good.
Dry matter content	Dry matter (DM %) - This is the amount of silage material after water has been removed. Generally the higher the dry matter the higher the potential intake of silage.
Diploid	Diploid (2n) is a term that refers to the presence of two complete sets of chromosomes in an organism's cells, with each parent contributing a chromosome to each pair.
Dribble bar system	The trailing hose (dribble bar) reduces the surface area of the slurry by placing it in narrow bands rather than a thin film on the grass. The trailing shoe is more effective at reducing ammonia losses as the slurry is placed in bands but directly onto the soil surface just below the grass.
Dried off	A dry cow refers to a dairy cow that is in a stage of their lactation cycle where milk production ceases prior to calving. This part of their lactation cycle is referred to as the cows dry period and typically lasts between 40 and 65 days. This dry period is a critical part of their lactation cycle and is important for the cow's health, the newborn calf and future milk production.
Dry cow treatment	This treatment known as Dry Cow Therapy protects the livestock against any intra-mammary infections (IMI) that they may develop or may have contracted during the period of lactation and provides a shield against new infections during the dry period.

Economies of scale	Economies of scale are cost advantages reaped by companies when production becomes efficient. Companies can achieve economies of scale by increasing production and lowering costs.
Feed to demand	Feeding animals whenever they shows you that they are hungry.
Flow meter	detecting the flow rate and volume with certain applications to provide valuable information for controlling, monitoring, and optimising processes.
Free will	the freedom of the will to choose a course of action without external coercion but in accordance with the ideals or moral outlook of the individual
Gallons	A gallon is a unit of measurement for liquids that is equal to eight pints. In Britain, it is equal to about 4.546 litres.
Handling Unit	Handling facilities consist of a pen, or set of pens, to gather the cattle in before working them. The catch pen(s) can also serve as a place to preliminarily sort cattle into management groups. Gates can be used to segment the catch pens to allow for sorting cattle into groups.
Hectare (Ha)	Unit of area in the metric system equal to 100 acres, or 10,000 square metres, and the equivalent of 2.471 acres in the British Imperial System
Incorporate clover	To incorporate is to include or integrate a part into the whole. Incorporate is a more active version of the word "include"; if you incorporate, you are adding something to the mix (e.g. incorporating clover into a grass sward)
Indoor system	Indoor Dairy Farming, as opposed to pasture-based farming, is when a dairy cow herd is kept inside a shelter with all the tools and amenities the dairy cows need.
Key Performance Indicators (KPIs)	Key performance indicators (KPIs) are targets that help you measure progress against your most strategic objectives.
Lactation Curve	A lactation curve represents the evolution over time of a herd's milk production during a specific lactation cycle. This cycle is the period from lactation onset after calving until the cow's is dried off.

Late heading varieties	Heading dates refers to the date a variety goes to seed. Quality of grass deteriorates after a plant heads. Early-heading grasses head out during the first half of May, intermediate-heading cultivars head out during the second half of May, while the late-heading head out during the first half of June.
Low Emission Slurry Spreading (LESS)	Slurry application techniques such as trailing hose or trailing shoe reduce the surface area of the slurry compared to the splash plate thus reducing the loss of Nitrogen as ammonia to the air.
Mastitis	Bovine mastitis is an inflammatory response of the udder tissue in the mammary gland caused due to physical trauma or microorganism infections. It is considered the most common disease leading to economic loss in dairy industries due to reduced yield and poor quality of milk
Metabolizable Energy (ME Value)	Metabolisable energy—(ME) is the difference between the digestible energy and the loss of energy in the form of urine and methane gas released by rumen and hind-gut microbes.
Nutrient Value	The nutritional value of a food describes the amount of carbohydrates, fats, proteins and energy that can be used during digestion
Optimum	the most favourable situation or level for growth, reproduction, or success.
Oxytetracycline	Oxytetracycline is a broad-spectrum antibiotic with activity against many bacteria
Parameters	Parameters are factors or limits which affect the way that something can be done or made
Preventative medicine	Preventive medicine is the practice of promoting preventive health care to improve animal well-being. The goal is to ultimately prevent disease and/or death
Profitable enterprise	A business or company that makes a profit I.e. money that you gain when you are paid more for something than it cost you to make
Progeny	Progeny means "offspring" or "children."
Repetitive Jobs	Tasks where they have to do the same thing hour after hour, day after day and week after week

Reseeding	To sow seed again (e.g grass). Reseeding will Increase the overall productivity of the farm (sales, farm output & silage production) and allow higher animal output per hectare relative to permanent pasture
Rumination	Rumination is the process where animals rechew cud to breakdown plant matter further and to stimulate digestion. Such animals are called ruminants and they have a specialized digestive system to help them breakdown tough, fibrous plant matter.
Staff retention	an organization's ability to hold on to its employees.
Sward	a portion of ground covered with grass.
Temple Grandin	American animal behaviorial specialist
Tetraploid	Tetraploid (4n) in biology refers to having four sets of chromosomes, symbolized as 4n.
Umbilical System	The umbilical method of Manure / Slurry handling involves pumping the liquid from a liquid storage facility (lagoon or tank) using a high-pressure pump unit, via a pipeline, to a tractor mounted applicator unit.
Urea	Urea is an organic compound formed when nitrogen and protein break down and is the main component of human urine. It has many uses, including in fertilizer and other industrial processes
Vaccination Programme	a plan to vaccinate the susceptible animal population for the purposes of disease prevention or control.
Ventilation System	Ventilation systems in livestock housing serve an important function in maintaining a comfortable animal environment. Ventilation systems continuously remove the heat, moisture and odours created by the livestock and replenish the oxygen supply by bringing in drier, cooler air from outside.
Weather window	a limited interval when weather conditions can be expected to be suitable for a particular project (e.g. making hay or silage)
Withdrawal period	The time that must elapse between the last administration of a veterinary medicine and the slaughter or production of food from that animal, to ensure that the food does not contain levels of the medicine that exceed the maximum residue limit.
Work-life balance	the amount of time you spend doing your job versus the amount of time you spend with loved ones or pursuing personal interests and hobbies



Video 1 : Technology on the Farm

Watch the videos based on Tommy's farm and answer the questions which follow:

1. What triggers cows to go to the robot to get milked?

2. On average, how many times a day do the cows get milked?

3. Using your own knowledge, how does the number of times the cows are milked on Tommy's farm compare with a traditional milking routine on farms?

4. Identify **three** pieces of technology used and explain how each technology makes the farm more sustainable.

5. Outline what is meant by key performance indicators.

6. Briefly explain the advantages of using a computer package in the management of a dairy herd.

7. List **four** pieces of information supplied by the computer package and explain why they are useful for the farmer.



Video 1 : Technology on the Farm

8. Based on the key performance indicators what does the data in orange and red mean?

Key Performance Indicators							
Milk/Cow/Day		Total Milk Produced		Milk Solids		Milking/Cow/Day	
Current	Weekly avg	Current	Weekly avg	Current	Weekly avg	Current	Weekly avg
28.7kg	29.8kg	3507kg	3540kg	2.1kg	2.1kg	2.7	2.7
Refusals		Failures		Milk Separated		Fat	
Current	Weekly avg	Current	Weekly avg	Current	Weekly avg	Current	Weekly avg
1.9	2.4	4.0	3.1	168.8kg	79.6kg	3.89%	3.86%
Protein		Connect Attempts		Total eating minutes		Rumination Activity	
Current	Weekly avg	Current	Weekly avg	Current	Weekly avg	Current	Weekly avg
3.35%	3.32%	1.29	1.30	280	272	520	525
Concentrates / 100kg milk		Concentrates fed		Box Time / Visit		Treatment Time	
Current	Weekly avg	Current	Weekly avg	Current	Weekly avg	Current	Weekly avg
19.6	19.5	688kg	691.6kg	07:18	07.18	02:30	02:31
Milk Speed		Free Time		Feed Efficiency			
Current	Weekly avg	Current	Weekly avg	Current	Weekly avg		
2.5kg	2.5kg	11%	10.2%	1.14	1.20		

9. Briefly explain the data used to decide on breeding replacements in the herd.

Reproduction Predictions			
	February	March	April
Calving	0	7	4
Calving heifers	2	0	2
Dry off	0	2	0
Lactating cows	122	124	129





Video 1 : Technology on the Farm

10. The graph shows a cow's lactation curve for the year. The cow is currently dried off. There are two incidents during the year where it cow's milk yield has dropped. Briefly explain one reason why this may happen.



11. The table shows a cow's data relating to the cow's production for the year. Analyse the table and answer the questions which follow.

Lactation Number	Calving Date	Lactation Production (litres)	Predicted Production (305 days)	Milk Separated	Lactation Days
2	10/02/2021	1480	1355	3.0	368
3	13/02/2022	12862	11446	313	379

(a) Comment on the calving interval and state if it is inline with production targets.

(b) Calculate how much milk entered the bulk tank for sale after the milk separated was discarded and explain the importance of this figure to the farmer.

(c) Outline one possible reason for milk to be discarded during a cow's lactation.





Video 1 : Technology on the Farm

12. Identify and explain three pieces of data shown on this robot screen.



Data Point	What does this mean? What is it telling the farmer?





Video 2: Health & Safety

The Health and Safety Authority (HSA) published Farm Safety Code of Practice - Risk Assessment Document in 2017. As you watch this video of Tommy on his farm, try to audit current practices on O’Harte farms by completing the Livestock Risk Assessment from page 13 and Slurry Handling Risk Assessment from page 16.

Livestock Risk Assessment	List the types of livestock (bulls, cows, rams etc.) on the farm				
<i>I will ensure that:</i>					
Pens, fencing, crush(es) and skulling gates and other handling facilities are adequate and allow safe animal handling.					
Gates can be securely closed.					
Fencing is adequate to contain stock.					
Facilities for loading and unloading of animals are adequate.					
A calving gate (which provides operator protection) is used for calving cows.					
A physical barrier is established when handling calves with freshly calved cows.					
A bull pen which prevents direct contact with the bull is provided when the bull is housed.					
When outdoors the bull has a chain/rope attached to the ring.					
A safe means of escape is available in the calving pen/bull pen.					
All visible defects in livestock facilities are rectified. (List defects on control sheet).					
Safety Practices					
Persons handling livestock, especially a bull, are competent and fit.					
A vehicle is used when herding if a bull is running with the herd.					
Signs warning of the presence of a bull are displayed beside public places.					
Adequate assistance is in place when carrying out animal handling operations.					
Aggressive animals are culled without delay.					
Suitable PPE and gloves are worn when handling animals.					





Video 2: Health & Safety

Slurry Handling <i>I will ensure that:</i>	Answer ✓ x or N/A
Open slurry/water tanks are fenced to a height of 1.8 meters and secured (including gates) to prevent access.	
Access (agitation) points to slatted tanks are kept secured.	
Slurry agitation/spreading is planned taking account of weather forecasts choosing a windy day if possible.	
Livestock are removed from sheds and pets are controlled before slurry agitation starts.	
All doors and sheeted gates are opened to maximize ventilation.	
During slurry agitation buildings and high risk areas are cordoned off to prevent access.	
Persons will stay away from agitation area for 30 mins after commencement.	
During slurry agitation and spreading agitation points are guarded and where possible safety grids are fitted.	
Manhole covers are replaced as soon as possible.	
Slurry gas warning signs are in place at agitation points.	
Entry into an underground slurry/effluent tank is never undertaken without full risk assessment and safety controls in place.	
Condition of slats is checked for damage regularly.	
Work is carried out upwind of agitation with no reliance placed on slurry gas monitors.	

Tommy has mentioned many other aspects other health and safety considerations he has in operation on the farm. Can you list some of them here:

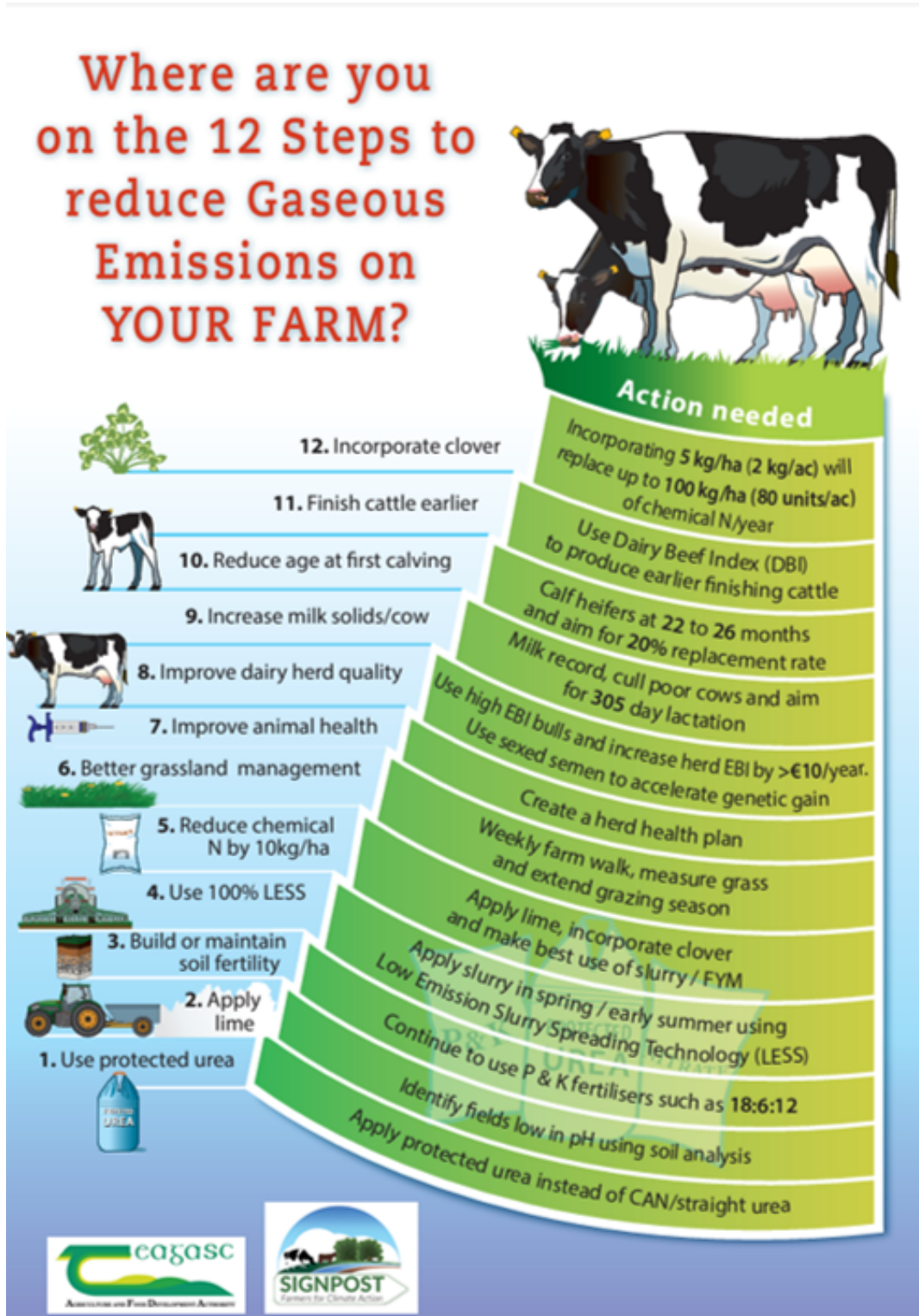
Health and Safety Risk	Steps taken to mitigate against this risk





Video 3 : Sustainability on the Farm

Read the graphic below created by Teagasc for their Signpost Programme (2022). On the page that follows fill in the ways in which Tommy’s farm tries to follow each of the steps.





Video 3: Sustainability on O'Harte's Farm

Pick any 10 of the 12 steps and write down what actions Tommy and his team do on their farm (one is already completed for you).

**Where are you
on the 12 Steps to
reduce Gaseous
Emissions on
YOUR FARM?**



12. Incorporate clover	
11. Finish cattle earlier	
10. Reduce age at first calving	
9. Increase milk solids/cow	
8. Improve dairy herd quality	
7. Improve animal health	
6. Better grassland management	
5. Reduce chemical N by 10kg/ha	
4. Use 100% LESS	
3. Build or maintain soil fertility	Tommy does regular soil analysis with Farm Eye to ensure soil health & fertility is maintained
2. Apply lime	
1. Use protected urea	



Additional Resource #2: Technologies on the farm

During the video(s), outline how each technology is used on the farm.

Technology	Explain the function of each piece of technology and how do they benefit farm operations	
	Function	Benefit
Automatic feeder		
Automatic scraper system		
Cow collar		
Milking robot		

Extension task:

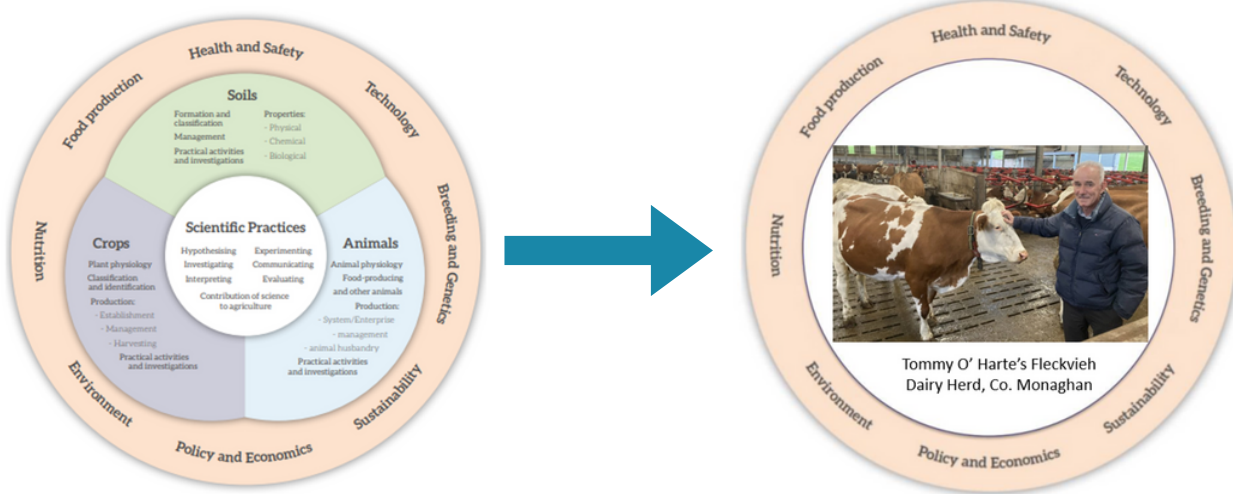
Select 2 pieces of technology from the list above and carryout research into their operations and their role on a farm





Additional Resource #3: Cross Cutting Themes Wheel

Watching the video describe places where the eight Cross Cutting Themes are taken into consideration by Tommy on his farm.



1. Health and Safety	
2. Technology	
3. Breeding and Genetics	
4. Sustainability	
5. Policy and Economics	
6. Environment	
7. Nutrition	
8. Food Production	



Additional Resource #4 : Further resources on Health & Safety

Online Safety Courses from Health Safety

Authority: Students can complete 40min courses and be awarded a certificate. Choose from An Introduction to Tractor Safety, Farm Safely with Slurry or Health and Safety for Seasonal Workers in Horticulture.

SCAN ME



SCAN ME



Slurry Safety Advice from the Farmer's Journal: Helpful advice from Ireland's most popular agricultural print media

SCAN ME



HSA Review of work related fatalities in Agriculture in Ireland: Summary of deaths between 2011-2020 in agriculture and forestry in Ireland

SCAN ME

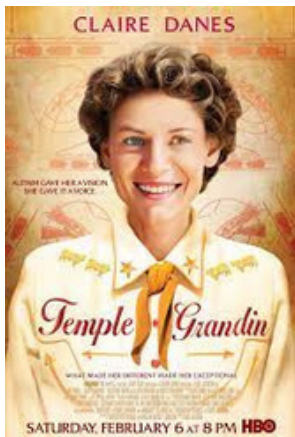


Survivor Stories from HSA: Videos highlighting potential hazards.



Additional Resource #5: Who was Temple Grandin?

Tommy mentioned that his curved cattle shoot was inspired by Temple Grandin, an American animal behavioural specialist. To find out more about Temple's amazing life story and journey into research on animal welfare, check out some of the resources below.



Temple Grandin Website (Click on QR Code)

Here you will find a bio on her life and also her backlog of research that she has carried out in the humane treatment of animals in agriculture. Or maybe you could find the her biopic movie, Temple Grandin(2010) starring Claire Danes or look for an interview with her on Youtube.

SCAN ME



Can you research who Temple Grandin was and the work she is famous for? Write 5 key points about her life and major contributions to animal welfare.



● ●✕



Additional Resource #6: Links to Part 1 of the Webinar

SCAN ME



Watch the full webinar

SCAN ME



Watch individual videos and use the resources

SCAN ME



Complete an EdPuzzle while watching the video



Cross-Cutting Themes on a Modern Dairy Farm - Part 1
May 9th @ 7pm

“ If we're going to go down the route of dairy farming it is going to be a fully computerised automated system...I'm very conscious from a health, safety and lifestyle perspective that this farm is sustainable...In general, we farm from 8AM-6PM, 5 days a week... ”

The PDST agricultural science team are delighted to present part 1 of a 2 part webinar on '*Cross-Cutting Themes on a Modern Dairy Farm*' in our webinar series with Tommy O' Harte.

In this webinar Tommy will cover topics including Breeding and Genetics, Economics and Policy, Nutrition and Food Production as they apply to his automated Fleckvieh dairy herd.



Tommy and his team will tell their story on how they set up and operate their modern dairy farm in a sustainable way.



Notes

Lined area for taking notes, featuring a vertical red margin line on the left and horizontal blue lines.





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