

# Leaving Certificate Agricultural Science

" Cross Cutting Themes on a Modern Farm - Part 1"  
Webinar Resource Booklet



Professional Development  
Service for Teachers

An tSeirbhís um Fhorbairt  
Ghairmiúil do Mhúinteoirí

pdst.ie  



© PDST 2023

This work is made available under the terms of the creative Commons Attribution Share Alike 3.0 Licence <http://creativecommons.org/licenses/by-sa/3.0/ie/>. You may use and re-use this material (not including images and logos) free of charge in any format or medium, under the terms of the Creative commons Attribution Share Alike Licence. Please cite as: PDST Agricultural Science Webinar resource, 2023.



## Keywords for this Webinar

<b>Ad Lib</b>	As much and as often as desired
<b>AI/ Artificial Insemination</b>	Artificial insemination (AI) is the process of collecting sperm cells from a male animal and manually depositing them into the reproductive tract of a female.
<b>AM PM Rule</b>	The AM-PM rule dictates that a cow should receive AI 12 hours after first being observed in estrus. If a cow is seen in estrus in the AM she should receive AI that PM, and cows seen in estrus in the PM should receive AI the following AM.
<b>Components/Constituents</b>	a part or element of a larger whole e.g. Milk has many components (Water, fat, lactose, proteins etc)
<b>Drying Off</b>	After each lactation, dairy cows require a dry period which is sufficiently long to allow the udder tissue to involute (shrink down), repair and rejuvenate.
<b>Dry Matter</b>	Dry matter is what remains after all of the water is evaporated out of a feed: grain and fresh or dried forages.
<b>Embryo Transplantation</b>	Embryo transfer is one step in the process of removing one or more embryos from the reproductive tract of a donor female and transferring them to one or more recipient females. Embryos also can be produced in the laboratory via techniques such as in vitro fertilisation or somatic cell cloning.
<b>Fertility</b>	fertility relates to our ability to be able to reproduce. In short, being fertile means having the ability to conceive, or have offspring.
<b>Permanent pasture</b>	Permanent grassland is land used permanently (for several consecutive years, normally 5 years or more) to grow herbaceous fodder, forage or energy purpose crops, through cultivation (sown) or naturally.

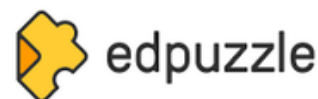
<b>Fleckvieh</b>	The Fleckvieh is a breed of dual-purpose cattle suitable for both milk and meat production. It originated in Central Europe in the 19th century from cross-breeding of local stock with Simmental cattle imported from Switzerland.
<b>Flushed Embryos</b>	Flushing involves the removal of fertilised embryos from the womb of a donor cow. The donor cow is given a course of injections to super-ovulate her and cause her to produce more eggs from her ovaries than in a normal cycle.
<b>Forage</b>	Forage is a plant material (mainly plant leaves and stems) eaten by grazing livestock
<b>Freemartin</b>	A hermaphrodite or imperfect sterile female calf which is the twin of a male calf whose hormones affected its development.
<b>Fully Automated</b>	Carried out by machines or computers without needing human control
<b>Heifer</b>	A cow that has not borne a calf
<b>Lactation</b>	Lactation is the process of producing and releasing milk from the mammary glands
<b>Lactation Curve</b>	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 milk dries up.
<b>Maize Silage</b>	Maize silage is made out of whole ensiled maize plants. It is a consistent source of palatable and high-energy forage for all classes of ruminants.

<b>Marbled Fat</b>	Marbling is the white flecks of intramuscular fat in meat, most notably red meat. The fat in lean muscle creates a marble pattern—hence the name. Marbling affects meat's juiciness, tenderness, texture, and flavour
<b>Milk Fever</b>	Milk fever is a metabolic disorder caused by insufficient calcium, commonly occurring around calving. Milk fever, or hypocalcaemia, is when the dairy cow has lowered levels of blood calcium.
<b>Milk Solids</b>	Milk solids refer to the amount of protein and fat in a quantity of milk
<b>Molasses</b>	Molasses is a thick syrup that people use as a sweetener. It is a by-product of the sugar-making process, and it comes from crushed sugar cane or sugar beets.
<b>Peat Bedding</b>	<p>Peat to be used for animal bedding will be harvested off the bog during the summer months, to ensure the peat is harvested at a moisture content between 40-50%. At this level of moisture it is easier to manage. Peat is also generally highly absorbent.</p> <p>Peat can be spread straight on to the land after use and does not require a period to break down. As peat has a naturally low pH there can be slight issues if too much peat is spread on land. To combat this some farmers will add lime to the peat before it is spread.</p>
<b>Pedigree Registered</b>	This pedigree certificate provides a breeder with an official ancestry document. This means that each animal can be traced back three generations at a single glance. This information is validated by IHFA and DAFM rules. From this verified data a farmer can make informed choices with his or her breeding decisions, breeding the right kind of stock to best suit his or her system.
<b>Poaching</b>	The term 'poaching' is applied to the loss of soils or grass by the damaging action of feet of livestock, which can affect availability of productive land, water pollution through increased runoff and welfare issues for cattle.

<b>Replacement Heifers</b>	Replacement heifer is a heifer that has been selected to be bred and placed in the beef or milk herd.
<b>Research</b>	Investigation into and study of materials and sources in order to establish facts and reach new conclusions.
<b>Semen</b>	Semen, also known as seminal fluid, is an organic bodily fluid created to contain spermatozoa
<b>Scanning</b>	Cow pregnancy scanning operators can scan cows from thirty days after insemination or service. Being able to predict when cows and heifers are due to calf can be a huge advantage to farmers.
<b>Starch</b>	An odourless, tasteless white substance occurring widely in plant tissue and obtained chiefly from cereals and potatoes. It is a polysaccharide which functions as a carbohydrate store and is an important constituent of the human diet.
<b>TMR (Total Mixed Ration)</b>	Total mixed ration (TMR) is a method of feeding dairy cattle. The purpose of feeding a TMR diet is that each cow can consume the required level of nutrients in each bite. A cow's ration should include good quality forages, a balance of grains and proteins, vitamins and minerals
<b>Transition Cow Diet</b>	Transition feeding (also known as lead feeding) is an animal management strategy that ensures a smooth, hassle free and healthy progression from the late stages of pregnancy through to lactation.
<b>Weaned</b>	A young animal that is weaned has been removed from its mother and has started to eat other food, instead of its mother's milk
<b>Zero Grazing</b>	Zero grazing is a dairy farming system where fresh grass is cut and brought to housed cattle.



## Video 2: Breeding and Genetics



**While watching this video please answer the questions below.**

You can pause the video each time to allow you to fill in your answer.

The video is available for you to watch and answer the questions online as an EdPuzzle at <https://edpuzzle.com/media/641d73bfdb339143399fa8ba> if you would rather answer the questions in digital format.



**1. What country are the Fleckvieh breed from? \_\_\_\_\_**

**2. Why do you think some of the milk that is produced doesn't "make it down the lane" or get sold to the creamery? \_\_\_\_\_**

\_\_\_\_\_

**3. If Tommy's herd sold 770,00kgs of milk to the creamery in 2022 and it contained 59,000kg of milk solids (fats, proteins) what was the total percentage milk solids for his herd?**

**4. According to Tommy what is the average number of lactations of a Fleckvieh cow?**

\_\_\_\_\_

**In your opinion, is the Fleckvieh breed a good option for a sustainable dairy herd in Ireland?**

\_\_\_\_\_

\_\_\_\_\_

**5. Give 2 reasons why some dairy farmers with "black and white" friesian herds are choosing Fleckvieh semen to AI their cows with?**

\_\_\_\_\_

\_\_\_\_\_

**6. If the herd last year produced 116 live calves from 104 cows, can you calculate the average number of calves per cow?**



## Video 2: Breeding and Genetics

Watch the video and answer the questions which follow.

1. Besides their good reproductive efficiency can you list two other benefits Tommy says about his Fleckvieh cows?

---

---

---

2. How many hours after the cow comes into heat does Eddie say is the best time to inseminate the cow? \_\_\_\_\_

3. Do they operate Spring Calving or Year Round Calving on the farm and outline why you think they operate this type of production system?

---

---

---

4. (a) Give some evidence that the cow that Tommy refers to is of superior genetic merit? (b) How does he intend to spread her genes across his herd?

---

---

---

5. What helpful pieces of information does scanning provide?

---

---

---

6. What two criteria does Tommy look for when looking at cows' data?

---

---

---







## Video 3: Activity A - Feed and Nutrition

When Tommy was interviewed, in March 2023, the cows were on the following feeding regime: 25 Kg of grass silage, 12 Kg of maize ration, 5 Kg of blend and 5 Kg of nuts (dairy ration 16% protein). This totals 47 Kg per day.

1. Maize grain/meal is a high energy feed low in protein. Why do you think Tommy has added maize to his feeding regime for this dairy herd?

---

---

---

---

2. Why do farmers have to be careful feeding ruminants a high energy, high carbohydrate diet which contains lots of digestible starches and sugars?

---

---

---

3. Name the bulky feed present in Tommy's blend and explain why it is important to include this component in a ruminants diet?

---

---

---

4. During early lactation it is important for cows to be given a quality dairy ration to stop her "*milking off her back*". Explain what we mean by this term and design a suitable ration listing all components to prevent this happening.

---

---

---

---

5. Sugar cane molasses is a great source of sugar. Tommy stated they were adding this to their feed. How would this impact on milk output?

---

---

---

---

## Video 3: Activity B - Calf Management



Tommy talks about how calves are cared for from birth until they are weaned off milk on his farm.

Use the terms that follow to complete the table below:

- Grouped with other calves in bigger sheds
- Colostrum
- Automated feeder keeps track of how much each calf drinks
- Jackets put on them to help them keep warm
- Clean straw bedding in individual pen
- Infra-red lamp for extra heat
- Use individual feeding buckets to avoid cross contamination
- Transition milk
- Clean straw bedding in individual pen
- Powdered milk (23% protein) (6-7 litres) and crunch
- Individual Calf Hutches with straw bedding on slats
- Automatic feeder providing ad lib feeding of powdered milk (up to 12 litres per day) and crunch

Age	Feeding	Housing	Other management tips
0-24 hours			
1-4 days			
5 days - 3 weeks			
3 weeks - 10 weeks			



## Video 4: Numeracy Activity



Below you will see a table containing some data from the farm. During year 1 the herd are predominantly first time calvers and so this is their first lactation which is impacting on output.

As the cows enter their second and subsequent lactations milk output will increase.

Use the data in the table to complete the numeracy activity below.

Total number of cows in year 1	104
Volume of milk production in year 1	770,000 Kg
Total amount of milk solids in year 1	59,000 Kg
Projected volume of milk per cow by year 3	10,000 Kg

1. Calculate the total milk yield per cow for year 1

2. Calculate the total amount of milk solids produced by each cow in year 1

3. By year 3 the farm is more profitable as compared to year 1 as the cows are producing more milk. Calculate the increase in output per cow in year 3.

4. If the current price of milk is 50 cent per litre (1Kg = 1 L) how much more profit is the farm making in year 3 compared to year 1?

---

5. Express this increase as a percentage increase for the farm.

---





## Technologies on Tommy's Farm

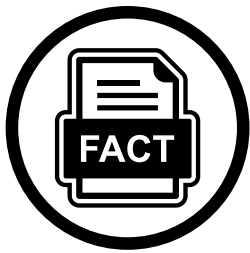
During the video(s), outline how each technology is used on the farm.

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 carry out research into their operations and their role on a farm





## Fleckvieh fact file



### Characteristics

Recently, great gains have been made in the genetic milk productiveness of the Fleckvieh through breed management to the point that the Fleckvieh now rivals pure milk producing dairy breeds.

### Special value is placed on the Fleckvieh's fitness/health characteristics including:

- fertility
- longevity
- calving ease
- udder health
- milking speed
- somatic cell count
- persistence.

### Breeding target: 38 per cent milk, 16 per cent beef, 46 per cent fitness

Fleckvieh cattle exhibit good development and performance capacity along with good conformation. 6,000 kg milk in the 1st lactation and over 7,000 – 9,000 kg milk in later lactations with 4.2 per cent fat and 3.7 per cent protein.

### Beef performance:

- Daily gain: 1.44 kg
- Carcass weight: 57.2 per cent
- EUROP classification E and U: > 85.7%
- Live weight: 650 – 850 kg
- Height of the rump: 140 – 150 cm
- Bull calves sell at €250

Fleckvieh have a number of profitable advantages over more "traditional dairy cows". These are a longer lifespan, ease of management, strong dual purpose traits and more lactations make Fleckvieh dairy cattle very competitive among the highest milk producing cow breeds. They have a quiet disposition and are easy to work with making them a very interesting breed with certain Irish dairy farmers.

## Fleckvieh Explainer - what do you find out about this breed?

**Things that I have learned**

**Things that I found interesting**

**Questions I still have**



### Related links



Further research into aspects of this Webinar:



**Unlocking calf potential with extra feed**

*AgriLand (2023)*



**It's not the colour of the cow, it's the quality**

*Farmer's Journal (2021)*



**Milking Fleckvieh cows with robots in Monaghan**

*Cows.ie (2022)*

● ●✕

---

---

---

---

---

---

---

---

## Notes

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





An Roinn Oideachais  
Department of Education



Dublin West Education Centre  
Ionad Oideachais Bhaile Átha Cliath Thiar

The PDST is funded by the Teacher Education Section (TES) of the Department of Education (DE) and is managed by Dublin West Education Centre

