Teagasc
Agriculture and Food Development Authority

DairyBeef 500 Factsheet

DAIRYBEEF 500
Sustainable Dairy Beef Production

Combating internal parasite infection on dairy-beef farms

Stomach and lungworms are two of the main internal parasites that can significantly reduce animal performance of dairy-beef calves during their first grazing season. Animals in their second grazing season generally develop immunity to these parasites.

What is anthelmintic resistance?

- Anthelmintic resistance is a term used to describe the ability of a parasite to survive doses of drugs that would normally kill it.
- Teagasc Grange trials have found that anthelmintic resistance levels among stomach worms on Irish dairy calf-to-beef farms are far higher than was previously thought.
- Care should be taken to avoid inappropriate dosing practices which increase the incidence of anthelmintic resistance occurring amongst stomach worm populations.
- As yet, anthelmintic resistance has not been detected in lungworm populations.

Dosing products

There are three classes of anthelmintic licensed for the treatment of stomach and lungworm in Ireland: benzimidazoles (white); levamisole (yellow); and macrocyclic lactones (clear). Although there are many different brands of doses on the market for the treatment of stomach and lungworm, they all contain one of or a combination of these three drug classes

Table 1. Anthelmintic classes for the control of gut worms in cattle.

Anthelmintic Class	Common Name	Route	Stages affected
Benzimidazole	White (1-BZ)	Oral	Eggs, Larvae, Adults
Levamisole	Yellow (2-LV)	Oral, inject, pour on	Adults
Macrocyclic lactone	Clear (3-ML)	Inject, pour on	Larvae, Adults

Practices to reduce anthelmintic resistance

Do:

- Take stock performance and faecal egg count (FEC) results into account when deciding on whether or not there is a need to dose.
- Pay attention to dose-to-weight calculations so animals receive a full dose.
- Dose based on the weight of the heaviest animal in the bunch (don't under-dose).
- If a large degree of weight variation exists, splitting the group into a heavier and lighter group and then dosing based on the heaviest in each group is advisable.
- Read the label and instructions carefully to ensure that you know exactly what the dose can and cannot treat.
- Dose for lungworm in calves based on first signs of hoose cough.
- Complete a drench test to verify whether or not there is resistance on farm to the drugs used (consult your local advisor/vet for more information on this measure).
- Only use wormers that work on the farm. If all work then alternate the drug used to dose cattle between the three classes listed above

Don't:

- Don't use flukicide/wormer combination products unless intended for control of both stomach worms and fluke.
- Don't dose and turn out to clean pasture. It is best to dose and return to contaminated to reduce anthelmintic resistance.
- Don't dose based on calendar dates or anticipated worm burdens.
- Don't turn calves out to the same paddocks as previous bunches of calves in the same/previous year. Try to alternate the ground calves graze during the first months post weaning/turnout.
- Don't use long-acting moxidectin products unless you are sure there is no resistance on farm to them and do not use more than once a year.

Best practice dosing programme for calves in the first year

- Controlling both stomach and lungworm is critical to achieving good animal performance over the first grazing season.
- The majority of spring-born calves are weaned off milk and turned out to pasture in April/May.
- The targeted average daily gain (ADG) for these animals over the rearing period and through the summer is 0.7-0.8 kg.
- ADG falling below this level suggests that a worm burden could be affecting calf thrive, but only once nutrition and herd health are satisfactory.
- Faecal samples should be taken monthly from early June onwards to quantify the level of stomach worm burden the calves are experiencing.
- The results of the FEC test will be the main indicator of when to dose. Subsequent doses should again be based on the results of FEC tests.
- For treatment of and protection against lungworms, the calves should be dosed when the first signs of coughing appear.
- With no known resistance to anthelmintic drugs in lungworm, there is an opportunity to use an alternative drug class to the ones normally used on your farm to treat stomach worms.

Interpreting FEC results

The results of FEC are given as 'eggs per gram' (epg) of faeces. The number of eggs is an indication of the number of adult worms in the gut of the animal. Animals should be treated for stomach worms when the FEC goes above 200 epg. Different types of tests are carried out for stomach worms, lungworm and fluke and so a stomach worm FEC test will not provide an indication of lungworm or fluke burden and vice versa. Treatment for lungworm is commonly based on clinical signs, while it should be noted that rumen fluke is very common and often causes no problem to the animal. It is not necessary to treat every time a positive result for rumen fluke is seen in a fluke FEC test and instead treatment should be based on veterinary advice or clinical signs of disease.

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Finishing Holstein Friesian dairy-beef steers

Spring born Holstein Friesian male calves are the most predominant breed available for dairy-beef production in Ireland with ~350,000 calves available annually. These male calves are best suited to beef finishing systems with targeted finishing ages of under 24 and 28-months, meaning animals require a second winter on farm. The provision of a second winter period and older slaughter ages means that Holstein Friesian steers systems carry fewer animals and can have reduced carcass output/ha than beef x dairy steer and heifer systems. Farms who enter into Holstein Friesian finishing systems generally have very good grassland management and grazing infrastructure and have ample housing facilities for first and second winter periods indoors. Despite the lower purchase price of Holstein Friesian male calves compared to beef sired calves, they have a higher production cost, due to increased inputs and have lower carcass value due to poor carcass conformation. Producers need to carefully budget for this system and market cattle at finishing based on their reduced ability to meet market specification, primarily due to poor carcass conformation potential.

24-month steer system

- Animals are housed in October after the second season at pasture.
- Weighing 530 kg at the start of finishing
- Steers are fed a diet of silage ad-lib plus 5 kg/day of concentrate, depending on silage quality.
- High silage quality (72 % DMD +) is an essential cost saving measure.
- The finishing period is approximately 100-120 days and the target live weight at slaughter is 620 kg.
- Expected carcass weight of 310-320 kg at 24 months, with an expected carcass conformation grade of O-/P+ and a fat score of 3-/3=.
- Lifetime concentrate input for this system is 1t.
- Grazed grass, silage and concentrates account for 52%, 26% and 22%, respectively, of the animals' overall diet.

Steer management guidelines

- To achieve a lifetime daily gain of 0.8 kg the calf rearing stage is critically important to ensure an adequately developed rumen capable of utilising grazed forage post-turnout.
- Castration should take place by 5-6 months of age, well in advance of housing for the first winter, to minimise stress and possible setbacks in performance.
- Weanling steers should be on average 230 kg at housing in the autumn. This requires excellent grassland management and a well implemented parasite control programme. Supplementation should cease 2 weeks post-turnout, recommencing in September (1-1.5 kg/hd/day) to account for declining grazed pasture quality.
- Over the winter a moderate growth rate of 0.6-0.7 kg/day is targeted from a diet of high quality grass silage (>72 DMD) and 1-2 kg of concentrate/day.
- Yearling steers should be turned-out in early spring and should gain 200 kg over a 220 day grazing season.
- Highly digestible, leafy grass should be offered to steers to ensure adequate growth rates (0.9 kg/day) over the second grazing season.

Recent Teagasc Grange Holstein Friesian steer system research

An experiment was carried out at Teagasc Grange to examine the feasibility of finishing high Economic Breeding Index (EBI) Holstein Friesian steers, following a conventional rearing strategy, followed by a finishing period on a diet of high quality grass silage and 5 kg/day of a barley based concentrate during a second winter indoors. Finished steers were drafted based on meeting a body condition score of 3.75 (5-point scale), deemed to be equivalent of a carcass fat score of 3+/4-.

Table 1. Farm system performance of 24-month Holstein Friesian steers

Physical performance	
Age (months)	23.6
No. cattle finished (40 ha farm)	111
Physical stocking rate (LU/ha)	2.7
Concentrates per head (kg)	1031
Carcass weight (kg)	312
Carcass output (kg/ha)	865
Financial performance	
Costs per kg carcass (€/kg)	3.90
Profit per kg carcass (€/kg)	0.86
Net margin (€/ha)	747
Net margin (€/per head)	269

Base price of €4.85/kg. Finishing concentrate price €375/t. Protected urea price €550/t. ***Net margin excludes land & labour charge** and assumes a calf purchase price of €60 per head for bull calves.*

Steers in this system achieved a carcass weight of 312 kg, conformation of P+/O-, and a fat score of 3+, with an average slaughter age of 23.6 months. Poor carcass conformation limits beef price received using the quality payment system. In this study only 23% of finished carcasses produced met overall market specification, with this primarily due to poor carcass conformation. In this study Holstein Friesian steers required a 120-130 day finishing period to achieve a fat score of 3+, with limited opportunity for earlier slaughter compared to early-maturing beef sired animals. Holstein-Friesian steers systems do offer advantages, including lower initial purchase price, earlier birth date, and a generally uniform carcass performance allowing producers to forecast returns with greater certainty. However, this system has a greater conserved silage requirement due to older slaughter ages, with additional housing requirements also present. This increase in slaughter age limits the total number of animals that can be finished, reducing carcass output/ha, and ultimately limiting profit.

28-month steer system (third grazing season finishing)

- Poor performing steers should be earmarked for finishing during a third grazing season prior to housing for their second winter.
- Steers are offered high-quality grass (72% DMD) silage ad-lib for the second winter, targeting an average daily gain of 0.5-0.6 kg.
- Where silage quality drops below this level, a degree of meal supplementation may be required.
- Steers are turned out to pasture in February/March for a third grazing season, during which time an ADG of 1.2 kg is targeted.
- Slaughtering occurs in May/June – typically a high beef price point in the year.
- A carcass weight of 350 kg is targeted.
- Lifetime concentrate input for animals produced under this system is 500 kg
- Grazed grass, silage and concentrates account for 65%, 26% and 9%, respectively, of the animals' overall diet.

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Grazing management for dairy-beef systems

Achieving the desired levels of animal performance at pasture is critical for dairy-beef systems. Target weight gains can be achieved from grass-only diets where the correct management practices are implemented.

Key components of efficient grazing systems:

Infrastructure

- Good grazing infrastructure (roads and paddocks) maximise grass utilisation.
- An inadequate number of paddocks leads to extended residency times, which reduces grass utilisation and DM production.
- Forty-eight hour paddocks offer the greatest flexibility in terms of ensuring animal's intake is not restricted, paddocks are large enough for machinery operations, and paddocks can be split for calves or during difficult grazing conditions.
- 10-12 paddocks necessary for each grazing group.

Grass measurement

- Needs to be done weekly (>20 measures/year)
- Give confidence in making decisions
- Identify when a surplus or deficit in feed supply occurs
- Improve labour efficiency
- Improve sward quality
- Identify underperforming swards

Nutrient management

- Grass growth and growth response to N fertiliser can be constrained on farm if soil fertility is not optimum.
- Dairy-beef farms should soil test regularly to identify any nutrient deficits and to formulate targeted nutrient management plans.
- Investing in correcting soil fertility on farm increases the availability of N in soils and improves the persistence of productive herbage species such as perennial ryegrass and clover.
- To maximise herbage production, the ideal pH is 6.3 for most soils and organic and inorganic manures should be strategically used to maintain and build P and K levels to index 3.

Clover

- Including white clover in grass swards can improve sward nutritive value and animal production, while reducing reliance on chemical N fertiliser due to the ability of clover to "fix" atmospheric N.
- An average annual white clover content of 20-25% increases pasture quality and encourages high levels of DM intake which ultimately leads to greater live weight performance of dairy-beef cattle. To promote and maintain high levels of sward clover content, a pre-grazing herbage mass of 1300-1600 kg DM/ha, and a post-grazing sward height of 4 - 5 cm should be maintained, N fertiliser should also be decreased over the summer months.
- Red clover can also play an important role in efficient dairy-beef systems. The growing point of red clover is more exposed in the sward compared to white clover, making it more suitable as a multi cut silage crop. Red clover has the ability to fix high levels of N annually (200-300 kg N/ha).

Seasonal management

Spring

- Spring rotation planner
- Finish first rotation by April 1st
- AFC: 600-700 kg DM/ha
- Target post-grazing sward height: 4 cm
- 45 day rotation
- Close 45-55% of the farm area for first cut silage

Mid-season

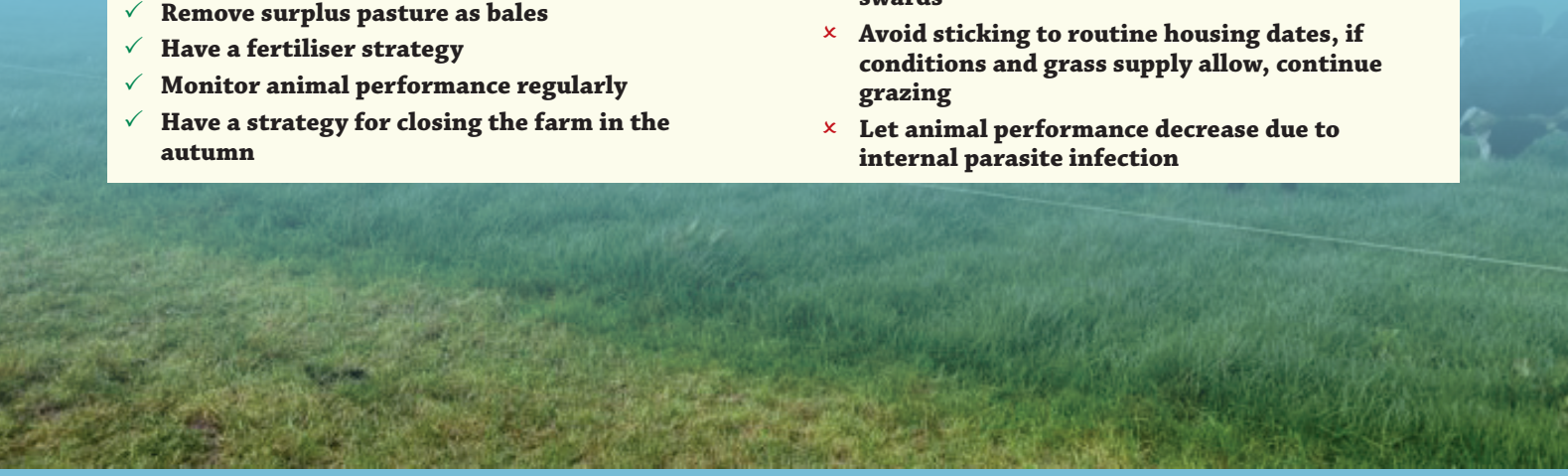
- Maintain sward quality
- Walk farm weekly
- Remove surplus grass as high quality baled silage
- 18-21 day rotation
- Target pre-grazing herbage mass: 1300-1600 kg DM/ha
- Target post-grazing sward height: 4-5 cm

Autumn

- Planning for the following spring begins in the Autumn
- Start building cover
  - Reduce demand, increase rotation length (+1.5 days/ week)
- Use the "60:40 Autumn planner"
- Target post-grazing sward height: 4 cm
- AFC: 450-550 kg DM/ha on December 1st

Do's and don't's of good grazing management

- ✓ **Graze covers of 1300-1600 kg DM/ha (8-10 cm)**
- ✓ **Regularly walk the farm**
- ✓ **Target post grazing height 4-5 cm**
- ✓ **Offer fresh herbage every 48 hours**
- ✓ **Follow a 18-21 day rotation length**
- ✓ **Remove surplus pasture as bales**
- ✓ **Have a fertiliser strategy**
- ✓ **Monitor animal performance regularly**
- ✓ **Have a strategy for closing the farm in the autumn**
- × **Continuously graze heavy covers (<1600 kg DM/ha)**
- × **Delay turnout in the spring**
- × **Residency time of >48-72 hours in a paddock**
- × **Force animals to graze out excessively heavy swards**
- × **Avoid sticking to routine housing dates, if conditions and grass supply allow, continue grazing**
- × **Let animal performance decrease due to internal parasite infection**



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DAIRYBEEF 500
Sustainable Dairy Beef Production

Silage quality and concentrate supplementation

Grass silage is an important winter feed in dairy-beef systems. Balancing this forage with the correct quantity/quality of concentrate is key to achieving the desired winter weight gains.

Why complete a silage analysis?

- Visual assessment alone is not adequate to determine silage quality; laboratory testing is recommended.
- Provides information on silage nutritive value and preservation; informed concentrate feeding decisions can be made.
- A breakdown of dry matter (DM), dry matter digestibility (DMD), metabolisable energy (ME), UFV, UFL, pH, crude protein and other relevant information will be generated.
- Mineral profiling (macro and trace) of silage can be obtained through a wet chemistry analysis.

Correct sampling procedure

- Poorly taken silage samples often lead to inaccurate results.
- A period of 5-6 weeks should elapse between ensiling and sampling.
- A long core sampler should be used.
- 3-5 cores from well-spaced points on or between diagonals on the pit surface should be sampled.
- Core to within 0.5 m of the pit floor.
- Discard the top 5 inches of each core before mixing into a composite sample.
- Alternatively sample an open pit by taking nine grab samples in a 'W' pattern across the pit face.
- Exclude air, seal well in a bag and avoid posting samples late in the week.
- When testing bales, a number of samples from each batch of bales made must be taken in order to get a representative sample. Test each batch separately.
- Use only Forage Analysis Assurance Group (FAA) accredited labs when having silage samples analysed.

Table 1: Key information provided from a silage analysis

Unit of measure	Meaning	Low	High	Target
Dry matter (%)	Feedstuff less water content	13-17	40-55	28-32
pH	Measure of acidity	3.4-3.7	4.5-5.5	3.8-4.5
Ammonia – N (% N)	Indicator of grass N content at cutting	4-7	15-25	<10
NDF (% DM)	Measure of forage fibre and intake potential	42-47	55-65	<44
DMD (%)	Measure of quality	55-65	76-80	>72
ME (MJ/kg DM)	Energy content (linked to DMD value)	8-9	11-12	>11
UFV/UFL (unit/kg DM)	Energy content (linked to DMD value)	0.6-0.7	0.89-0.96	>0.89
Crude protein (% DM)	Measures N as indicator of true protein content	7-9	15+	>13.5
Ash (% DM)	Indicator of soil contamination	5-6	12-15	<8.6

Winter weight gain requirements

Dairy-beef systems require superior quality silage, as animals have to perform at every stage of the production system. Table 2 highlights the targeted average daily gains (ADG) of animals over the winter months for various production systems.

Table 2: Daily winter weight gain targets for spring-born dairy-beef animals at various stages

	21 month steers	23-24 month steers	28-30 month steers	19 month heifers	U16 month bulls	20 month bulls
1st winter (kg/day)	0.6	0.6	0.6	0.5	0.85	0.70
2nd winter (kg/day)	-	1.0-1.05	0.5	-	-	-

Matching silage quality and concentrate feeding

- Concentrate supplementation provides energy and protein to an animal's diet that may be lacking in silage.
- Dairy-beef systems require excellent quality silage (DMD of >72).
- Additional concentrate supplementation will be required to improve the overall energy/protein density of the diet where silage quality is sub-optimal.
- Growing and finishing animals have varying requirements for energy and protein – one concentrate will not do both.
- Ensure animals are adequately provided with minerals, either through the concentrate or additional supplementation.
- For more detailed information on balancing silage quality and concentrate feeding, contact your local Teagasc advisor.

Energy

Energy is typically the most limiting factor in beef diets. Concentrate feeds for weanlings have a requirement of >0.94 UFL, while >0.92 UFV is necessary for finishing concentrate. Table 3 provides guideline daily concentrate feeding rates depending on the quality of silage (DMD) available.

Table 3: Guideline daily feeding rates based on silage quality (DMD)

Animal type	Target ADG	66 DMD	68 DMD	70 DMD	72 DMD	74 DMD	76 DMD
Weanling	0.6 kg/day	1.8 kg	1.5 kg	1.2 kg	0.9 kg	0.6 kg	0.4 kg
Finishing steer	1 kg/day	7.0 kg	6.0 kg	5.5 kg	5.0 kg	4.0 kg	4.0 kg
Finishing heifer	0.9 kg/day	7.0 kg*	6.0 kg	5.5 kg	5.0 kg	4.0 kg	4.0 kg

*Ad-lib feeding should be considered

Protein

After energy, protein is the next limiting factor in the winter diet of dairy-beef animals. Always balance the protein content of the concentrate with the protein content of silage. Concentrate fed to weanlings should have a crude protein content of 14-16%, while 11-14% is needed for finishing diet concentrates.

Table 4: Crude Protein (%/kg fresh weight) required in concentrate feeds for grass-silage based diets

Animal type	10% CP silage	14% CP silage
Weanlings (1.0-1.5 kg/day feeding rate)	20%	14-16%
Weanlings (2.5 kg/day feeding rate)	16%	*
Finishing steers and heifers	14%	11-12%
Finishing bulls	11-12%	11-12%

*Silage with a crude protein value of 14% or greater tends to have a high DMD value.
2.5 kg/head/day concentrate feeding rates are not recommended.

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Sustainable Dairy Beef Production

The first 12 weeks at grass for dairy-beef calves

When calves underperform during their first season at pasture, it makes it difficult to achieve key performance targets, irrespective of system further down the line. Failing to hit an average daily gain target of 0.7-0.8 kg/day results in delayed slaughter, the production of lighter carcasses and/or the introduction of additional concentrates to try and recover the loss in performance recorded over the first grazing season. Therefore, ensuring calves perform to their optimum over the first 12 weeks of life is important.

Transitioning to the outdoors

- The majority of calf-to-beef producers opt to wean their calves prior to moving them from the calf shed to the field.
- During this period, calves may suffer a post-weaning growth check and subsequently disease outbreak as a result of: the low intake of dry feed up until weaning; the high intake of low-energy, bulky forages; or stress when feeds are changed.
- Feeding concentrates before, during and after weaning should limit the level of growth check experienced.
- Calves should be offered concentrates (1-2 kg/day) for 2-3 weeks post-turnout.
- Concentrate supplementation provides the calf with adequate time to become accustomed to grazing before an all-grass diet is offered.
- An animal health protocol is recommended to reduce the possibility of disease onset. RSV, PI3, *Mannheimia (Pasteurella) haemolytica* and IBR are common causes of respiratory diseases in Ireland.

When and where to turnout calves?

- Only correctly weaned and healthy calves should be turned out to pasture.
- Ensure all calves are consuming concentrates prior to turnout.
- A well-sheltered paddock should be targeted.
- Avoid turning calves out in unfavourable weather conditions – avoid extremes of warm, wet or cold.
- Turnout calves to alternate fields each year to avoid the build-up of pathogens and diseases.
- Ensure calves have a clean, fresh source of water at all times.
- Target a pre-grazing cover of <1,000 kg DM/ha to encourage grazing at turnout

Grassland management

Excellent grassland management is essential to achieve the desired level of performance from calves over the first 12 weeks following turnout.

- Calves can be selective grazers and providing quality grass must be a priority.
- Don't force calves to graze out paddocks like older stock.
- Calves should be offered fresh grass every 3-4 days; don't leave calves in the one paddock for long periods of time.
- When settled or when grass is a large percentage of the diet, the ideal pre-grazing grass covers for calves are 1,000-1,400 kg DM/ha.

Monitoring performance

- Weighing of calves is critical and should be carried out a minimum of three times a year to determine if cattle are hitting weight gain targets.
- Calves should be weighed at turnout, mid-season and again at housing.
- Dairy-beef calves are typically turned out to grass at approximately 85-100 kg.
- Completing mid-season weighing will provide you with information to see if calves have reached the desired weight gain targets over the first 12 weeks at pasture.

Animal health

To gain 0.7-0.8 kg/day, calves must remain healthy. When a calf suffers a health set back, its feed intake and daily weight gain will be affected. If calves are coughing or an illness is suspected, seek veterinary advice and identify the cause of the problem through nasal swabs, blood tests or faecal samples. When a vaccination protocol (pneumonia, IBR or clostridial diseases) is being implemented, ensure that the programme is up to date and calves have received their booster shots prior to turnout.

Table 1: Effects, symptoms and treatments options for gut worm, lungworm and coccidial infections

Effects	Symptoms	Treatment/Control
Stomach worm		
Associated with appetite suppression	Heavily infected calves may experience scouring and a lack of thrive	Know what actives/classes were previously used to help avoid resistance
Sub-clinical disease can result in failure to meet weight targets		Dose only when needed; use faecal egg count results or animal performance
Dairy-beef calves are more susceptible to gut worm infestations than suckler calves	Reduction in growth rate could be as high as 50%	Use the recommended rates; don't under dose animals. Administer the product in the correct way
Sufficient immunity is usually developed after the first grazing season to prevent clinical disease		A Faecal Egg Count Reduction Test or drench test may be required to test the efficacy of some classes
Lungworm / Hoose		
Nature and severity of lungworm infection depends on the number of larvae that are ingested and the response of the animal	Hoose should be considered when cattle are seen to be coughing at pasture. A harsh and deep husky cough is heard	A faecal sample can be tested in the laboratory for the presence of lungworm, but the disease is sometimes due to the larval stage of the worm which cannot be detected with this test
Individual animals will differ with regard tothe severity of the symptoms	Moderately affected animals will have bouts of coughing even when resting	
Parasitic bronchitis is the main issue in previously naïve cattle	Heavily infected animals will suffer from respiratory disease, have an increased breathing rate and open-mouthed breathing	Most available anthelminthics are effective against larvae and adult lungworms
	The tongue will appear as they try to cough	Cattle should be treated as soon as possible; there may be varying degrees of infection in one group
Coccidosis		
Poor thrive and mortality in severely infected animals	Tends to be seen in cattle between three weeks and nine months of age	Where there's a history of coccidosis on the farm, vigilance is required
	A watery scour due to damage of the intestinal mucosa	Prophylactic dosing of calves is common
Sub-clinically infected animals will as suffer a performance set back	Calves become dehydrated, may start to pass blood, shed part of the intestine lining and become weak and uncoordinated	Taking dung samples from a number of animals within the group is also advised as animals failing to exhibit clinical signs may have a high coccidial oocyte burden
	Calves may suffer from a sub-clinical infection and show very few symptoms	
	Calves that have the condition can often be seen straining	

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Finishing options for early-maturing dairy-beef steers

Spring born, early-maturing (Angus and Hereford) dairy-beef steers are particularly suited to finishing toward the end of the second grazing season under 22-months or after an indoor finishing period under 24-months of age. The choice of system can be influenced by animal genetics, farm infrastructure and customer requirements. Late spring born calves or those of lower beef genetic potential, are typically not advanced enough, both in terms of live weight and body condition to allow slaughter by the end of the second grazing season and require finishing indoors by 24 months of age. Compared to dairy-beef heifers, steers have a greater ability to produce an 'inspec' carcass due to their higher carcass weight potential, however, such steers will require higher concentrate and silage inputs, and greater availability of housing facilities.

Under 22-months

- Finished from late-September to late-October (no second winter indoors)
- Supplemented for 60-90 days at pasture (4 kg concentrate/day)
- Target finished live weight of 560-600 kg
- 280-300 kg carcass, conformation of ≥O= and fat score of 3- to 3+
- Lifetime ADG 0.8-0.9 kg
- Lifetime concentrate input 750 kg
- Traditionally low beef price months
- Higher animal numbers finished (reduced silage requirement)
- Early born calves of high Commercial Beef Value (CBV)
- Makes efficient use of housing facilities
- Useful where winter forage supply or quality is limited

Under 24-months

- Finishing by November to February during a second winter indoors
- Supplemented for 60-80 days indoor finishing (5 kg concentrate/day)
- Target finished live weight of 580-620 kg
- 300-320 kg carcass, conformation of ≥O= and fat score of 3- to 3+
- Lifetime ADG 0.8 kg
- Lifetime concentrate input 650 kg
- High beef price months (January/February)
- Higher individual animal performance, but fewer cattle finished (increased silage requirement)
- Suited to later born less advanced animals
- Requires good housing facilities

Finishing management

Finishing diets should consist of high quality pasture or grass silage (>75% DMD) ad-libitum, and up to 5 kg of concentrate daily. As finishing periods increase in duration, the conversion of feed into carcass reduces, to a point where feed costs exceed carcass gain. It is essential that live weight gain and the level of fatness of finishing cattle are monitored regularly, allowing timely drafting.

Recent Teagasc Grange early-maturing steer system research

An experiment was carried out in Teagasc Grange to examine the feasibility of finishing early-maturing steers outdoors by the end of the second grazing season, by supplementing steers with 4 kg/day of a barley based concentrate from July until slaughter (outdoors), while an identical group of steers were not supplemented and were housed at the end of the grazing season and finished conventionally indoors on a silage and concentrate diet (5 kg concentrate, indoors). Finished steers were drafted based on meeting a body condition score of 3.75 (5-point scale), deemed to be equivalent of a carcass fat score of 3+/4-.

The Angus steers that were supplemented with concentrate during the second half of the grazing season reduced finishing age by 1.5 months, which meant that an expensive indoor finishing period was avoided compared to their non-supplemented counterparts.

Outdoor finishing reduces margin due to higher concentrate inputs and lighter carcasses produced during peak beef supply months. However, outdoor finishing is a profitable option for farms with high CBV cattle and limited housing facilities. High CBV animals outdoors produced a 310 kg carcass and were better suited than low CBV animals, of lower carcass weight potential. Cattle must be at an advanced live weight to commence supplementation at pasture (>480 kg) to ensure carcass weight is optimised (>300 kg) by the time targeted fatness is reached.

Table 1. Performance of dairy-beef steers finish outdoors and indoors

Finishing strategy	**Outdoors**	**Indoors**
Physical performance		
Age (months)	19.6	21.0
No. cattle finished	143	127
Physical stocking rate (LU/ha)	2.7	2.5
Concentrates per head (kg)	864	694
Carcass weight (kg)	296	307
Carcass output (kg/ha)	1057	974
Financial performance		
Costs per kg carcass (€/kg)	3.55	3.51
Profit per kg carcass (€/kg)	1.12	1.27
Net margin (€/ha)	1190	1232
Net margin (€/per head)	334	390

Base price of €4.85/kg. Finishing concentrate price €375/t. Protected urea price €550/t. ***Net margin excludes land & labour charge** and assumes a calf purchase price of €200 per head for bull calves.*

Steer management guidelines

- To achieve a lifetime daily gain of 0.8 kg the calf rearing stage is critically important to ensure an adequately developed rumen capable of utilising grazed forage post turn-out.
- Castration should take place by 5-6 months of age, well in advance of housing for the first winter, to minimise stress and possible setbacks in performance.
- Weanling steers should be on average 230 kg at housing in the autumn. This requires excellent grassland management and a well implemented parasite control programme. Supplementation should cease 2 weeks post-turnout as calves, recommencing in September (1-1.5 kg/hd/day) to account for declining grazed pasture quality.
- Over the first winter a moderate growth rate of 0.6-0.7 kg/day is targeted from a diet of high quality grass silage (>72 DMD) and 1-2 kg of concentrate/day.
- Yearling steers turned-out in early spring should gain 200 kg over a 220 day grazing season.
- Forward planning and assigning of animals to tailored finishing strategies is important:
  - January/February born steers of high CBV and that are at an advanced live weight of >480 kg are best suited for finishing at pasture, to ensure an 'inspec' carcass is produced.
  - March/April born steers are best suited to indoor finishing at older ages to enhance skeletal development and the opportunity for a higher carcass weight.

More information on the Teagasc DairyBeef 500 Programme can be found at Teagasc.ie

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DAIRYBEEF 500

Sustainable Dairy Beef Production

Increasing the profitability of dairy-beef systems using the Commercial Beef Value (CBV)

In recent years, there has been a notable increase in dairy-beef cattle in Ireland. Historically, beef farmers lacked important information regarding the 'beef genetic quality' of dairy-bred cattle. However, the introduction of the Commercial Beef Value (CBV) has addressed this gap. Dairy-beef cattle of higher CBV will on average produce heavier carcasses of improved conformation, at younger finishing ages and return higher profit margins for beef farmers.

What is the CBV?

- The CBV, or Commercial Beef Value, is a tool for gauging the quality and anticipated profitability of dairy-beef calves.
- The CBV offers farmers valuable insights into the beef genetic worth of purchased beef calves in terms of carcass weight, conformation, finishing age and feed intake (Figure 1).
- CBV is denoted as a €uro value. A higher euro value signifies superior beef genetic merit across the included traits.

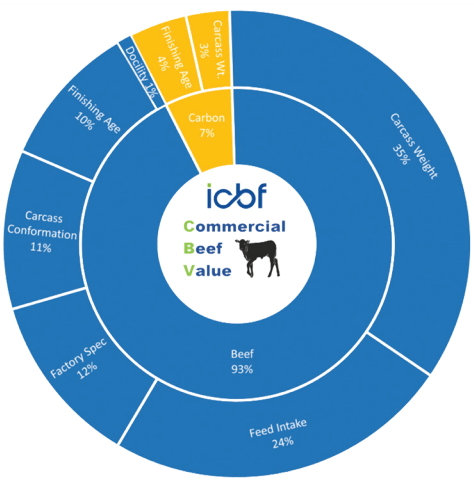

Figure 1. The Commercial Beef Value

How does it benefit farmers?

- The CBV allows beef farmers to make more informed decisions when purchasing dairy-beef animals, regardless of age.
- Genotyped animals being traded through marts will have their CBV displayed on mart boards. When engaging in farm-to-farm sales, purchasers should request the CBV profile from the seller.
- The beef merit of calves can vary significantly even within the same breed (Table 1).

Table 1. CBV values by breed for 2023 born dairy-beef calves

2023 Born Beef Calves from the Dairy Herd					
Sire Breed	Btm 10%	Btm 1/3	Average	Top 1/3	Top 10%
Angus	<€43	<€63	€72	>€84	>€116
Aubrac	<€102	<€122	€132	>€145	>€179
Belgian Blue	<€106	<€141	€160	>€174	>€208
Charolais	<€126	<€153	€167	>€184	>€218
Friesian	< -€25	< -€3	€6	>€15	>€36
Hereford	<€29	<€51	€61	>€75	>€107
Limousin	<€125	<€148	€159	>€175	>€209
Simmental	<€59	<€82	€97	>€116	>€150

(source www.icbf.com)

Teagasc Grange research herd performance

Over multiple years at Teagasc Grange, within a pasture-based system, high CBV genetics have consistently been more profitable, due to improved carcass traits at younger finishing ages and from lower concentrate input than low CBV beef x dairy and dairy x dairy steers (Table 2).

Table 2. Performance of 2020 and 2021 born dairy-beef steers of contrasting CBV managed within a paqsture-based finishing system.

	High Angus (€95 CBV)	Low Angus (€61 CBV)	Holstein Friesian (-€1 CBV)
Finishing age (Months)	21.1	21.5	23.6
Carcass weight (kg)	314	306	311
Carcass conformation	O=/O+	O=	P+/O-
Carcass fat	3+/4-	3+	3+
Finishing period (days)	51	62	127
Finishing supplement (kg)	248	306	628
Net profit per head (€)	459	382	269
GHG per kg carcass (kg CO_2e	12.8	13.0	15.4

National herd performance

Nationally dairy-beef cattle of higher CBV exhibit superior carcass weight, better conformation, and increased carcass value due to their increased ability to meet overall market specification compared to those of lower CBV (Table 3). Despite large differences in beef production efficiency (carcass value and finishing age), little difference in calf purchase price exists between the bottom and top 10% for dairy (€43) and Angus x dairy (€58) sired steers. The CBV is relevant all through the animal's life. Therefore, dairy-beef farmers purchasing calves, weanlings or store cattle, can utilise the CBV tool to identify superior beef cattle.

Table 3. Calf price, finishing price and finishing age for A) dairy × dairy steers and B) Angus × dairy steers finished in 2023 by CBV decile.

A: Dairy steers finished in 2023

CBV Rank	Calf Price	Finishing Price	Finishing Age
Top 10%	€99	€1,538	817
2	€85	€1,471	823
3	€79	€1,455	826
4	€79	€1,439	826
5	€78	€1,415	824
6	€71	€1,409	826
7	€72	€1,392	827
8	€67	€1,373	829
9	€65	€1,338	832
Btm 10%	€56	€1,263	833
Difference Top & Bottom 10%	€43	€275	-16

B: AA X FR steers finished in 2023

CBV Rank	Calf Price	Finishing Price	Finishing Age
Top 10%	€249	€1,763	778
2	€235	€1,689	787
3	€230	€1,684	789
4	€231	€1,653	790
5	€229	€1,632	788
6	€223	€1,608	792
7	€218	€1,589	802
8	€211	€1,569	805
9	€208	€1,541	817
Btm 10%	€191	€1,490	831
Difference Top & Bottom 10%	€58	€273	-53

How to breed calves of high CBV

- The Dairy Beef Index (DBI) is a genetic index used in dairy farming to select bulls that will produce calves suitable for beef production, while also maintaining desirable calving traits in their progeny.
- The index consists of three sub-indices: Calving, Beef and Carbon (Figure 2).
- Dairy farmers should select bulls with high beef sub-index values in the DBI in order to improve calf quality.
- The beef merit traits will be reflected in the CBV of the progeny.

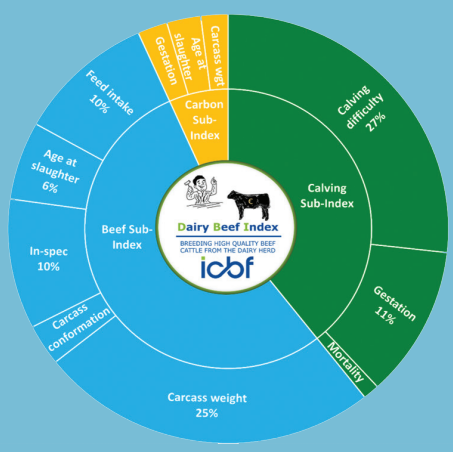

Figure 2. The Dairy Beef Index

More information on the Teagasc DairyBeef 500 Programme can be found at Teagasc.ie

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Sustainable Dairy Beef Production

Nutritional management of the dairy-beef calf - from arrival on beef farms to weaning.

Key targets of the calf rearing period

- Double calf birth weight by 8-weeks (e.g. 40 kg to 80 kg in 8-weeks).
- Achieve a live weight of 100 kg by 12 weeks of age.
- Record a growth rate of 0.7/0.8 kg per day.
- Transition calves from a pre-ruminant to ruminant diet without any setbacks.

The amount of milk fed and concentrate intake determines calf growth rate in the period up to 12 weeks, with the target being to get the calf to grow from 40-45 kg at birth to about 100 kg. This can be achieved with inputs of ~25 kg of milk replacer and 120 kg of concentrates on dairy-beef farms.

Selecting a calf milk replacer

- Protein content >20%.
- Oil content 18-20%.
- Ash content <8%.
- Fibre content <0.15%.
- Contains milk derived proteins (skim milk powder or whey protein concentrate).
- Easily dissolved without leaving residuals on feeding equipment.

Milk replacer feeding levels

- The first feed offered on farm after arrival should be electrolytes, to rehydrate calves after transport.
- Care should be taken to ensure calves are trained onto their new milk feeding system.
- For dairy-beef systems where calves are purchased at 2 to 4 weeks of age, each calf should receive at least 13-15% of its birth weight in a good quality milk replacer – typically 6 L/day fed in two feeds for the first 4-weeks and 4 L/day fed in one or two feeds up to weaning.
- To make one litre of calf milk replacer at 12.5% solids, mix 125 g of milk powder to 875 ml of water.
- Mixing rates may vary between products; always adhere to the manufacturer's instructions.
- Consistency in the timing and mixing of milk replacer is important to avoid digestive upsets.
- Milk replacer should be considered as a feed; clean, fresh water should be available at all times.
- The volume of milk replacer fed determines calf concentrate intake.

Table 1. Teagasc Grange and Johnstown Castle dairy-beef milk feeding protocol

Days	Milk replacer per day per calf	Litres per feed	No. of feeds per day	Concentrates
10-30	750 g of milk replacer.	3	2	Ad lib
30-50+ (weaning)	500 g of milk replacer. If calves have not reached their targeted weaning weight of 85-90 kg, continue to feed at same rate until heavy enough to wean.	2	1 or 2	Ad lib (up to 2 kg)

Mixing milk replacer

- Maintain a high level of hygiene throughout the mixing and feeding process.
- Use scales to measure the powder correctly and to ensure consistency.
- Mix milk replacer using water below 40°C – boiling water damages the milk proteins.
- Reconstitute by adding the total amount of powder required to half the measured volume of water.
- Mix thoroughly (use a mixer or whisk) and then add the balance of warm water to make up the correct volume.
- Aim to feed calves milk at body temperature (37-39°C).

Concentrate feeding

- Concentrate supplementation is the single most important factor for rumen development.
- A high-quality, palatable starter concentrate should be available to calves freely, as soon as they arrive on farm, and offered fresh daily.
- Calf concentrate should contain 17-18% crude protein and have an energy value of at least 12 MJ/kg (greater than 0.95 UFV/kg).
- Finely ground, dusty feeds should be avoided.
- Calves fed coarse starter mix initially eat more and have higher weight gains than calves fed pelleted starters.

Forage supplementation

- Forage supplementation is beneficial to rumen development, but not as fundamental as concentrates.
- Calves need small amounts of roughage.
- Straw is an easier roughage for calves to digest and is preferred to hay.
- Avoid the over consumption of straw as this reduces the overall energy density of the diet. Research recommends a concentrate to roughage ratio by weight of 8:1 or 200 g/hd/ day to pre-weaned calves.

Weaning

- Weaning decisions should be made based on concentrate intake and weight, not age.
- Calf weaning age can vary from 6 to 10-weeks depending on the feeding strategy.
- Gradually wean by reducing the volume of milk fed over a period of 7 to 10 days. If calves are being fed milk twice a day, weaning can be achieved by cutting down to once a day feeding.
- Calves should be consuming >1 kg of calf starter per day for three consecutive days prior to ceasing liquid feed.
- Monitoring starter intake allows adjustment/delay of weaning dates for any calves not meeting growth targets/eating consistently well.
- Stressors, such as dehorning/vaccination, should be avoided during the weaning period.

More information on the Teagasc DairyBeef 500 Programme can be found at Teagasc.ie

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Sustainable Dairy Beef Production

Pasture-based systems for early-maturing dairy-beef heifers

Spring born, early-maturing (Angus and Hereford) dairy-beef heifers can form high output, low input systems when finished during the second grazing season at 19 – 21 months of age. Despite the lower carcass weight potential of heifers compared to steers, pasture-based dairy-beef heifer systems have the potential for a high carcass output/ha. This is due to the potential to increase numbers of animals finished/ha, at younger ages from pasture, thus eliminating or reducing the need for an indoor finishing period. Heifer systems are particularly suited to farms with limited housing facilities, and good grazing infrastructure.

- Heifer systems are desirable as animals have the potential to be slaughtered at young ages, allowing for increased animal numbers and avoid the need for a second winter indoors.
- It is important that heifers in these systems achieve carcass weights in excess of 230 - 240 kg as lighter carcasses are more difficult to market, and do not avail of breed bonus payments.
- Early-maturing dairy-beef heifers have the lowest chance of meeting minimum market specification, so producers must be realistic when assessing calves carcass potential at purchase, and reflect this in purchase price.
- Spring born heifers finished at pasture are being marketed in autumn when supplies of finished cattle are at their highest and when beef price is traditionally low.

Elements of success

- Complete a thorough budget before calf purchase; dairy-beef systems are sensitive to fluctuations in calf purchase, concentrate and beef price.
- Purchase healthy calves from a trusted, known source – preferably direct off farm.
- Purchase high beef genetic merit (high Commercial Beef Value) calves.
- Implement a comprehensive herd health plan, to include a robust vaccination protocol, ensure adequate housing ventilation and space allowance, and awareness of reducing anthelminthic resistance through the use of multiple agents.
- Excellent grassland management, implementation of a rotational grazing system, incorporation of clover and the production of high quality silage (>72 DMD) are required.
- Monitor weight gain frequently and draft finishing cattle regularly.

Key performance indicators

- Finishing age 19-21 months
- >60% finished from forage diet
- >240 kg carcass, ≥O= conformation and 3- to 3+ fat score
- Lifetime concentrate 450 kg
- Lifetime ADG 0.8 kg

Heifer management guidelines

- To achieve a lifetime daily gain of 0.8 kg the calf rearing stage is critically important to ensure the heifer has an adequately developed rumen capable of utilizing grazed forage post turn-out.
- Weanling heifers for this system should be on average 200 kg at housing in the autumn. This requires excellent grassland management, and a well-implemented parasite control programme. Supplementation should cease 2 weeks post turn-out, recommencing in September (1-1.5 kg/hd/day), to account for the declining quality of grazed pasture.
- Over the winter a moderate growth rate of 0.6-0.7 kg/day is targeted from a diet of high quality grass silage (>72 DMD) and 1-2 kg of concentrate.
- Yearling heifers should be turned out in early spring and should gain 200 kg over a 220 day grazing season.
- Typically, a large proportion (60%) of the earliest born heifers will achieve desirable fat levels from a grass only diet, however later born heifers may require ~3 kg/hd/day of concentrate over 60 days (at pasture or indoors) to achieve desired carcass fatness and weight.
- Grazing management for calves and yearlings needs to be excellent, rotationally grazing high quality grass-clover swards.

Early-maturing dairy-beef heifer research

At Teagasc Johnstown Castle the contribution of pasture type (perennial ryegrass-only, perennial ryegrass plus red and white clover and multi-species swards that included perennial ryegrass, red and white clover, plantain and chicory) have been evaluated within an early-maturing beef heifer system (standard beef merit animals). The perennial ryegrass pasture received 150 kg of chemical N/ha annually, double that of perennial ryegrass plus red and white clover and multi-species sward types (75 kg N/ha).

When dairy-beef heifers were drafted at a target fat score of 3=, CLOVER animals achieved the greatest net margin compared to the other two sward types (Table 1). This was due to a greater carcass weight, a lower chemical nitrogen application rate, and a greater proportion of these animals being finished at pasture during the second grazing season, which reduced overall costs. Incorporating clover or clover+herbs, allowed the inorganic chemical nitrogen application level to be halved due to biological fixation by the clover plants, whilst still achieving the same herbage production, resulting is significant cost savings.

Despite having a light carcass weight, dairy-beef heifer systems have the potential to have a high carcass output level per ha, and are profitable, and this can be further improved by including clover or clover+herbs into pastures. The inclusion of clover or clover+herbs generated an additional €150 to €100 net margin/ha, respectively, through improved animal performance and lower input costs, offering farmers an opportunity to improve system efficiency.

Table 1. The effect of pasture type on animal, financial and environmental performance of dairy-beef heifers finished in 2022 and 2023

	PRG	CLOVER	MSS
Finishing performance			
% drafted from pasture	68	86	75
Age (months)	19.6	19.2	19.2
Finished weight (kg)	482	492	490
Carcass weight (kg)	243	250	249
Carcass conformation score	O=	O=	O=
Carcass fat score	3=	3=/3+	3=/3+
System			
Stocking rate (LU/ha)	2.65	2.37	2.48
Animals finished on 40 ha	139	127	131
Lifetime concentrate (kg DM/head)	400	370	380
Carcass output (kg/ha)	849	791	813
Financial performance (40 ha farm) (€,000)			
Net margin (€/40 ha farm)	38,000	43,880	42,000
Net margin (€/ha)	950	1097	1050
Net margin (€/head)	273	347	320

Base price of €4.56/kg on the QPS grid; €0.20/kg QA payment and €0.20/kg breed bonus. Finishing concentrate price €400/t. Protected urea price €550/t. ****Net margin excludes land & labour charge*** *and assumes a calf purchase price of €150 per head for early-maturing breed heifer calves.*

More information on the Teagasc DairyBeef 500 Programme can be found at Teagasc.ie

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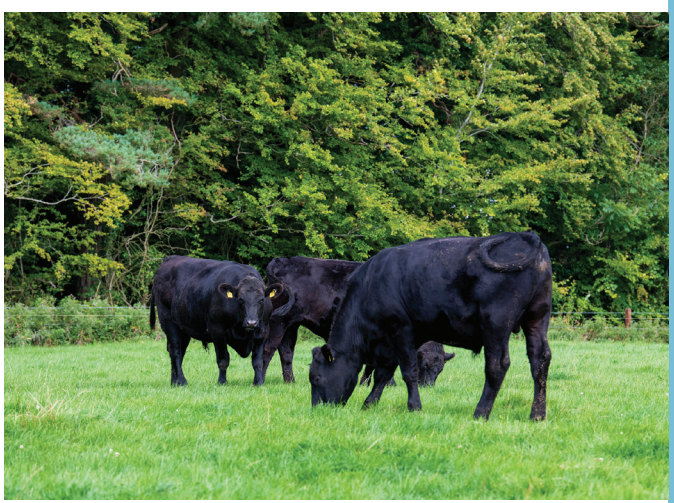
Sustainable Dairy Beef Production

Profitable and environmentally sustainable dairy-beef systems

Approximately 60% of Irish beef is product of the dairy herd. Economic and environmental efficiency of dairy-beef production systems is dependent on the application of key technologies in the areas of animal genetics (high beef merit), calf health and rearing and the production of high quality grazed grass and silage. Dairy-beef cattle suit a range of finishing systems from 19 to 28 months of age for heifer and steer systems. The choice of system can be influenced by animal gender and beef genetic potential, farm infrastructure and customer requirements.

Why dairy-beef?

- Over 1.1m calves to select from.
  - An increasing proportion of these are sired by beef bulls, with significant improvements in beef merit possible.
- Can support very high carcass output systems from a predominantly grass-based diet (80-90% forage).
- More structured labour requirement compared to breeding enterprises.
- Profitable options to finish cattle during a second grazing season, second winter or third grazing season.
- Low carbon footprint beef products.



Choosing a dairy-beef system for your farm

Choosing a dairy-beef system which suits you and your farm is based on a number of criteria, including land, labour, facilities and work-life balance. The financial return from your most limited resources should be used to evaluate your chosen system. Typically this is land, hence, net margin per hectare (ha) is commonly used. To optimise profit per ha, farmers generally have higher stocking rates and target younger finishing ages to support high beef output, through careful animal and grassland management. However, where systems are not restricted by facilities or land resources, and producers are more focused on a work-life balance, lower stocking densities and finishing cattle older, during a 'third' grazing season, can provide a good return on labour input.

1. Labour

How much time can you devote to the farm? Dairy-beef systems have a structured labour requirement in comparison to other livestock enterprises, making them complementary to other on-farm or off-farm enterprises.

2. Facilities

The availability of appropriate housing facilities for calves, weanlings and finishing cattle will determine the most suitable dairy-beef system for your farm. Certain dairy-beef systems require less housing facilities than others. For example, heifers or early-maturing steers, which can be finished during or by the end of the second grazing season, offer farmers the opportunity to increase dairy-beef cattle numbers without further investment in farm buildings.

3. Land/grazing infrastructure

On dairy-beef farms, the ability to support moderate-to-high stocking rates through high levels of grass production and utilisation is a key driver of profit. The production potential of swards is dependent on land quality, soil fertility, drainage, sward type and level of grazing management/grass budgeting ability. Investment in paddock and roadway infrastructure will improve labour efficiency and facilitate improved grassland management.

Performance on DairyBeef 500 demonstration farms

- Predominantly Holstein Friesian steer systems
- Average net margin in 2023 was €542/ha (excluding subsidies).
  - Ranging from €47/ha to €1459/ha.
- Key drivers of profitability on farms:
  - Calf purchase price
  - Beef price
  - Grass utilisation
  - Stocking rate
  - Animal performance

Analysis of the stocking rate of all DairyBeef 500 demonstration farms in 2023, showed that in order to achieve a margin >€500/ha required a stocking rate of over 170 kg organic N/ha, meaning these farms needed a nitrates derogation. Across the DairyBeef 500 farms a reduction of 10% in stocking rate would result in a reduction in net margin of ~ €267/ha. To improve farm profits farmers are focused on increasing output while maintaining stocking rate by improving animal beef genetic merit. This can be achieved by switching from dairy x dairy steers to high carcass merit beef x dairy steers, that can produce high carcass weights at younger finishing ages. As farmers seek high beef merit calves pricing should be according to Commercial Beef Value (CBV), as excessively high calf purchase prices often exceed their genetic potential and limit farm profit.

Teagasc Grange systems study examining the impact of CBV and feeding strategy on the economic and environmental efficiency of dairy-beef steers

A recent study completed at Teagasc Grange investigated the influence of the Commercial Beef Value (CBV) and concentrate supplementation strategy on profitability/ha and greenhouse gas emissions (GHG) emissions/kg carcass. All calves were born to Holstein-Friesian (HF) dams, and sired by Angus or HF sires. Angus calves were subsequently split into two groups, selected for being either high (4-5 stars) merit (High CBV) or low (1-3 stars) merit (Low CBV), forming three genetic groups including HF. Within each genetic group, half of the animals were assigned to conventional management, receiving a grass-only diet during the second grazing season and being finished indoors from concentrates and grass silage (Conv.), and the other half were supplemented at pasture from the 1st of July in the second grazing season with 4 kg of concentrates until finished at pasture (Supp.). Both High and Low CBV groups that were supplemented with concentrates from the 1st of July were finished without the need of second winter indoors, however HF steers required a housed finishing period, despite being supplemented at pasture.

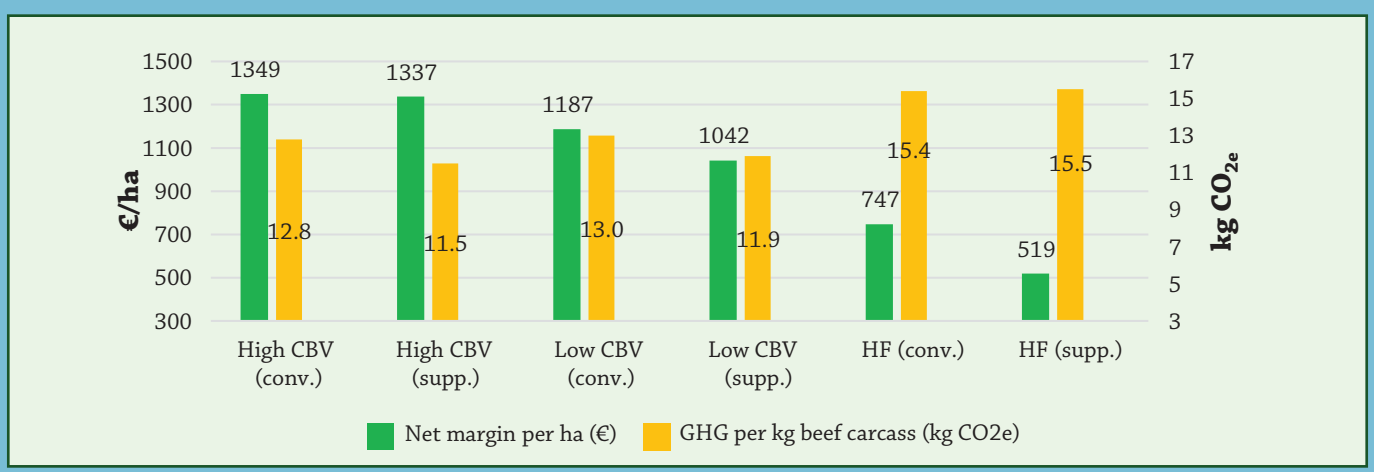


Figure 1. Profit (€/ha) and carbon efficiency (kg CO2e/kg carcass) of dairy-beef steer systems of contrasting beef merit and feeding strategy.

More information on the Teagasc DairyBeef 500 Programme can be found at Teagasc.ie

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Vaccination programmes for dairy-beef farms

Numerous challenges to calf health are encountered in the early stages of the animal's life. When an animal becomes ill, treatment with antibiotics is often needed. The overuse and misuse of antibiotics in livestock is contributing to the rise of antimicrobial resistance in both animal and human medicine.

Antimicrobial resistance (AMR)

What is AMR?

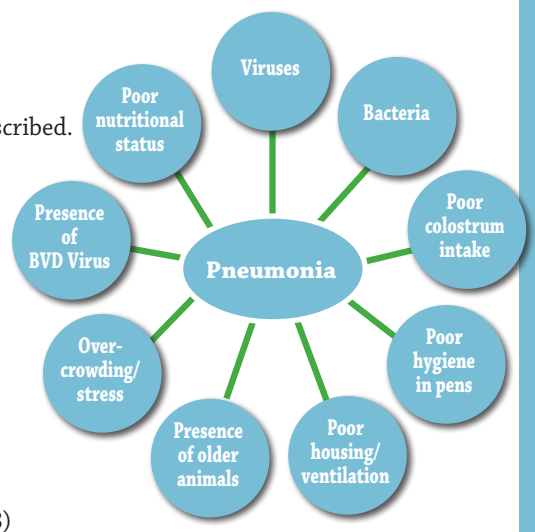
- AMR occurs when organisms such as bacteria and parasites develop resistance to antimicrobial treatments thus making the treatment ineffective.
- AMR is a major future risk to current everyday medicines in agriculture and human health.

How can we slow down AMR?

- Focus on preventing disease outbreaks with vaccinations and biosecurity.
- Seek veterinary advice for treating disease outbreaks.
- Avoid using antibiotics to prevent disease unless advised by a vet.
- Ensure correct administration of antibiotics and always finish the course prescribed.

Pneumonia

- Pneumonia is the most common disease associated with housed calves.
- Mortality rates due to pneumonia are approximately 3% in calves in the first 12 weeks of life.
- The cost of treatment and loss in performance due to pneumonia can heavily reduce farm efficiency and profits.
- Pneumonia is a multifactorial disease – often caused by many factors.



Pneumonia vaccination

- A range of vaccines are available for pneumonia in calves and cattle.
- Intranasal vaccines
  - Available for Respiratory syncytial virus (RSV) & Parainfluenza type 3 (Pi3)
  - Can be administered as early as the day of birth depending on the vaccine brand used
- Injectable vaccines
  - Available for RSV, Pi3 and the bacteria Mannheimia haemolytica
  - Can be administered from two weeks old
  - Onset of immunity delayed compared to intranasal vaccines

IBR

- Infectious Bovine Rhinotracheitis (IBR) is a viral disease causing inflammation of the upper respiratory tract.
- It can significantly reduce animal performance, resulting in economic losses.
- The virus can lie dormant in the animal's system and flare up at times of increased stress. The animal will then begin to shed the virus, spreading the disease to herd mates.

IBR vaccination

- Intranasal and injectable vaccines are available for IBR and can be administered at the same time as the pneumonia vaccines outlined above – depending on the product used.
- In herds where IBR is widespread, intranasal IBR vaccines can be used from 2 weeks of age.
- Injectable IBR vaccines can be given from 3 months of age.

Clostridial diseases

- Clostridial diseases is an umbrella term which covers a range of bacterial diseases including blackleg, tetanus, malignant oedema, black disease, botulism, sudden death syndrome, bacterial redwater and enterotoxaemia.
- Cattle between 3 and 12 months of age are at the highest risk.
- Clostridia are bacteria that live freely in the soil and are highly infectious but do not spread between animals.
- They may be ingested with feed or water.

Clostridial vaccination

- Clostridial vaccines consist of a combination vaccine covering a range of clostridial diseases with a primary course of two injections given 4-6 weeks apart.
- An annual booster injection can be given for continued immunity
  Neither the primary or booster vaccine should be given in a close timeframe to other vaccines.

General vaccination protocol

- Allow purchased calves to settle in their new environment post arrival for 24 hours before receiving first vaccines.
- Ensure that calves are in good health before vaccinating. Vaccines will not be effective if calves are ill at the time of vaccine administration.
- Minimise animal stress in the period around vaccination; avoid disbudding, castration etc.
- Ensure that all vaccines are stored and used in accordance with the label.
- Use clean equipment including syringes, needles and nasal spray applicators. Change the needle/nasal applicator regularly while vaccinating.
- Apply the vaccine via the route specified on the label.
- Ensure that the animal receives all follow up booster vaccinations to ensure continued immunity.

Case study

Farm name: Tipperary Calf-to-Beef Farm

No. of calves purchased annually: 335

Calf age at purchase: 2-3 weeks (>45 kg)

No. of source farms: 7

Calf mortality: 0.5%

The farm has strict criteria for calf purchase (e.g. weight for age) and all calves are vaccinated against pneumonia using intranasal vaccines 5 days prior to arrival on farm. Ten weeks later on farm calves receive a subsequent injectable pneumonia vaccination followed by booster 4 weeks later, ensuring maximum immunity during the calf rearing stage.

Sample vaccination plan

Table 1: Vaccination plan covering pneumonia (RSV, Pi3 & *Mannheimia haemolytica*), IBR & Clostridia

Calf age	Vaccine/Dose	Prevents	Route of administration
1-3 weeks (depending on vaccine brand)	Pneumonia	RSV/Pi3	Intranasal
2 weeks	IBR live	IBR	Intranasal
6 weeks	Clostridial	Clostridial diseases	Injectable
10 weeks	Clostridial	Clostridial diseases	Injectable
12 weeks	IBR live	IBR	Injectable
6 months	Pneumonia	RSV/Pi3/*Mannheimia haemolytica*	Injectable
7 months (at least 2 weeks pre housing)	Pneumonia	RSV/Pi3/ *Mannheimia haemolytica*	Injectable
9 months	IBR live	IBR	Injectable
14 months	Clostridia	Clostridial diseases	Injectable
15 months	IBR live	IBR	Injectable

More information on the Teagasc DairyBeef 500 Programme can be found at Teagasc.ie

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Agriculture and Food Development Authority

DairyBeef 500 Factsheet

DAIRYBEEF 500
Sustainable Dairy Beef Production

Weanling health and nutrition

The primary aim of the winter housing period on dairy-beef farms is to ensure weanlings are primed to perform at grass next spring. To achieve this, an average daily gain (ADG) of 0.6 kg is required and, for this to occur, health and nutrition must be prioritised.

Managing herd health

- Housing provides an opportunity to control both internal and external parasites in cattle.
- Stomach worms, lungworm, liver fluke and rumen fluke can only be picked up at grass; if cattle are treated while housed, they will not be re-infected prior to turnout.
- Alongside a vaccination programme, parasitic treatments at housing or over the winter help avoid negative impacts such as disease, poor growth or sub-standard performance.
- Lice and mange outbreaks are observed most during the housing period and it's an opportune time to treat such infestations.
- An animal health protocol is recommended to reduce the possibility of disease onset. RSV, PI3, Mannheimia (Pasteurella) haemolytica and IBR are common causes of respiratory diseases in Ireland.

Dosing strategy

- When dosing, know what actives/classes were previously used to help avoid resistance and what stages of the parasite they control.
- Dose only when needed; use faecal egg count results or animal performance to verify your decision.
- Treatment may be required on farms with a history of liver fluke or where faecal egg counts have confirmed its presence; be aware that a lot of products will only control adult liver fluke.
- Understand the control options for the various stages (early immature, immature, adult) of liver fluke; failing to control immature fluke at housing may lead to the development of mature fluke later in the winter and further treatment may be required.
- Use the recommended rates; don't under dose animals and administer the product in the correct way.
- If unsure, seek veterinary advice on the product/class best suited to your herd and the treatment methods available.

Table 1: Treatment options (actives) and effects of the main parasites affecting cattle at housing

Parasite	Effect	Treatment (actives)	
Stomach Worms	Poor performance and reduced ADG Associated with appetite suppression Heavily infected cattle may experience scouring, a lack of thrive and anaemia	• Benzimidazoles (white) • Endectocides (e.g. Avermectins) (clear)	
Lungworm	Hoose Increased risk of pneumonia Parasitic bronchitis in previously naïve cattle	• Benzimidazoles • Endectocides	
Liver Fluke	Poor performance and reduce ADG Poor appetite Anaemia	• Albendazole* • Clorsulon* • Closantel** • Nitroxynil**	• Oxyclozanide* • Rafoxanide** • Tricabenazole***
Chewing Lice and Mange	Poor coat Scratching Poor growth	• Endectocides • Pyrethroids • Amitraz	
Sucking Lice	Anaemia Poor growth Scratching	• Endectocides • Pyrethroids	

*Mature liver fluke (10 weeks) controlled; **Immature and mature liver fluke controlled; ***early immature (2 weeks), immature (6 weeks) and mature (10 weeks) liver fluke controlled.

Nutrition

- A weanling's demand for energy, protein, fibre, minerals and other elements must be met to ensure an ADG of 0.6 kg is achieved over the housing period.
- Offering poor-quality diets – lacking in energy or protein – will result in reduced weight gains and the potential stunting of dairy-beef weanlings.
- Silage should be of excellent quality; significant savings can be achieved by producing high dry matter digestibility (DMD) silage.

Balancing silage quality

- The ability of silage to provide sufficient energy to dairy-beef weanlings is measured through its ME (metabolisable energy) and DMD contents.
- Silage testing is required to evaluate its feed value and to formulate winter diets for weanlings.
- Visual assessment of silage will not provide accurate details on DMD, ME, protein content, dry matter etc.
- Where silage quality is insufficient, supplementary concentrate feeding will be required to ensure ADG targets are achieved.
- Offering only poor-quality silage diets will have a negative impact on winter liveweight gain and the overall lifetime performance of the dairy-beef stock.

Table 2: Average daily gains from different silage qualities and concentrate supplementation requirements

Silage quality (DMD)	ADG on silage alone (kg/day)	Concentrates needed (kg/day) for 0.6 kg ADG	Concentrate feeding cost over 120 days (€/head at €280/t ration)
75	+0.50	0.50	17
70	+0.35	1.50	50
65	+0.20	2.00	67
60	0.0	3.00	100
55	-0.20	3.50	118

Feeding a supplementary concentrate:

- Concentrates should be medium to high in energy (0.90-0.96 UFL).
- 16% crude protein or higher if silages are low in protein.
- Fortified with vitamins and minerals.
- Palatable, fresh smelling and free of dust.
- Front loaded to the first half of the housing period to maximise compensatory growth post turnout.
- Fresh, clean drinking water needs to be available at all times.

Space requirements

Careful attention should be paid to the size of the shed available, as overcrowding can lead to a significant reduction in animal performance. Don't overstock sheds and ensure ventilation is sufficient. The two space requirements that need consideration are floor space and feeding space (Table 3).

Table 3: Floor space and feeding space requirements

Floor space requirements		
	Slatted housing	**Straw bedded housing**
Cattle >275 kg	2.0 – 2.5 m^2/animal	4.0 m^2/animal
Cattle <275 kg	1.2 – 1.5 m^2/animal	2.4 – 3.0 m^2/animal
Feeding space requirements		
Ad-lib roughage	225 – 300 mm/head	
Restricted roughage	400 – 500 mm/head	
Concentrate supplementation	400 – 500 mm/head	

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