

## Section 6

# Feed options for Finishing Cattle

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## Introduction

The finishing period is when animals are fed an energy-dense diet so that they will grow rapidly and add muscle/meat to their frame and optimise fat cover in preparation for slaughter.

- ① How do I finish steers and heifers on grass?
- ② Should I feed concentrates to grazing animals?
- ③ How do I finish animals on grass silage & meals?
- ④ How do I finish animals on a high concentrate diet?
- ⑤ How do I finish animals on fodder beet + forage + concentrates?

# Feed options for Finishing Cattle

## Checklist

### The key nutrients for the finishing animal



- **Energy:** Energy intake is the main determinant of live weight gain of cattle. Therefore, maximising energy intake is important.
- **Protein:** Steers and heifers have a relatively low requirement for protein during the finishing period. Aim for 11-12% crude protein (CP) / kg diet dry matter (DM). For bulls that are growing (up to 550 kg LW) aim for 13-14% CP / kg diet DM. For finishing bulls (greater than 550 kg LW) aim for 11-12% CP / kg diet DM.
- **Fibre:** Where forage makes up a large proportion of the diet, fibre levels are likely to be adequate. When feeding meals ad lib, ensure that animals receive at least 10%-15% of their dietary dry matter as straw, hay or grass silage, in order to maintain rumen function.
- **Minerals:** All finishing animals should receive appropriate minerals for the duration of the finishing period. For grass silage-based diets this is a general purpose mineral. For diets based on alternative forages (e.g. maize silage) or fodder / sugar beet feed a maize/beet mineral. On ad lib concentrate diets, ensure that the inclusion rate of the mineral matches the feeding rate of the ration.
- **Water:** The water requirement of finishing cattle depends on the proportion of dry feeds i.e. concentrates in the diet. Animals on an ad lib diet will have a much higher requirement for water than animals on a grass silage-based diet. Under normal conditions (free access to feed, silage, etc) and water), an animal will consume approx 20 litres of water over a 24-hour period. This could be 1.5-2.0 times greater for ad lib concentrate systems.

## Key facts



- Increasing the level of supplementary concentrate fed increases live weight and carcass weight gains, but at a diminishing rate. This means the performance benefit from each additional kilogram of concentrate is less and especially so at high levels of supplementation.

- In general, the growth response to concentrate supplementation is higher in animals of high growth potential than those of lower growth potential.
- The efficiency of feed utilisation by finishing beef cattle primarily depends on the weight of the animal (it decreases as live weight increases), the potential for carcass growth (e.g. breed type, genetic merit, gender, compensatory growth potential) and the duration of the finishing period (it decreases as the length of the finishing period increases).

### 1 How do I finish steers and heifers on grass?

Aim for high-digestibility grass to maximise gain of animals finished off pasture. Pre-grazing covers of between 1,200-1,600 kg DM/ha (pre height 8-10 cm) are desirable. See Grassland chapter.

## Key Target



### Gain from grass (kg per day)

	Suckled Beef		
	Bulls	Steers	Females
Daily Gain 2 <sup>nd</sup> Summer	1.25-1.45	0.85-1.05	0.80-1.00
	Dairy Beef (males)		
	Fr Bulls	Fr Steers	AA/HE Steers
Daily Gain 2 <sup>nd</sup> Summer	1.10-1.30	0.80-1.00	0.90-1.00



## ② Should I feed concentrates to grazing animals?

### The answer depends on:

How much grass is available (and how good its quality is)  
Target finishing date and the markets

### In early summer

- If grass is plentiful and quality and grazing conditions are good, feeding supplementary concentrates may mean animals perform slightly better but it is very rarely economical.
- If grass supply and/or quality is poor there will be very little substitution and it is likely that feeding 2-3 kg / day of concentrate will be economical – but cost of gain is higher than where animals are fed grass alone.
- While pasture supplementation with concentrates at this time is seldom economical there may be situations where the extra cost/performance is justified. For example, if it means animals can be finished and sold early into a higher-price market, or the concentrates may help an animal to 'get over the line' into a higher carcass grade.

### In late summer/autumn

- On beef farms in autumn, grass demand is usually greater than supply and often grass quality is lower than earlier in the year. As a result, finishing cattle at this time of the year usually requires concentrates to be fed at pasture or alternatively, animals are housed indoors.
- Autumn grass is still a cheaper feed than silage or concentrates, so finishing animals on pasture is usually much less expensive than if they have to be housed.
- There is a carcass growth response to concentrate supplementation at pasture in autumn for finishing steers.

Feed 0.5 kg meal per 100 kg live weight (3.0 kg / day to a 600 kg steer) with good autumn grass

Or

Up to 1.0 kg meals per 100 kg live weight where grass is scarce or of moderate to low quality

- Even if you cannot finish animals at pasture, short-term supplementation is often worthwhile as it reduces the requirement for more costly silage later. Also, the 'build up' period to a concentrate finishing diet can be implemented at pasture prior to indoor finishing.

### What supplement type should be used?

Animal performance is similar whether the supplement to autumn grass is starch-based (cereal) or fibre-based (pulp).

## How to



### Feed concentrates at grass in autumn

Energy rather than protein is the limiting factor in autumn grass and supplementation with concentrated energy sources rather than protein is required.

### Can I finish bulls at grass with meals?

- Research to date indicates that it is preferable to finish bulls indoors on a concentrate-based diet after a sufficient growing period at grass.

### Should I feed concentrates to 18-19 month-old bulls before housing for finishing on ad lib concentrates?

- Offering meals to bulls at grass before housing to accustom them to meals is an option but:
  - They can do a lot of damage to the pasture,
  - Rates of gain may be low if conditions are poor,
  - If they are roaming a lot, live weight gain will be poor
  - It is preferable to finish bulls indoors on a concentrate-based diet.
  - It's easier to manage.

# Feed options for Finishing Cattle

## Key term

### Substitution

Animals will always eat concentrates if they are available. But if they can fill up on concentrates they will eat less forage. This is called 'substitution' and it can push up total costs because grass is so much cheaper as a feed than concentrates.

### 3 How do I finish animals on grass silage & meals?

## Key facts

- It is not possible to finish animals on grass silage alone, even with very good quality (high dry matter digestibility) silage. Some concentrate supplementation is needed. However, the better the quality of silage offered, the less concentrates required to finish animals.
- When feeding a fixed total quantity of supplementary concentrates over a set finishing period it doesn't make any difference to performance whether you feed it at a flat rate, at a stepped increasing rate or ad lib towards the end of the finishing period.
- There are no animal performance or feed efficiency benefits from feeding the same quantities of silage and concentrates as a total mixed ration or separately.

## Key Target

Suckled Beef			
	Bulls	Steers	Females
Daily Gain on Ad Lib	1.15-1.35	0.9-1.10	0.8-1.00
Dairy Beef (males)			
	Fr Bulls	Fr Steers	AA/HE Steers
Daily Gain on Ad Lib	1.05-1.25	0.85-1.05	0.80-1.00
Silage + Meals (kg)			

## Key Target

**Animals require dry, well-preserved, high-quality (72 DMD or greater) grass silage. See chapter on conserved forages for details on how to achieve this. If grass silage is less than 70 DMD, other options need to be considered.**

## Key Target

**Aim for a total dry matter intake of 1.7-1.8% of live weight**

## How to

**Calculate intake as a % of body weight**

1. Weight of the animal, for example 600 kg live weight
2. Measure fresh weight intake, for example
  - a. Grass silage (20% DM) 30 kg fresh weight
  - b. Concentrates (87% DM) 5.5 kg fresh weight
3. Convert to dry matter basis
  - a. Grass silage  $30 * (20/100) = 6$  kg DM
  - b. Concentrates  $5.5 * (87/100) = 4.8$  kg DM
  - c. Total (a+b)  $6 + 4.8 = 10.8$  kg DM
  - d. Calculate intake as % of live weight  
 $(\text{dry matter intake}) / (\text{live weight}) * 100 = 1.8\%$  of body weight

## Silage Quality

Animals require well-preserved, high-DMD grass silage, see chapter on making quality grass silage.

## Key Question

**How much concentrate should I feed?**

- This depends on how well the animal can respond and the relative prices of beef, forage and concentrates. For finishing cattle, estimates of carcass efficiency (kg concentrates per kg carcass), silage substituted (kg DM per kg carcass gain) and the true costs of grass silage and concentrates are required.

Concentrate supplementation rates (kg/day) required to achieve target growth rates in combination with high, medium and low quality grass silage

	Grass Silage Quality			
	Target Gain kg/day	High (72 DMD)	Medium (68 DMD)	Low (64 DMD)
Continental steers	1.00	5.5	7.0	8.5
Friesian steers	0.85	4.0	4.5	6.0
Continental heifers	0.85	4.0	4.5	6.0

### Supplement type?

- A wide variety of feed ingredients are available and used extensively in beef rations in Ireland. However, cattle offered concentrate rations differing in ingredient composition BUT formulated to have the SAME net energy and protein levels will have similar intake, growth, feed efficiency and carcass traits. Aim for a minimum energy density of 0.92 UFV / kg as fed in the concentrate. (0.92 UFV is equivalent in energy value for finishing to 0.92kg of standard dried barley)

### What protein level should be in the ration?

Finishing cattle will only respond to additional supplementary protein in barley-based concentrates when grass silage has moderate to low digestibility and/or low protein content.

- For finishing steers or heifers offered well-preserved, high digestibility grass silage there is no response to additional protein with barley. Under these circumstances feed a ration with 11-12% / kg fresh weight crude protein

### What type of mineral do I need?

- All animals should receive a suitable mineral / vitamin supplement in winter, regardless of the length of the finishing period.

### Key fact

Grass silage can be incorporated into the diet of finishing bulls.

Research from Northern Ireland suggests that excellent quality grass silage (75 DMD) can constitute up to 1/3 of the diet (where the remainder is concentrate feeds) without any negative effect on animal performance.

### 4 How do I finish animals on a high-concentrate diet?

High concentrate diets can also be described as ad lib diets or diets where animals are offered as much concentrates as they can eat.

### Key Target

	Suckled Beef		
	Bulls	Steers	Females
Daily Gain (kg)	1.70-1.90	1.25-1.45	1.05-1.25
	Dairy Beef (males)		
	Fr Bulls	Fr Steers	AA/HE Steers
Daily Gain (kg)	1.35-1.55	1.15-1.35	1.05-1.25

### Key Target

#### Maximum length of finishing period

- Heifers 60-80 days maximum
- Steers 70-90 days
- Bulls Up to 180 days, preferably 80-120 days

### How to

#### Manage roughage supply

- The animals should eat a minimum of 10% of their intake as roughage
- The options include grass silage, hay, straw and alternative forages including maize silage and whole-crop cereal silage. Ensure access is good but limit intake. If forage quality is too good, intake can be excessive
- Should it be mixed through the concentrate or fed separately? There should be no difference.

### Key risk

Rapid fermentation of the high levels of starch in high grain diets can result in acidosis. Gradual adaptation to the diet is critical and a minimum level (One kg DM/day or 10% of the dietary DM) of a palatable roughage/forage should always be provided to maintain rumen function.

#### How much concentrate will animals eat?

- On average animals will eat about 2.0-2.2% of body weight per day. Friesians have higher intake capacity than continental breeds. Supplementation rates of 10-13 kg fresh of concentrate feeds would be expected in this system. e.g. A 600kg animal would eat 12-13kg of concentrate plus roughage.

#### What type of concentrate should I feed?

- Aim for a blend of cereals and digestible fibre sources (i.e. soya hulls, beet pulp, citrus pulp) to minimise the risk of digestive upsets. High levels of cereal (~80-85%) can be used but the risk of digestive upsets is potentially greater and great care must be taken with feeding management.



# Feed options for Finishing Cattle

## How much protein should I feed?

- Steers, heifers and finishing bulls need 11-12% CP / kg DM in the complete diet. For growing bulls aim for 13-14% CP in the complete diet.

## Do I need a buffer / yeast?

- A buffer / yeast acts as an insurance policy but it is no substitute for good feeding management.

## Checklist

### Minerals

- High levels of meals must be balanced for minerals.
- Feed a general-purpose cattle mineral. Ensure that the inclusion rate of the mineral matches the feeding rate of the ration.
- If feeding high levels of cereals, ensure the calcium content of the mineral is adequate to balance the cereal.
- Check that the mineral inclusion rate matches the feeding rate of the concentrate used.

## How to

### Manage an ad lib feeding system (where animals can eat as much concentrates as they like)

- The system is suitable for short finishing periods of approximately 60-90 days for steers and heifers, and up to 180 days for bulls
- It is essential to regularly estimate dry matter intake on the farm. Changes in intake can indicate illness.
- Adequate fibre in the diet is critical. At least 10% of the diet must be a source of long roughage to maintain rumen function.
- High energy-feeds should be fed for maximum weight gains.

- A mixture of energy sources, e.g. cereals and pulps, are preferable for this system. A good source of digestible fibre such as soya hulls will help reduce the risk of digestive upsets. Do not use ground cereals.
- Minerals must be fed to maintain good health
- Animals should have access to water at all times. Lack of water will depress intake and performance. Troughs should be cleaned out regularly

## Feeding management is critical

- Allow an introductory period of 3-4 weeks
- Never go below 5% feed remaining in the trough
- Avoid sudden changes in diet
- Remove stale feed regularly
- Permanent supply of fresh, clean water

Animals need to be checked daily for signs of ill-health. Animals should be treated for lice, worms, etc at housing. Adequate air movement is vital for this system.

## High concentrate diets

### Pros & Cons

#### Pros

Predictable performance  
Higher killout %  
Reduced days to finish  
Lower fat cover  
Saving on working capital, slurry storage and housing due to shorter finishing

#### Cons

Can be expensive if concentrate prices are high  
Risk of digestive upsets  
High level of management needed

## 5 How do I finish animals on fodder beet + forage + concentrates?

### What type of fodder beet?

- Use high dry matter fodder beets e.g. Magnum

### How much fodder beet should I feed?

- 25 kg of fodder beet is equivalent to 5.5 kg of barley.
- For cattle of 500-600 kg do not exceed 25 kg.
- For weanlings (250 - 350 kg) do not exceed 10 kg

### How much concentrate should I feed?

- Supplementation rates will depend on level and quality of silage and fodder beet used. 20 kg of fodder beet is equivalent to 4.5 kg of concentrates, but it must be balanced for protein and minerals. If feeding good quality silage ad lib with 20 kg of fodder beet, use concentrates to supply protein and minerals (See below).

### What type of concentrate do I need?

- Fodder beet is high in sugars, therefore avoid ingredients that are high in sugar. Aim for a high level of digestible fibre sources such as soya hulls. If there is home grown cereal included in the diet, use a fibrous protein such as rapeseed meal to balance for protein.

### Key Risks



**Using starch / sugar-based concentrate mixes with fodder beet increase the risk of digestive upsets. Use digestible fibre sources. Buffers such as sodium bicarbonate also act as insurance policies but are no substitute for good feeding management.**

The Table below presents the kg of protein balancer for various quantities of fodder beet for growing animals/weanlings (steers/heifers & bulls) and finishing steers + heifers, see later for bulls.

Equivalent to	Concentrate Crude Protein		
	20% Maize gluten feed	35% Rapeseed meal	45% Soyabean meal
Weanlings (balanced to 14% CP with grass silage as the sole forage) kg fresh fodder beet			
10	–	1.0	0.6
Finishing (balanced to 12% CP with grass silage as the sole forage) kg fresh fodder beet			
20	2.0	0.8	0.5
25	2.2	1.0	0.8

*For example, feeding finishing steers and feeding 20 kg of fodder beet, feed 2.0 of a 20% protein balancer or 0.8 kg of rapeseed meal + minerals or 0.5 kg soyabean meal + minerals.*

# Feed options for Finishing Cattle

## Key Risks



**Feeding high levels of fodder beet to weanlings may result in inadequate protein supplementation (unless using straight soyabean meal + minerals).**

## Key Question



**Do I need to feed minerals with fodder beet?**

- Fodder beet is low in minerals, particularly phosphorus, and must be balanced up accordingly
- Always check the label for feeding rate

## Key Question



**Can fodder beet be used in bull finishing diets?**

- As per using fodder beet for weanlings and finishing steers and heifers, treat fodder beet like a concentrate in bull finishing systems. 5 kg of fodder beet is the equivalent of 1 kg of barley. If feeding 20 kg of fodder beet in an ad lib system, feed 7-10 kg of a 14% CP ration, fortified with minerals suitable for beet.

## How to



### Manage fodder beet feeding

- Always wash and chop harvested fodder beet before feeding. Unwashed beet can carry up to 18% clay as tare, even in good harvesting conditions.
- Over time the intake of soil (containing iron and molybdenum) will affect the availability of minerals, particularly copper. A high intake of soil over a prolonged period may also affect rumen function.
- Feeding management must be excellent with beet to avoid digestive upsets
- Introduce slowly. Start with five kg/head/day and increase by five kg every 3-4 days until desired level is reached.
- When feeding exceeds 14 kg (finishing cattle) feed twice a day or use a TMR mix.

- All animals should have access to beet at the same time. Therefore, feeding space should be 600 mm (2 feet) for finishing cattle or 500 mm for weanlings.
- Freshly-harvested beet contains high levels of nitrates. Always allow a delay of 4-5 days after harvesting before feeding.
- Frosted beet will cause digestive upsets. Avoid feeding it where possible.

## Checklist



### Storing fodder beet

- Beet can be stored in a long narrow clamp, max 4 m wide and up to 2.2 m high.
- The clamp should be covered with straw to a depth of 0.5 m.
- A polythene cover may be used over the straw but a central vent 0.5 m wide should run along the apex of the clamp to allow ventilation.
- Beet for storage should be tightly crowned or serious losses can occur.

## Checklist



### Ensiling fodder beet

- Beet roots should ensile perfectly without adding any absorbent containing sugar. The main reason for adding the absorbent is to soak up the large volumes of effluent.
- The roots do need to be crushed to avoid too many large air spaces.
- Using 1 tonne of absorbent for every 5 tonnes of beet roots will retain most effluent.
- Ingredients that will retain effluent include beet pulp, citrus pulp, soya hulls, rapeseed meal, cottonseed meal and distillers grains. Ingredients that will not retain effluent well include maize gluten feed and soyabean meal.



- If done correctly, over 95% of the feed value added in the concentrates is retained. It is best not to put grain in the beet at the very top of the silo. It can attract vermin.
- If mixing a number of ingredients with the beet, the mixing of the ingredients needs to be good. These ingredients must then be well mixed with the beet.
- A drainage system (could be straw bales) should be put in under the silo to channel out the effluent that escapes.

Pros & Cons	
Pros	Cons
High energy yielding crop	Significant labour input
High feeding value	Significant capital investment in equipment needed if starting out
High rates of gain	Risk of digestive upsets

## 6 How do I finish animals on forage maize or whole-crop cereal silage + concentrates?

### Key Target



#### Live weight gain

	Suckled Beef		
	Bulls	Steers	Females
Daily Gain	1.4-1.6	1.1-1.3	1.0-1.2
	Dairy Beef (males)		
	Fr Bulls	Fr Steers	AA/HE Steers
Daily Gain	1.3-1.5	1.0-1.2	1.0-1.2

#### Forage quality / inclusion

- Good quality forage maize: 30% dry matter, 25-30% starch
- Good quality whole-crop cereal silage: 40-45% DM, 25-30% starch
- Alternative forages can be offered as a mix with grass silage or as the sole forage

#### How much concentrates should I feed?

- There is a concentrate saving of 2 kg with good quality forage maize and whole-crop cereal silage.
- Feed 3-3.5 kg of meals for a target gain of 1.00 kg live weight per day with good quality forage maize or whole-crop cereal silage
- Feed 5.0-5.5 kg of meals for a target gain of 1.20 kg live weight per day with good quality forage maize or whole-crop cereal silage.

#### How much protein should I feed?

- For steers and heifers, if feeding 50:50 grass silage: maize silage (both good quality), feed 5 kg of a 14% CP concentrate mix or 3 kg of a 16% CP concentrate mix, depending on target performance (see above).
- For growing bulls, if feeding 50:50 grass silage: maize silage (both good quality) feed 3-4 kg of a 20% CP concentrate mix.
- For finishing bulls, if replacing 33% of the ad lib diet with maize silage, feed 8-9 kg of a 14% CP concentrate mix.

#### What type of mineral do I need?

- Forage maize and whole-crop cereal silage are low in major and trace elements and must be balanced with a maize / whole crop balancer mineral.