



Grass Challenge *for dairy farmers*

Challenge Note 2D - Supplementing the Grass Supply

Contents

- 1 When Should I Supplement the Grass Diet?
- 2 Buffer Feeding at Grass
- 3 Supplementing Cows at Grass with Concentrates
- 4 How much Supplement should be Fed
- 5 Factors Determining the Milk Response to Feeding Concentrates

1. When Should I Supplement the Grass Diet?

Supplements should be fed if the grass intake does not meet the demands of the cow. This usually arises in the following situations:

- Insufficient grass intake to meet the energy requirements of very high yielding dairy cows and cows in early lactation;
- Poor grass quality - may arise if grass becomes mature and stemmy, as a result of poor grazing management or if grazing conditions are cold and wet resulting in grass that is low in dry matter, hence reducing the cows energy intake;
- Insufficient grass supply - may arise:
 - a) When grass growth rates are low due to low temperatures mainly in early or late part of the grazing season;
 - b) When grass growth rates are low due to drought conditions;
 - c) If the cow's grazing time is limited due to wet ground conditions;
 - d) If there is a very high stocking rate on the farm.



2. Buffer Feeding at Grass

Why buffer feed?

The aim in feeding grass supplements is to increase or maximise the total intake of nutrients in order to maintain or even increase milk production. Since all forages are more expensive than grazed grass, the economics of feeding a forage supplement will not add up unless milk production is maintained or increased.

When should I buffer feed?

- To provide an energy and fibre source during a grass shortage or when ground conditions are poor thereby restricting the grazing time.
- To provide extra fibre when cows are grazing very lush grass in the spring or autumn to slow down rumen throughput.
- When the grass quality or supply is low during the early and late part of the grazing season.

What type of forage supplement should I feed?

The type of forage supplement to be fed will largely be determined by:

- Its availability;
- Its price;
- The length of supplementary period;
- The reason for the grass limitation (that is, wet lush grass or mature stemmy grass).

Examples

Silage should be fed in situations where the cow's fibre intake is less than 25kg fresh weight of roughage (or four kg DM per cow). This may be in cases of severe grass shortage or when grass is very leafy and lush. Lack of roughage in a ruminants diet will lead to acidosis and laminitis within an intensive production system.

Big Bale Silage - useful if purpose is to maintain forage intake until the grass supply recovers in the short term or to introduce silage to the diet, which will save opening the clamp and risk spoilage or wastage.

A variety of forages can be considered as a supplement in addition to grass silage. Maize silage and wholecrop cereals can be used as well as brewers grain. Some farmers especially with complete diet feeding facilities have found brewers grain a useful supplement. Approximately four kg of brewers grain will replace one kg of concentrate with a maximum feed level of 20kg per cow per day.

How should I feed a forage supplement?

Research shows that offering a forage supplement after milking is more effective in comparison to feeding forage in the field. For the system to be effective all cows must have access to the forage for at least 45 minutes before turn out to grazing. Extended periods may be necessary in periods of severe grass shortages. It is also important that just enough fresh forage is made available to minimise waste. The forage should be of a high feeding value and also if available contain a starch source to increase the energy intake for example, wholecrop or forage maize.

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3. Supplementing Cows at Grass with Concentrates

Grass alone will not be sufficient to meet the potential milk yields of high genetic merit cows under typical grazing conditions. Under ideal grazing conditions, grass has the potential to support up to 27 litres of milk per cow per day in May by maximising the grass intake per cow. Concentrates should be fed when grass energy supply does not meet the energy demand of the cow.

4. How much Supplement should be Fed?

The level of supplementation will be determined by the following factors:

- a) Target milk yield of the cow;
- b) Potential milk yield from grazed grass;
- c) Type of supplement.

a) Target milk yield per cow

The target milk yield per cow will depend on the herd's annual yield potential and the cows month of calving. If the herd has a wide calving pattern, supplements should be fed on an individual or yield group basis.

b) Potential milk yield from grazed grass

The potential milk yield from grazed grass is determined by quality and quantity of grass offered and the cow's genetic merit and / or stage of lactation.

Table 1: Potential daily milk yields per cow produced from forage alone (litres)

Jan	Feb	Mar	Apr	May	June
15	15	15	22	27*	23
July	Aug	Sep	Oct	Nov	Dec
19	17	15	15	15	15

Source: ARINI (*this assumes cows are grazing high quality swards and the grazing system is well managed)

In practice it may be difficult to achieve milk from forage targets for any of the reasons below:

- The grass allowance may be restricted to achieve post-grazing cover targets;
- Cows may be grazing stemmy grass;
- Grazing weather conditions may be cold and wet;
- A proportion of the herd may be of low genetic merit and / or autumn calving.

c) Type of supplement

The amount of supplement to be fed will be determined by its energy and dry matter content. Supplements with a high energy and dry matter content such as concentrates will be fed at a lower rate compared to those with a lower energy content and dry matter such as brewers grain.



Example 1: Calculating quantity of supplement

Calculate the daily concentrate feeding rate for a spring calving herd with a target annual yield of 7000 litres per cow.

- The daily milk yield in May is 34 litres/cow/day with 23 litres of milk produced from 17kg grass DM/cow/day.
- If the milk yield from grass per cow is 23 litres then 11 litres will have to be produced from concentrates (34 – 23).
- If 0.45kg of concentrates produces one litre of milk then 5kg of concentrate supplement will have to be fed to meet the target daily and annual milk yield.

Table 2: *Required daily concentrate per Cow (kg)*

Target daily milk yield (A)	34 litres / cow
Target daily grass dry matter intake (see table 3 below)	17kg DM / cow
Target daily milk from grass (B) (see table 3 below)	23 litres / cow
Milk yield to be supported by concentrate (A - B) = C	11 litres / cow
Amount of concentrate required (C X 0.45)	5kg / cow

It is important that the amount of supplement fed is tailored to each individual cow as much as possible as feeding a cow above her requirement will allow her to divert the excess energy intake into fat reserves. Body Condition scores above 3.5 are excessive and are viewed as a poor use of feed input.

Table 3: *Potential daily grass DM intakes and milk yields from grass*

	Month					
	April	May	June	July	August	September
Daily grass dry matter intakes per cow (kg DM/cow/day)	14 -16	14 - 18	13 - 17	12 - 15	12 -14	12 - 13
Daily milk yields per cow from grass (litres/cow/day)	17-22	17 - 27	15 - 23	13 - 19	13 - 17	13 - 15

Note: Under ideal grazing conditions grass intakes will be closer to the top of the range figures. However during poor weather with high rainfall and low grass dry matter content, grass intakes will be closer to the bottom of the range figures.

For the example above if weather and grazing conditions were poor, intakes would be reduced to 15kg DM/cow/day. This would leave 19 litres of milk produced from grass. The concentrate feeding rate would have to be increased to seven kg/head/day.



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The Substitution Effect

The substitution effect of a supplement on grass intake can be defined as the reduction in the grass intake per kg of supplement fed. While supplements such as concentrates reduce grass intakes, the total dry matter intake is increased. This increase in total dry matter intake also means an increase in energy intake, which will produce extra milk compared to just grass alone. In summary the effects of substitution are as follows:

- Substitution rate of concentrates on grass intakes increases as the concentrate feeding rate increases;
- Milk response per kg of concentrate fed decreases as the concentrate feeding rate increases.

5. Factors Determining the Milk Response to Feeding Concentrates

a) Grass supply and quality

- The higher the cow's grass intake the more grass will be replaced by the inclusion of concentrates in the diet and so less extra milk will be produced per kg of concentrate fed. In situations where concentrates are fed during a grass shortage, the substitution effect will be low and therefore the milk response will be high.

- If cows are eating stemmy/ low digestible grass then concentrates will replace less grass. In this case more milk will be produced per kg of concentrate fed because of the reduced initial intakes of low quality grass. However it must be noted that the total milk yield per cow will be lower if cows are grazing stemmy / rank grass than in comparison to cows grazing high digestible leafy grass.

b) The type and level of supplementation

- Concentrate energy sources can be divided into either starch (cereal grains) or digestible fibre (beet pulp, citrus pulp, soya hulls).
- A lower level of supplementation will be required using high energy / dry matter supplements in comparison to those of low energy and low dry matter. As the concentrate feed level increases the amount of grass in the diet replaced by concentrates increases; therefore less extra milk will be produced per kg of concentrates fed.
- If the quantity of supplement to be fed is a substantial proportion of the diet and is to be targeted to all cows and a complete diet feeding system is available then a brewers grain/silage mix could be fed to all cows at milking time. If the supplement to be fed is a small proportion of the overall diet and needs to be targeted to individual cows then extra concentrates could be fed in the parlour during milking.



c) Cow's stage of lactation and genetic merit

- The higher the genetic merit and the earlier the cow is in her lactation the higher the potential daily milk yield. High quality grass alone cannot sustain daily milk yields above 27 litres per cow so a supplement will have to be fed to meet her potential daily milk yield. See Table 4 below:

Table 4: *Energy balance on average and high milk yields at pasture*

	Milk yield	
	Average	High
Target milk yield (litres/day)	25.0	35.0
Energy Requirement (MJ)		
Maintenance	69	69
Milk (1 litre milk = 5 MJ)	125	175
Total energy requirement	194	244
Energy Supply from grass (MJ) (18kg grass DM/cow/day) x (11MJ/kg grass DM)	198	198
Energy deficit to be met by concentrate	0	46
Concentrates required to meet energy deficit (kg FW / cow) (1kg concentrate FW = 11MJ)	0	4

(Assuming cows are spring calving, grazing ideal covers during good weather in May)