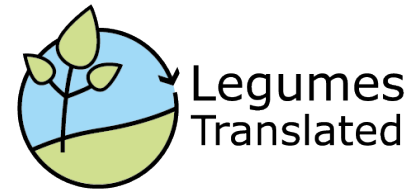


# Feeding lucerne to dairy cows

Lucerne is a protein-rich forage legume

Lorna MacPherson, Jennifer Flockhart and Paul Hargreaves



This note describes feeding lucerne. Lucerne is a protein-rich perennial forage legume that fits well into arable cropping systems. Optimising the use of lucerne on dairy farms involves balancing agronomic, nutritional and economic considerations.

## Outcome

The inclusion of lucerne in a grass or maize-based forage ration reduces the need for feeding high protein rapeseed and/or soybean meal to high-performance dairy cows. The beneficial effect depends on the protein content of the grass or maize silage that is replaced and the stage of cutting of lucerne which will determine its nutritional value.

## Forage quality of lucerne

The protein concentration of lucerne silage (18–22% of dry matter) is significantly higher than that of maize silage (about 8%) and good quality grass silage (14%). This benefit is offset by a lower metabolisable energy content. Farmers can use lucerne to substitute grass silage or maize silage without affecting animal



Crichton cows at feed fence. Photographer: Lorna MacPherson (SRUC)

## Applicability

**Theme:** Feeding lucerne to dairy cows

**For:** Dairy farmers

**Where:** Western Europe; cool temperate areas; areas well-suited to grass and forage maize

**Impact:** A high protein forage crop that reduces purchased supplementary protein feeds while maintaining milk output

performance. This provides the foundation for reducing supplementary feeding costs. For example, replacing 3 kg dry matter of maize silage with lucerne silage balanced by extra cereal to raise the starch content reduces the need for rapeseed meal by 1.3 kg.

Lucerne is more palatable than grass and maize silage. This means that the lower energy content of the lucerne is partly compensated by higher forage intakes. Milk output is maintained while supplementary protein feeding can be reduced, although the starch component of the concentrate supplement will need to be increased where lucerne replaces maize silage or other whole-crop cereals. In supporting milk production, lucerne is similar to red clover (another legume forage) as a high-protein forage that is fed together with grass or maize silage, although lucerne leads to improved milk quality compared to red clover. Lucerne has a greater buffering capacity than maize silage and can have a beneficial effect on rumen pH.

Replacing some grass silage with lucerne silage in milking cow diets has been shown to increase dry matter intake, milk production and quality (Table 1). This requires formulation of diets that contain similar levels of metabolisable energy and protein. The inclusion of lucerne in the silage mix significantly increased dry matter

**Table 1.** Total mixed ration composition and milk output as affected by grass:lucerne ratios in the silage dry matter (DM).

	<b>Grass:Lucerne 100:0</b>	<b>Grass:Lucerne 75:25</b>	<b>Grass:Lucerne 50:50</b>	<b>Grass:Lucerne 25:75</b>
<b>Total Mixed Ration composition</b>				
Grass silage (g/kg DM)	574	431	287	144
Blend (g/kg DM) (crude protein 214 g kg DM)	211	211	211	191
Lucerne silage (g/kg DM)	0	144	287	431
Rolled wheat (g/kg DM)	124	144	163	206
Rapeseed meal (g/kg DM)	67	43	22	0
Protected fat (g/kg DM)	18	18	18	18
Min/vit premix (g/kg DM)	10	10	10	10
<b>Animal intake and milk output</b>				
Intake (kg dry matter/day)	19.8	21.2	23.4	24.6
Milk yield (kg/day)	32.0	32.0	32.7	33.2
Milk fat (g/kg)	39.5	39.5	40.0	39.5
Milk protein (g/kg)	30.1	30.2	30.2	30.0

intake and the higher forage protein content enabled a reduction in supplementary protein feeding at similar levels of milk output.

Milk output per unit dry matter intake declined due to the lower digestibility of the lucerne. For overall feed costs, inclusion of lucerne in a diet can help save on bought in protein concentrate costs assuming the protein in the lucerne silage is greater than the protein in grass silage. The stage of maturity of the lucerne crop when cut for silage affects the balance between yield and nutritional quality. The protein and metabolisable energy content of the silage is high when cut at the flower bud stage. Delaying cutting to the flowering stage increases yield but decreases quality. A compromise between yield and quality is cutting at between the 10 to 30% flowering stage (See Practice Note 12). Short forage chop length can increase feed intake in dairy cows. However, a short chop length can increase the risk of sub-acute ruminal acidosis.

## Feeding strategies

Effective use of lucerne to replace other forages

in the diet for milking cows is highly dependent on the nutritional value of the lucerne and the quality of the forage it replaces.

Increasing lucerne silage in the ration will reduce the requirement for purchased protein, particularly where it is replacing whole-crop cereal or maize silage (although more cereal grain may be required to balance the ration for starch). The relative prices of these feeds determine whether including lucerne can be a cost-effective option. Home-grown high-protein forages, such as lucerne, become more competitive as the cost of imported protein ingredients increases.

Lucerne silage has higher levels of calcium than grass silage. As is the case with all high calcium feeds, feeding lucerne to cows before calving might increase the risk of hypocalcaemia (milk fever due to calcium deficiency) when milk production starts around calving time. This is because high calcium intake before calving affects the hormonal mechanisms that control calcium mobilisation, increasing the risk of low blood calcium levels after calving.

## Key points

- Lucerne can substitute grass silage in dairy rations without compromising animal performance.
- Depending on the forage quality that lucerne replaces in the diet, savings can be made in supplementary protein costs.
- Starch levels need to be maintained when substituting maize silage or other whole-crop cereal with lucerne.
- Stage of cutting is an important consideration for forage quality but also to aid regrowth and persistency. Cutting at the bud stage will maximise quality but it is advised to leave until the early flower stage to gain extra yield and maintain plant health.
- A shorter chop length increases forage intake.

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