

# How to Feed the 500 kg MS Cow?

Wybe Kuperus

PO Box 18, Darfield

Vitec Nutrition

## Why a kg MS per kg LW?

A fair number of dairy farmers in the South Island have passed the 400 kg MS per cow mark and are keen to further increase per cow production to 500 kg MS for a 500 kg live weight (LW) cow. To compare apples with apples the challenge can be 400 kg MS for a Jersey, 450 kg MS for a Crossbred, 500 kg for a NZ Friesian and 600 kg MS for an OS Holstein Friesian cow: “a kg MS per kg LW”.

Farmers have their own reasons for a further increase in per cow production:

- Increase total MS production of the same area
- Produce the same MS with less cows and therefore reducing the per cow costs (e.g. labour, animal health, breeding) often rated at \$300-500 per cow, i.e. increase profits
- Put less feed into maintenance and more into milk production
- Utilise more of the genetic potential of their cows
- They like to see and work with happy, well fed and well performing cows.

This paper focuses mainly on how to feed cows for 500 kg in a pasture based system on the Mainland, however this can not be seen separate from management of cows, pasture and supplements.

## Different ways to achieve 500 kg MS

Basically there are two ways to achieve more MS per cow:

1. Increase days in milk
2. Increase average kg MS per day

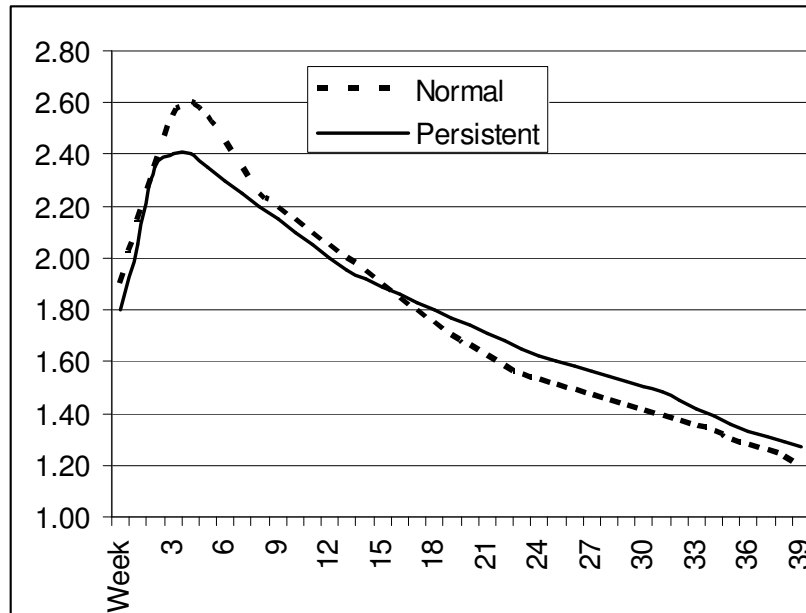
Calving cows a week earlier or drying cows off a week later can yield 10-15 kg MS. This is not only a case of bringing the planned start of calving forward; a more condensed calving and less drying off to correct poor condition will increase average days in milk per lactation in an easy manner.

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The average kg MS per day can increase through a higher peak yield and/or an improved persistence, less post peak decline.

Figure 1 displays 2 different lactation curves which both achieve 500 kg MS per lactation, assuming 280 days in milk. The normal curve peaks to 2.6 kg MS and declines faster post peak. The persistent curve peaks at 2.4 kg MS which is easier to achieve in a pasture based system and requires less peak shares.

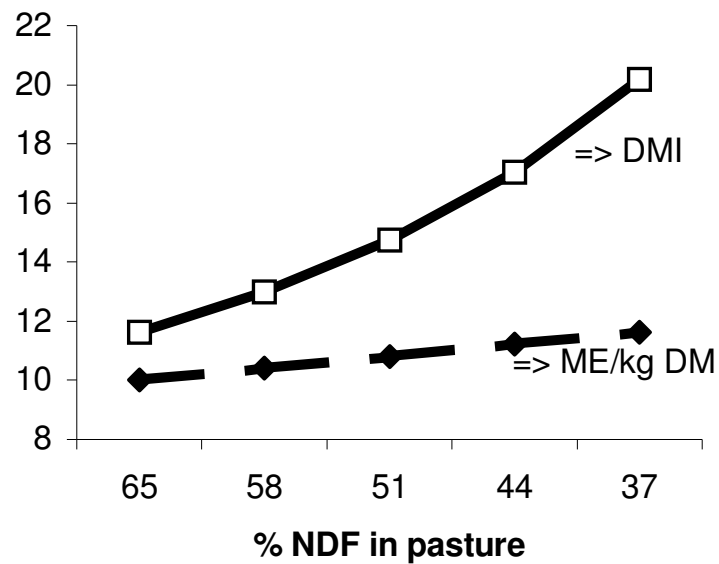


**Figure 1:** Two different lactation curves to achieve 500 kg MS per cow

### Maximising ME intake from pasture

At 500 kg MS per cow ME intake is still the primary production limiting factor in a pasture based system according to Kolver (2000) and Kuperus (2002).

As explained in last years SIDE proceeding the average MJ ME per kg DM to achieve 500 kg MS per cow in 280 days needs to be 11.5 MJ ME/kg DM over the whole lactation. This means a pasture ME of 12-12.5 MJ ME in early lactation and no lower ME than 11 MJ ME at any point in time. Figure 2 explains the relationship between fibre content (NDF) in pasture and ME/kgDM and the impact on pasture intake. More leaf and less stem result in a lower %NDF, a higher digestibility, higher ME/kg DM and an increase in dry matter intake.

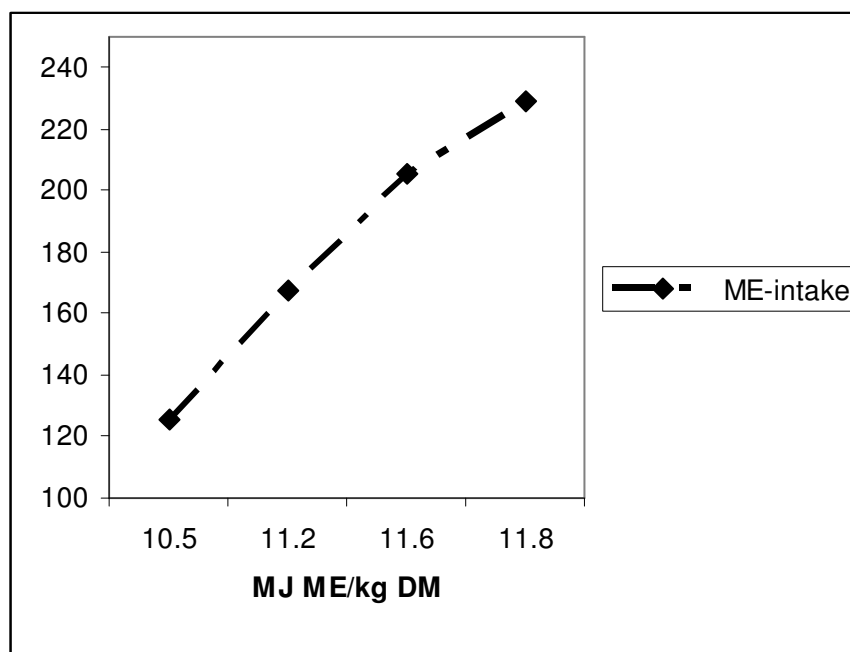


**Figure 2:** The effect of NDF-content in pasture on MJ ME per kg DM and Dry Matter Intake

Figure 3 shows the compounding effect of intake and ME/kg DM on total ME-intake per cow per day. High quality ryegrass/clover pastures, timely cutting for silage and a daily focus on pre-grazing and residuals are key-factors to achieve target ME-values. The Dexcel Feed4Profit “Managing Pastures for Quality” Poster clearly states how to manage pastures for quality. Make sure this gets thoroughly discussed with all your staff on farm.

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**Figure 3:** Compounding effect of intake and ME/kg DM on total ME intake

With an average ME over spring of 11.8 MJ ME per kg DM the cow harvest 230 MJ ME per cow per day, sufficient to produce 2.3 kg MS. (68 MJ per kg MS and 72 MJ for maintenance including grazing). If we allow 0.5 kg bodyweight loss (1 body condition score in 3 months) our cows could produce 2.5 kg MS per day under ideal grazing conditions.

Holmes, Kolver and Lopez (2002) indicated that 3<sup>rd</sup> lactation New Zealand Friesian cows can produce a kg MS for a kg LW (508 kg MS in 300 days) when fed generous pasture during the whole lactation.

Improving pasture management to maintain quality above 11 MJ ME/kg DM throughout the season can have a large impact on milk solids production from pasture.

### ***Pasture Allowance & DMI***

Besides NDF and ME content pasture allowance has a big impact on DM intake. Vazquez and Smith concluded that pasture NDF intake was 1.33 % of body weight with a low allowance (<20 kg DM) and 1.65 % of body weight with a high allowance (> 20 kg DM).

A higher pasture allowance gives the cows opportunity to select pasture of higher quality and generally increases bite-size (grams DM per bite). Dry matters below 15 % can limit bite size and restrict intake. Under normal grazing conditions the number of bites per cow per day is fairly constant (Bargo, Muller and Kolver, 2003) and mainly restricted by grazing time. Cows under unrestricted conditions spend 9 to 12 hours grazing and the remaining time on ruminating, walking, milking etc.

## Selecting the right supplement

Supplements can play different roles:

- fill feed deficits, when feed demand exceeds pasture supply
- increase total daily ME-intake
- compensate deficiencies or surpluses in pasture nutrients.

No matter what supplement you buy or make yourself, Quality is king!

### ***Fill feed deficits***

For 500 kg MS per cow 11 MJ ME per kg DM is the minimum requirement. Test the forages you buy or make, so you can make informed decision regarding the use of the supplements and how to improve it next time.

The feed should be well ensiled, have a fresh odour and not contain mouldy or rotten material. If it does, remove before feeding out, you will not fool your cows!

### ***Increase daily ME intake***

You can use feeds like meal, grain, palm kernel extruder etc. as possible feeds to increase the energy intakes. The net increase in ME intake will depend on the ME of the introduced feed and the substitution of pasture. See the examples in Table 1.

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**Table 1:** The impact of feeding grain on DMI, total ME-intake and milk production

	<b>Pasture Only</b>	<b>Pasture Low substitution</b>	<b>Pasture High substitution</b>
DMI Pasture (kg DM) @ 11.5 MJ ME	17	17	17
Rolled barley (kg DM) @ 13 MJ ME	-	3	3
Pasture substituted (kg DM)	-	0.9 kg DM	1.8 kg DM
Net pasture intake (kg DM)	17	16.1	15.2
Total Dry Matter Intake (kg)	17	19.1	18.2
Total Energy Intake (MJ ME)	196	224	214
Kg MS per cow per day <sup>1</sup>	1.8	2.2	2.1

<sup>1</sup>MS production based on 72 MJ ME for maintenance including grazing and walking and 68 MJ ME per kg MS. No MS production from body reserves mobilisation included.

With a low substitution rate the net increase in energy intake allows for an increase in milk production of 0.4 kg MS. Substitution rate will be low when the cows physically can not eat enough pasture, due to lower quality or due to grazing conditions, pasture allowance, DM%, weather conditions, and time in the paddock etc. To achieve a high response you need healthy cows in good condition.

### ***Balancing pasture***

As discussed in the SIDE 2002 paper p.145-151 pasture has some limitations. The major limitation is the amount a cow can eat on a daily basis.

When supplementing spring pastures containing more than 25 % crude protein it pays to choose feeds higher in rumen available carbohydrates (e.g. maize silage, barley) and lower in protein, this saves cows waiting energy on excreting the protein surplus in the form of urea. Starch, especially, will supply more glucogenic energy a limiting resource in early lactation cows. But remember ME/kg DM of the supplement. Although it shifts the balance of the diet, whole crop silage of 9.5 MJ ME/kg DM will not increase production; make sure you make top quality.

The second and third grazing round in spring and sometimes the second spring flush after summer can result in low fibre levels (less than 35 % NDF) which combined with a low effectiveness ( 40% or less) can result in suboptimal rumen function. Then the effective fibre

gained from grass/whole crop/maize silage can add value to the diet over and above the ME value.

Regarding mineral requirements, take pasture samples from paddocks with new and old pastures, from paddocks with different soil types or fertiliser history and check for the macro minerals N, K, S, P, Na, Ca, Mg and the trace-elements Se, Co, Cu, I, Zn, Mb. Adjust your normal mineral program to accommodate specific deficiencies on your property.

## **Preparing the cow for take-off (and landing)**

You can do endless ration calculations, but if the cow is not healthy she will not eat enough. DM intake is easily reduced with 30-50 % through (sub) clinical ketosis, milk fever, grass staggers, lameness, mastitis, metritis etc.

Feeding plays an essential role in preventing metabolic disease around calving.

The last 3 weeks before calving cows (springer herd) need to be fully fed with feeds of milker quality to compensate for the increase in energy demand and the reduction in intake. If you have had problems in the past with milk fever you can substitute magnesium oxide by magnesium chloride and magnesium sulphate pre-calving in combination with other anionic salts and low K pastures or forages to reduce the Dietary Cation-Anion Difference (DCAD) and activate the Calcium metabolism before calving. Trace-element status has been checked at drying off and corrected over the dry period.

The difference between pre-calving (springers) and post-calving rations (colostrums) has to be kept small in order to keep the cows feed intakes up and prevent rumen disorders.

If you want to milk 500 kg MS plus, cows need to have a minimum body condition score of 5 and heifers of 5.5 at calving; there are no excuses for not achieving these targets. Remember it takes time and quality feed (ME>10.5) to put condition on your cows. Put the low condition cows and heifers in a separate herd. If the dry cows have to stay in wet and cold conditions, the only option is fully feeding them.

## **People make the difference**

Last but not least: to turn all things discussed into reality we need the right people, with the right attitude and the right skills. To get performance we need people with a genuine interest in dairy cows, who recognise problems early and respond timely. Make sure your staff gets

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**Notes:**

training in recognition and treatment of animal health problems, discuss this with your veterinarian. A thorough understanding of how to achieve quality forages, pasture and how to feed cows is paramount for every staff member. Attention to detail on a daily basis is what achieves the 500 kg MS plus performance on an annual basis.

## Summary

To achieve 500 kg MS per cow or a kg MS per kg LW profitably you need

- Top quality pasture (minimum 11.5 MJ ME/kg DM)
- High energy supplements (minimum 11 MJ ME/kg DM)
- 280 days in milk or more
- Fully feed all year round
- Proper transition feeding
- Body condition score 5 for cows and 5.5 for heifers at calving
- Animal health program focused on prevention and early recognition/ and treatment of cows
- Attention to details
- People with the right skills and motivation.

## References

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- Vazquez O P and Smith T R. 2000. Factors Affecting Pasture Intake and Total Dry Matter Intake in Grazing Dairy Cows. *Journal of Dairy Science* 83: 2301-2309.