

Parturition in lactation

NUTBAL PRO estimates the current potential milk yield (MP_{max}), expressed as the ME value of the milk for the young, from equation 66 in the *Agric. Syst. Paper on GrazFEED*. This equation is basically a Wood's function scaled for the mature size and milking potential of the breed type and the maturity of the female. This function is modified by body condition score of the mother at parturition. After the peak milk yield, a factor LB attempts to adjust potential yield for nutritional limitations that have occurred since parturition. As NUTBAL is a point in time model, we have to estimate LB from the weight lost by the mother since parturition.

The program then predicts how much of the adjusted current potential can be achieved (MP_1), given the available energy (ME_{xs}) (i.e after deducting the ME requirements for maintenance and pregnancy from the intake). The equation below (68) is the one that does this, but the values of two of the C parameters have changed since the paper was prepared (C_{L7} remains at 0.85).

$$MP_1 = \frac{C_{MP}}{C_{L7}} \left(10. + \exp \left(-C_{L8} \left(MR - C_{L9} \right) \right) \right)$$

where

$$MR = ME_{xs} / MP_{max}$$

for dairy cattle: beef cattle sheep

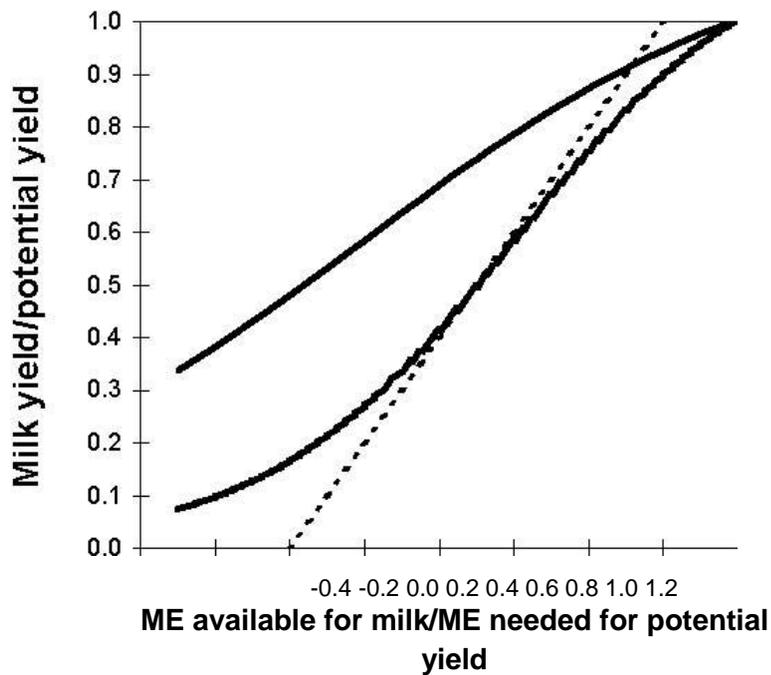
$$C_{L8} = 1.8 + 0.004 d \quad 1.8 + 0.006 d \quad 1.8 + 0.012 d \quad C_{L9} = 0.2 + 0.0013 d \quad 0.2 + 0.002 d \quad 0.2 + 0.004 d$$

$$A \text{ coefficient} = .004 \quad .006 \quad .012 \quad B \text{ coefficient} = .0013 \quad .002 \quad .004$$

where d = stage of lactation, in days

Examples for early and late lactation were shown in Fig.14 of the ISHN book chapter. Freer made the parameter changes because he had evidence from a research station in Victoria that beef cattle calving down in autumn on low quality pasture, from which they could not even get their maintenance requirements, were producing enough milk for their calves to gain at more than 250 g/d. Most of the hard data on milk yields vs body weight change are for dairy cattle reasonably well fed; the system we have developed is trying to make the best of what little we know about underfed ewes and beef cows. However, it seems certain that condition at parturition affects the peak and persistence of the milk curve, and that yield after the peak is resilient to short-term shortages of energy but will be permanently depressed if they persist.

Ideally, there should be a set of parturition functions allocating scarce resources in accordance with known priorities, but our knowledge of the system is still a long way from that.



As far as protein is concerned, our approach is to reduce the potential intake of feed if the diet is deficient in rumen degradable protein, i.e. adjusted potential = old potential x (RDP intake/RDP requirement). If there is a shortage of UDP (very rare in my experience) milk production is reduced in proportion. If the animal is losing weight, the protein mobilised is available for milk synthesis.