



Dairy Nutrition & Management Solutions Ltd

Optimizing grass-based systems

Understanding base and marginal milk

Presentations at recent Farmers Forums have left a number of farmers confused about the two different kinds of milk – base milk and marginal milk. Farmers were told that marginal milk (extra milk produced from using supplements) is more expensive than base milk. A number of farmers have contacted me for clarity as they perceive that farmers should produce at base level to maximise profitability, based on the widely held belief that farms with the lowest farm working expenses per milk solid will be the most profitable. This perception needs to be corrected.

Farmers should maximise their overall profitability, not focussing solely on reducing costs per milk solid. Total profitability is determined by the *profit/MS* multiplied by the *number* of milk solids produced. Overall profit is not determined only by the profit per MS. The number of milk solids produced is a very important component in determining the overall profitability.

Let's look at a simple example. With a milk price of \$6, a farmer producing milk from grass only at a cost of \$4/MS will make \$2 profit per milk solid, or \$2000/ha profit if production was 1000 kg MS/ha. Another farmer, feeding supplements, may produce milk at a higher cost of \$4.50/MS and make a lower profit of \$1.50/MS, but if he produces 2000 kg milk solids/ha his total profit would be \$3000/ha. Farmers are often advised to produce at the lowest base price where profit/MS is maximised but this is false economy and is costing dairy farmers millions in lost revenue.

Marginal analysis is the economic tool used to determine the level of production where overall profitability will be maximised. Marginal cost is the added cost to produce another milk solid. As long as the extra milk solid produced costs less than the milk price, the extra milk solid will add to the overall profitability. The economic rule is to continue increasing production until the marginal cost is the same as the milk price. It does not matter if the marginal cost increases and is higher than the base cost, in fact, this is expected to occur. This simply means each additional milk solid will add less and less to the overall profit until a level of production is reached where the cost to produce the extra milk solid costs the same as the milk price and not add any further profit. Producing below this level will be losing potential profit, while exceeding this level will reduce overall profit, as each additional milk solid is produced at a loss. Farmers must know what level of production will maximise their overall profitability.

As long as the overall profit continues to rise, even though the additional profit per milk solid is less than the preceding one, continue to produce. Stopping production at the base price or lowest cost per milk solid will seriously reduce overall profitability.

Farmers need to make sure their consultant understands these principles and can determine the optimum level of production for their farm, or they could be farming with sub-optimal farm systems and not maximise their overall profitability or be producing additional milk at a cost higher than the milk price and losing money.

Let's consider a simple example where the selling price is \$6/MS. Say it costs a farmer \$4 to produce 1 milk solid. The overall profit will be \$2 for the day, or the profit on that 1 milk solid. Say it costs \$4.50 to produce another 2nd milk solid, which is known as the marginal cost to produce the additional MS. The overall profit is the \$2 from the 1st MS plus the \$1.50 from the 2nd MS, increasing the overall profit to \$3.50 for the day. To produce a 3rd milk solid costs an extra \$5 for that extra milk solid (marginal cost). Overall profit increases to \$4.50 per day, the combined profit from each milk solid. If the 4th milk solid costs an extra \$5.50 (marginal cost) it will result in an overall profit of \$5 per day. If producing another 5th milk solid adds \$6 of extra cost, the same as the selling price, no profit is made on the 5th milk solid as it cost as much to produce as what it could be sold for. Overall profit did therefore not increase by producing the 5th milk solid. If the farmer continues to produce a 6th milk solid at an additional cost of \$7, he would actually lose \$1 on that extra milk solid and the overall profit will then actually be less than what it was at the previous level of production.

With the example above the marginal cost to produce additional milk solids increased from \$4.50 for the 2nd MS, to \$5 for the 3rd MS, \$5.50 for the 4th milk solid and \$6 for the 5th milk solid produced. The marginal cost increased with each additional milk solid produced, which means the profit made on every additional milk solid got less and less, but as long as each additional milk solid cost less than the selling price, the overall profitability continued to rise. The overall profit continued to rise, even if at a lower rate with each additional milk solid produced, until a level was reached where the additional cost of producing the extra milk solid (marginal cost) was the same as the selling price. This is the level of production where profitability is maximised.