The feed efficiency imperative – confronting 2011

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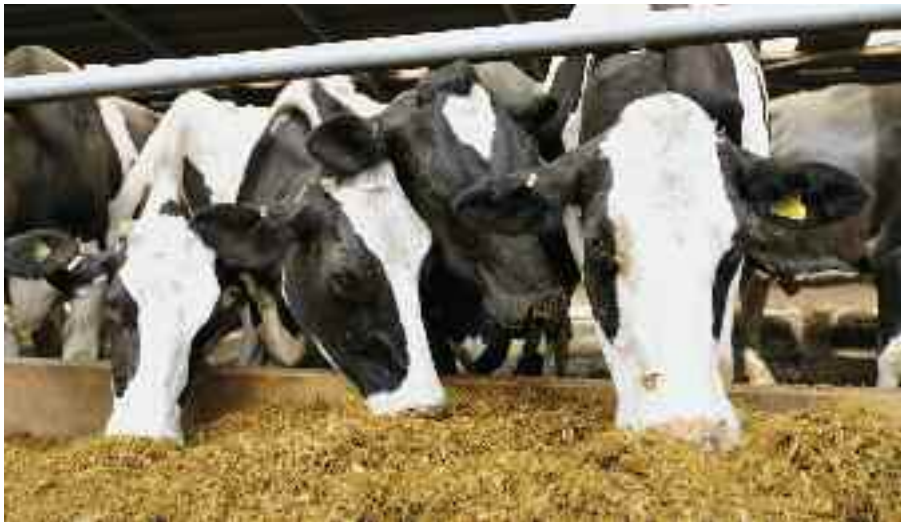

A major concern shared by dairy farmers all over the world is the rising cost of milk production. In this era of volatile milk prices and ever increasing oil, fertiliser and feed ingredient prices, minimising the cost associated with milk production has never been of greater importance.

Confronted with this economical reality, individual farmers react differently but ultimately there are only two ways to face the situation: simply suffer the price variations, whatever they are, and try to stay in business by taking short term measures or, alternatively, work towards a target milk price to determine an attainable maximum production cost and then take a pragmatic approach to precisely identifying the various components of this cost.

The former often leads to drastic decisions with potentially long term negative impacts. The latter, however, allows farmers to identify which aspects of production they can control in order to keep their production costs aligned with milk price.

This approach requires a serious commitment to collecting reliable data and processing it. Against a backdrop of rising global milk prices and escalating feed costs this approach makes the most economic sense. Essentially, as milk prices cannot be altered, the current challenge posed to dairy farmers is to stop the production cost rise observed over the last few years (Fig. 1).

As always, the first step in taking control of any parameter is to monitor it. For dairy farmers this means being aware of their production cost components in order to act on them.

In a study carried out among French dairy farms during a milk campaign, by Alteor Conseil (consultancy and training for farming business) in 2009/2010 the five largest contributors to production costs were: feeding (28%), mechanisation (22%), land and buildings (11%), young stock (9%) and other structural charges (8%). The ranking of these figures is very similar all across Europe and automatically raises awareness about the importance of feeding cows efficiently.

This is far from being the only area to consider, however, other global factors such as lactation performance over lifetime, or milk production per day of life, provide excellent opportunities for significantly reducing the fixed costs per litre of milk. Reaching this goal requires increasing productivity, longevity and/or reducing unproductive periods such as heifer rearing.

Take the example of a cow from an average herd that started milk production at 26 months of age, producing 8000kg per 305 days lactation, with 60 days of dry period and culled after 2.4 lactations. This cow produced 19,200 litres over her lifetime but only 11.7 litres per day of life. If nutritional management can reduce the age at first calving to 24 months, this will increase milk production per day of life to 12.2l/day.

At the same time, heifer production cost is reduced by approximately €70/animal, which is equivalent to a reduced production cost of €3.65 per 1000 litres. Using a similar approach, increasing feed efficiency by 5% would also increase milk production over lifetime by 960kg, thus increasing the milk production per day of life to 12.4 l.

Looking at these figures, it is obvious that

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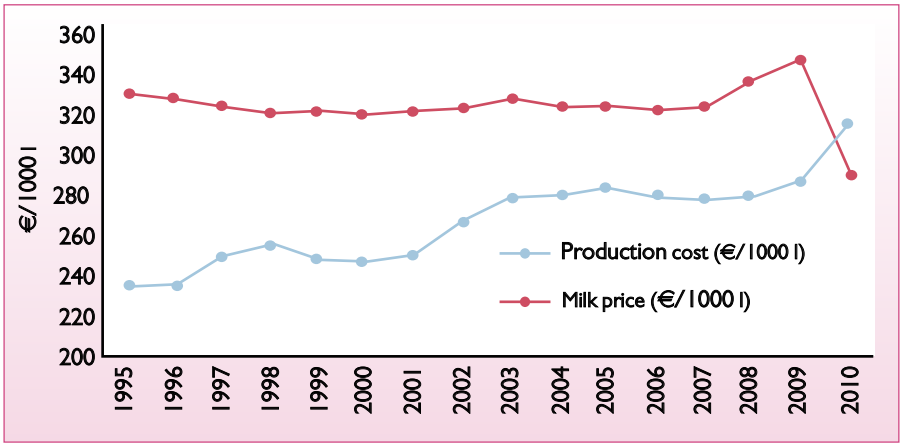
Fig. 1. Milk price and production cost (€/1000 l) in France from 1995 to 2010 (Alteor Conseil, France, 2011).



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the goal of the dairy operation should be to maximise the efficiency of converting feed into milk. So since feed efficiency variation factors in dairy herds are numerous and include days in milk, body weight change, milk composition, herd management, feed digestibility, heat stress or activity etc, the next question for farmers is how to influence this crucial parameter.

While farmers have little impact on lactation stage, and heat stress, and can only make moderate changes relative to herd management, nutritional management actions resulting in increased feed digestibility can easily be implemented.

Three major factors

How efficiently feed is converted into milk is determined by three major factors: the digestibility of the feed, which is linked to diet balance, ingredient characteristics, physical aspects, harvesting conditions; a highly active population of rumen micro-organisms to increase the overall effectiveness of rumen fermentation and an adequate, stable rumen environment, promoting microflora development.

In terms of rumen microflora population, the most sensitive one is the fibre-degrader as it requires specific nutrients to grow and function at its optimal activity level. In particular, this rumen bacteria group has a specific requirement for non-protein nitrogen (NPN) and ammonia as a nitrogen source, while it rather inefficiently uses more complex protein sources as a substrate.

However, common NPN sources, such as urea or vinasses are rapidly degraded into ammonia (NH_3) in the rumen environment, evident in their complete disappearance after 15 minutes following ingestion. Being potentially toxic, ammonia is quickly absorbed into the blood stream and converted in the liver into urea.

A minor proportion of this is recycled and a larger proportion excreted in the urine. As a result of this process, fibre digesting bacteria in the rumen have access to adequate ammonia levels for a very limited amount of time and can experience, in the same day, periods of excess where urea is produced and periods of deficit where the activity of cellulolytic rumen bacteria is reduced. This in turn reduces fibre degradation.

Using an alternative nitrogen-rich feed ingredient, such as Optigen (Alltech Inc) takes advantage of a constant release of NPN in the rumen environment, ensuring a more steady ammonia concentration in the rumen and providing ideal conditions for the growth of fibre degraders and ultimately fibre digestion.

In addition, using Optigen provides a similar quantity of protein equivalent in a more concentrated way than common vegetal protein, which allows nutritionists to include a higher quantity of other feed ingredients such as forage or energy sources, which are often time limiting in high yielding dairy cow diets.

As a result, more rumen-friendly diets can be fed translating at farm level into fewer particles left undigested in the manure.

This has a direct impact on how feed is converted efficiently into milk. In a university trial carried out in Harper Adams University College (UK), Optigen inclusion in dairy cow diets at 120g/head/day resulted in an improved feed efficiency of 1.44 to 1.51 litre of fat-corrected milk per kg of DMI. Other dietary changes consisted of increasing forage quantity while being able to reduce vegetal protein supply by 1kg/head/day.

Besides adequately feeding the rumen microflora and, in particular, the cellulolytic population, other dietary manipulations have been investigated, including the use of live yeasts in order to stimulate specific rumen bacteria activity. Yea-Sacc[1026] (Alltech Inc) has consistently demonstrated its beneficial effect on stimulating specific groups of rumen bacteria, such as fibre degraders and lactic acid utilisers.

Many years of research carried out on this product have resulted in numerous peer-reviewed articles demonstrating its mode of action and benefits for milk production, to the extent that a recent independent peer-reviewed meta-analysis, carried out by INRA in France, clearly established Yea-Sacc[1026] as the most researched live yeast product on the market.

More recently, a meta-analysis focusing specifically on the effects of Yea-Sacc[1026] in dairy cows has been published, detailing feeding trials where Yea-Sacc[1026] was compared to a negative control and where feed efficiency was recorded.

On average, Yea-Sacc inclusion resulted in an increased feed efficiency from 1.29 to 1.34 litres of protein and fat corrected milk per kg DMI, together with a milk production response (Table 1).

	Control	Yea-Sacc[1026]
DMI (kg/cow/day)	18.85	18.97
Milk (kg/cow/day)	23.91	24.93
Fat (%)	3.73	3.74
Protein (%)	3.05	3.05
EFCM (kg/cow/day)	24.38	25.45
Feed Efficiency (kg EFCM/kg DMI)	1.29	1.34

EFCM= 0.3246*MY+12.86*(Fat%*10*MY/1000) +(7.04*Protein%*10*MY/1000)

Table 1. Yea-Sacc[1026] meta-analysis results on milk production and feed efficiency, adapted from Feedstuffs, January 10, 2011.

Conclusions

As feed costs rise, feed efficiency becomes one of the key economical drivers which farmers have to monitor closely. Together with adequate diet formulation and good management practices, Yea-Sacc[1026] and Optigen have consistently demonstrated beneficial effects on milk production and a high feed conversion efficiency, thus supporting dairy farmers to better control their milk production costs. ■