TECHNO FARMING: FRIEND OR FOE?

by Dr Joubert Nolte
The business environment of dairy operations has changed significantly in the recent past. Rapidly increasing energy costs and volatile commodity prices put profits under pressure, resulting in an increase in the average size of dairy operations as dairymen endeavour to improve efficiency and benefit from larger economies of scale.

Conversely, market awareness about animal welfare, food safety, natural foods, a healthy lifestyle, continuous quality assurance and consumer protection have increased significantly. Success in an environment of lower profit margins and higher product demands has intensified the drive for proper operational, technical and financial management. Recent technological advancements can certainly contribute to more effective business management.

The modern, high-production dairy cow is truly remarkable. These animals produce lactations of 12 000 to 13 000 litres in harsh climatic conditions of severe summer heat, high humidity and cold, wet winters. Yet, they deliver the expected result every year and keep on growing their output. To allow this ever-increasing trend to continue, the production environment of the cows must be managed to limit the effect of natural extremes on animal performance and create comfortable conditions for the animals.
The physical characteristics and chemical quality of the feed presented to the cows are further critical inputs that directly affect the overall performance of the cows. The first objective is to ensure the diet is palatable to achieve maximum feed intake. Limit ingredients that reduce feed cost but are unpalatable and ensure sufficient levels of palatable ingredients. The physical presentation of the diet must be homogenous and prevent sorting to ensure the cows digest the total ration. Moisture and roughage content, the roughage sources and cut length of the roughages are particularly important in this context. When roughages are too long, they will not be ingested and the diet will lack sufficient fibre which may result in metabolic disorders. Roughages that are cut too fine will constrain the formation of an effective rumen mat and limit anaerobic fermentation in the rumen. Without proper anaerobic rumen fermentation, the nutritional value extracted from the diet will be reduced; animal performance will be constrained and the risk for associated metabolic diseases, increased. When total mixed rations (TMRs) are prepared, the homogeneity of the diet must be managed carefully to ensure that every ingredient considered in the formulation ends up in the rumen. Modern, advanced diet formulation models take the chemical and physical attributes of feed ingredients into account when diets are composed. However, palatability and ensuring that the feed is eaten properly remains an art and cannot be readily measured. Many of these feed formulation models are continuously upgraded with the latest research findings to improve the accuracy of cow requirement calculations and the prediction of milk production. These models add great value to predicting the amino acid profile of a specific diet and actual quantity of amino acids available to the cow. Essential amino acids are often a limiting factor in diets for high-production dairy cows. The balance of raw materials available to use in the diet, as well as amino acid contributions from microbial protein (that is derived from the rumen) affects the total amino acid supply. Modulation of rumen function and predicting nutrient supply from the rumen has a marked effect on animal performance.

Cows must spend sufficient time lying down to achieve maximum milk yield, but will not do this if they are hot. On many occasions, too little time and effort is spent to create comfortable, cool areas where cows would want to lie down and rest, ruminate and produce milk. As production demands increase, the management of cow comfort should improve concurrently.

**Accurate information**

As the size of dairy operations increase, the need for timeous and accurate management
Dairy management technology not only aims to improve the prevention of disease, but also measures parameters that allow healthy animals to perform according to their genetic potential and remove those constraints imposed by ineffective management. Daily individual milk recording, milk component monitoring, pedometers, automatic oestrus detection, early ketosis identification and daily body weight measurements contribute significantly to providing timeous management information that allows early intervention when necessary.

Further theoretical dairy management technologies that have been proposed include lying behaviour, feeding behaviour, ruminal pH, heart rate, animal positioning and activity, udder surface temperatures and respiration rates. Many may regard investing in this technology as prohibitively expensive. This may be true, however, in many cases the challenge lies in extracting and interpreting the data available within the management system.

Dairy management is considered a hands-on job that requires direct involvement of the senior managers to ensure that a large number of routine tasks are performed correctly and on time. For this, they rely heavily on their own experience and judgement and often spend little time on interpreting the data within the management system. However, if the available data could be evaluated thoroughly, it will markedly contribute to achieving optimal conditions for the cows to reach their genetic potential.

Physiological disturbances associated with metabolic diseases such as sub-acute rumen acidosis, negative energy balance and ketosis in early lactating cows could be identified earlier and corrected before the cow becomes acutely ill. Even regular challenges such as mastitis can be properly managed by early detection. A further benefit is accurate heat detection to prevent intercalving periods extending beyond the guidelines for that farm.

One cannot replace the skill, judgement and stockmanship of experienced dairymen by technology. Modern technology does, however, strengthen the management capabilities of these skilled people and will contribute to improved profitability when it is properly applied and used to support the subjective judgement of humans.

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