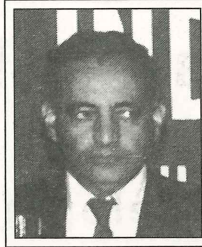


Research and Product Development¹

Global research efforts in dairy production and development of new products are concentrating on the application of feeding strategies, molecular genetics and reproductive technologies to improve lactational performance and milk quality. In developing countries, the emphasis currently is to increase the quality and quantity of milk produced. Whereas, in developed regions an additional focus is to increase the supply of essential amino acids and fatty acids, so as to satisfy the nutrient requirements of genetically improved high producing dairy cows. There is also a continued interest and debate about the nutritional quality and properties of milk. For example, the composition of milk fat is questioned with respect to its fatty acid composition and the relatively high level of saturated fat e.g., myristic & palmitic acids, which are responsible for elevating low density lipoproteins — a risk factor in heart disease. To offset these criteria, dairy food companies have developed an enormous range of low fat and fat modified products — these trends will continue into the future. In addition, as our nutritional knowledge expands, new specific micronutrients are being identified, which are involved in gene regulation, fat deposition, immune response and disease prevention. Therefore, there will be opportunities to design feed/food supplements both for animal and humans that will provide such specific nutrients.

For example, in the dairy cow feed supplements will be designed to influence lactational performance, herd health and also result in the production of milk with specific nutrient qualities e.g., enhanced proportions of n-3, n-6 and conjugated fatty acids. Milk processors will have at their disposal milk with a



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range of fat characteristics. This will facilitate the production of dairy products containing specific nutrients that are designed for consumers with varying predisposition to disease e.g., heart problems, obesity etc. The foundations for India to be involved in such feeding strategies commenced about three years ago with the establishment of a collaborative research project involving NDDB, CSIRO and ACIAR.

This research resulted in “optimising” the bypass content of by-product feeds, such as rapeseed meal and sunflower meal, to provide additional essential amino acids, the precursors for an additional litre of milk (with a net profit of Rs. 10) per animal per day (Gulati *et al*, 2002a).

The project culminated in a production unit being set up at the cattle feed plant at Itola, Gujarat, in September 2002 — currently commercial-scale trials are in progress.

In parallel studies in Australia, feeding protected nutrient supplements comprising protein, fish oil, canola/soybean and conjugated linoleic acids on a pasture or a feed-lot diet significantly increased the levels of oleic (C_{18:1 cis}), linoleic (C_{18:2}), linolenic (C_{18:3}), conjugated linoleic acids (CLAs), eicosapentaenoic-EPA (C_{20:5}) and docosahexaenoic-DHA (C_{22:6}) in milk fat. There were reductions in the saturated fatty acids i.e., myristic (C_{14:0}) and palmitic (C_{16:0}) (Gulati *et al*, 2002b, 2003).

Feeding rumen protected CLAs decreased milk fat content by approximately 30% and this re-partitioning of nutrient, has the potential to significantly enhance the efficiency of milk production (Bauman *et al*, 2001; Gulati *et al*, 2001). In human nutrition trials, the consumption of butter enriched with C₁₈ unsaturated

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fatty acids significantly reduced the level of low-density lipoprotein plasma cholesterol (Poppitt *et al*, 2002). In respect to its physical properties this modified butterfat was softer and spreadable from the refrigerator.

It is now possible to design and feed rumen protected fat and protein supplements that will produce meat and milk products with optimal nutritional qualities; it is likely that these products will require a small price premium to offset the cost of production.

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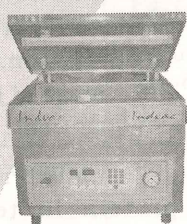
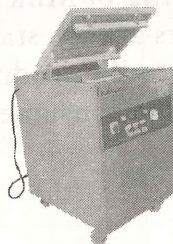
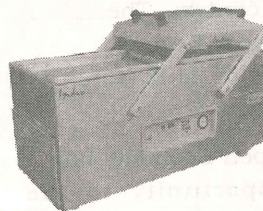


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