VARIATIONS IN LIPID COMPOSITION OF PERENNIAL RYEGRASS (*LOLIUM PERENNE*) AND BARLEY (*HORDEUM VULGARE*) WITH SPECIAL REFERENCE TO GALACTOLIPIDS

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By

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I N T R O D U C T I O N

In New Zealand, dairy cows are fed mainly on pasture *in situ*. This is in contrast to feeding practices in other countries where lactating cows are nor ally fed diets containing appreciable proportions of food products, other than fresh pasture. Although lipids form only 4 - 6% of the dry weight of leaf tissue (Hilditch and Williams, 1965) it has been estimated that a cow by eating 9 Kg. of dry matter of grass per day may consume up to 700 g. of lipid (Hawke, 1963). The nature of the dietary lipid and its modification in the rumen (Reiser and Reddy, 1956) is of particular interest as it may influence the composition of the depot and milk fats of ruminants. Only a few investigators have studied possible relationships between the composition of the milk fat and dietary lipids when ruminants are fed entirely on pasture species. (McDowall and McGillivray, 1963; Hawke, 1963). The latter worker demonstrated that young succulent short rotation ryegrass (*Lolium multiflorum* x *Lolium perenne*) contained a higher content of lipid (% of dry wt.) than mature grass which contained appreciable stalk material. Furthermore the lipid from the new growth contained higher proportions of linolenic acid and lower proportions of linoleic and palmitic acids. When pairs of monozygous twin cows were grazed on these two types of pasture, the cows feed on the young grass had higher levels of unsaturated fatty acids in the milk fat. This was thought to be related to higher levels of unsaturated fatty acids in the young grass and to the degree of hydrogenation of the unsaturated fatty acid components of the dietary lipid in the rumen.

A large proportion of the dietary lipid of ruminants fed on pasture would consist of galactosyl glycerides since these components are the major lipids of photosynthetic tissue (Weenink, 1961; Sastry and Kates, 1964). Consequently the comparative levels of galactosyl glycerides and changes in their fatty acid composition in L. perenne leaf tissue of varying age has been investigated. The present investigation also includes a study of the effect of the light environment on the levels and composition of lipid, especially the galactolipids, and on the biosynthesis of fatty acids.