A STUDY OF SOME ASPECTS OF THE METABOLIC PROFILE OF GRAZING DAIRY CATTLE IN NEW ZEALAND

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ABSTRACT

Groups of cattle on three dairy units at Massey University were sampled on a monthly basis for a period of twelve months to collect data on 11 blood parameters that would provide the basis for a metabolic profile for grazing dairy cattle in New Zealand. The parameters selected were those initially in the 'Compton Profile' i.e. haematocrit, haemoglobin, total protein, albumin, urea nitrogen, glucose, sodium, potassium, magnesium, calcium and inorganic phosphate.

Comparison between the Massey and the U.K. results revealed that haematocrit and haemoglobin values were lower and serum total protein, urea nitrogen and glucose values higher than the comparable figures for the U.K. and almost all parameters for the New Zealand data were more variable. Possible reasons for differences were discussed.

The design of the investigation permitted the estimation of a number of sources of variation, namely season, lactation and age. To obtain additional information a further herd was sampled for another year and in another location. Seasonal variation occurred with most parameters although this was minimal with sodium and potassium. The seasonal variation in haematocrit and haemoglobin followed a consistent pattern with high values in winter and summer and low values in autumn and spring. Urea nitrogen values showed marked changes which followed the variation in pasture protein content but which were apparently modified by the amount of feed offered. In the case of other parameters seasonal change appeared to be minor and/or inconsistent; nevertheless it could at times be important, e.g. low serum magnesium in the spring in one herd only.

Stage of lactation appeared to have little influence on the values recorded except at times of peak lactation when nutritional insufficiency was also present. Inorganic

phosphate and calcium showed a decrease with age and globulin showed an increase; the extent of these changes was relatively small. Age had minimal influence on all other parameters measured.

In an attempt to define other factors contributing to the variation observed an additional two investigations were carried out: the first where sets of identical twin cows were sampled daily for three consecutive days each month for thirteen months; the second where two hourly samples were collected for a 12 day period from cattle which were housed, and fed and milked on a rotation which allowed the effects of diurnal variation (if any) and the influence of these two variables to be separated.

Monthly changes in the values of the parameters, which represent the combined effects of season and lactation, was an important source of variation in all cases but daily variation was found to be relatively unimportant. Significant genetic effects were observed with haematocrit and haemoglobin, to a lesser extent with urea nitrogen, total protein and albumin, and to a minor extent with glucose, potassium,calcium and inorganic phosphate.

Significant diurnal rhythms were observed with sodium, calcium and inorganic phosphate, with the latter two tending to move together. Time since milking was relatively unimportant as a source of variation.

Time since feed was first offered was an important source of variation in the case of haematocrit, haemoglobin and inorganic phosphate while the amount of feed consumed was important with haematocrit, haemoglobin, total protein, albumin and calcium.

Despite the efforts that were made to standardise procedures throughout the entire investigation, and to partition the total variance to a number of likely sources, the residual variation remained high. Further investigations are warranted

to define further the factors that contribute to this residual variation before the potential of the 'metabolic profile' as a diagnostic tool can be properly exploited.

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