RELATIONSHIP BETWEEN TEMPERATURE HUMIDITY INDEX AND CONCEPTION EFFICIENCY OF DAIRY CATTLE IN QUEENSLAND

M.R. McGOWAN[A], D.G. MAYER[B], W. TRANTER[C], M. SHAW[D], C. SMITH[E] and T.M. DAVISON[F]

[A] The University of Queensland, Dept of Farm Animal Medicine and Production, St. Lucia, Qld 4072
[B] Dept of Primary Industries, Animal Research Institute, Yeerongpilly, Qld 4105
'Tablelands Veterinary Service, PO Box 43, Malanda, Qld 4885
[D] Karalee Karana Downs Veterinary Surgery, Chuwar, Qld 4306
[E] The University of Queensland Farm Animal Practice, Dayboro, Qld 4521
[F] Dept of Primary Industries, Mutdapilly Research Station, MS 825, Ipswich, Qld 4305

Decreases in first service pregnancy rate and increases in number of services per pregnancy have been observed in dairy cattle maintained under environmental conditions of high ambient temperature and relative humidity (Ingraham *et al.* 1974). The objective of this study was to determine the threshold temperature humidity index (THI) value, above which conception efficiency is depressed in dairy cattle maintained in either a tropical upland, or subtropical coastal environment.

Reproductive performance data from 92 dairy herds which used computerised herd health programmes (Advice or DairyMan) were analysed for the period June 1993 to May 1995. Sixty-three herds were located on the Atherton Tableland, 19 herds in the Brisbane Valley and 10 herds in the Dayboro district. For each region data were collated by season for first service pregnancy rate and number of services per pregnancy. Mean seasonal THI values for each region were derived from long term Bureau of Meteorology data. Relationships with THI were fitted via weighted nonlinear regression using Genstat 5, with the weights being the number of cows used in the estimation of each point. Exponential and bent-stick models were tried, with the latter preferred as it gave better fits to the data, and also provided an estimate of the 'break-point' THI value, above which conception efficiency was depressed (Figure 1).

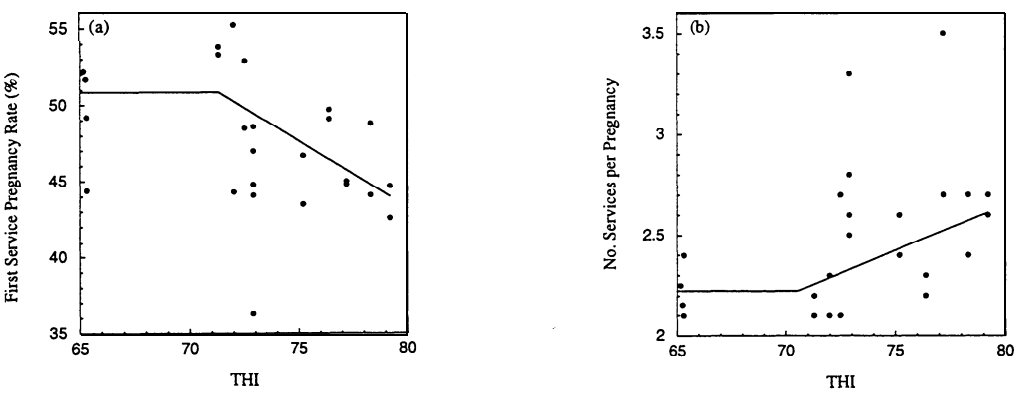

Figure 1. Relationship between temperature humidity index (THI) and (a) percentage first service pregnancy rate, and (b) average number of services per pregnancy

Figure 1 demonstrates that an increase in THI above a value of about 72 (eg, 25^{0}C at relative humidity 50%) will result in a significant ($P < 0.05$) decrease in first service pregnancy rate and an increase in number of services per pregnancy. This finding is consistent with results from overseas studies of the effects of heat stress on the reproductive performance of dairy cattle.

Financial assistance by the Dairy Research and Development Corporation is acknowledged.

INGRAHAM, R.H., GILLETTE, D.D. and WAGNER, N.D. (1974). *J. Dairy Sci. 57:* 476-81.