Environmental factors affecting the apparent metabolisable energy of feed wheat in broiler diets

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Establishing procedures for identifying low AME wheats would greatly benefit the poultry industry, allow for better selection and marketing of high AME wheats, and enable more accurate feed formulation. There is evidence that the physicochemical properties of barley are affected by climatic conditions (Willingham *et al.* 1960). Similarly, wheat grown in cool and moist regions contained lower levels of non–starch polysaccharides (NSP) than that given in hotter and drier conditions (Coles *et al.* 1997). Choct (1995) speculated that heat stress during grain filling may be responsible for the high level of NSP in low AME wheat. These observations suggest that high AME wheat may be grown under favourable environmental conditions.

Wheats from the 93/94, 94/95, 95/96 and 96/97 season were assayed for AME, using feeding trials. Monthly rainfall and temperature data were obtained from the Bureau of Meteorology. The AME for a total of 40 wheat samples (13 varieties, 35 sites) varied between 10.7 and 15.0 MJ/kg DM. A significant positive correlation between AME and total rainfall was observed (Table 1) for the months of January, September, December and for total annual rainfall ($r = 0.327$, $P<0.05$). An inverse relationship was observed between mean daily maximum temperature and the AME of 14 wheat samples (7 varieties, 12 sites) for all months of the year. In particular, correlations were highly significant for the months of January, February and December. These data suggest that cool and high rainfall growing conditions may favour the production of high AME wheats. The correlations observed in this study did not, however, allow accurate prediction of the AME of wheats. This suggests that rainfall and temperature *per se* are not the only factors affecting AME, and that other variables such as wheat variety or soil type may be responsible for the observed variation.

Choct, M. (1995). Role of soluble and insoluble fibre in broiler nutrition. Chicken Meat Research and Development Council—Final Report. Project Number CSN 2CM, CSIRO.

Coles, G.D., Hartunian–Sowa, S.M., Jamieson, P.D., Hay, A.J., Atwell, W.A. and Fulcher, R.G. (1997). Environmentally–induced variation in starch and non–starch polysaccharide content in wheat. *Journal of Cereal Science* **26,** 47–54.

Willingham, H.E., Leong, K.C., Jensen, L.S. and McGinnis, J. (1960). Influence of geographical area of production on response of different barley samples to enzyme supplements or water treatment. *Poultry Science* **39,** 103–108.

Table 1 Correlations between AME and mean daily maximum temperature (°C) and total monthly rainfall (mm).

	Temperature		Rainfall	
Month	**Range**	**Correlation**	**Range**	**Correlation**
Jan	22.7 – 39.0	–0.680, P<0.01	0 – 242	0.308, P<0.05
Feb	23.4 – 35.5	–0.665, P<0.01	2 – 147	NS
Mar	20.9 – 33.5	–0.469, P<0.1	0 – 69	NS
Apr	19.3 – 29.8	–0.379, P<0.2	0 – 55	NS
May	15.0 – 26.3	–0.396, P<0.2	1 – 108	NS
Jun	10.3 – 21.2	–0.409, P<0.2	12 – 140	NS
Jul	11.0 – 20.9	–0.355, NS	0 – 213	NS
Aug	12.4 – 22.5	–0.319, NS	0 – 80	NS
Sep	13.5 – 23.9	–0.425, P<0.2	13 – 136	0.331, P<0.05
Oct	15.6 – 27.4	–0.436, P<0.2	4 – 124	NS
Nov	18.0 – 30.8	–0.490, P<0.1	0 – 221	NS
Dec	20.3 – 33.7	–0.690, P<0.01	0 – 177	0.426, P<0.01

NS: No significant correlation.