

THE EFFECTS OF TEMPERATURE ON THE DIGESTIBILITY OF DIETARY ENERGY AND NITROGEN IN GROWING PIGS

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Conflicting reports exist on the effects of ambient temperature on the digestibilities of energy and nitrogen in the pig (Holmes 1973,1974). The current work was undertaken to investigate the influence of level of dietary energy and protein on their digestibilities at near-optimal and at elevated temperatures.

Digestible energy and nitrogen retention were measured on four diets (Table 1) incorporating the following high (H) and low (L) concentrations of energy (MJ/kg DM) and crude protein (g/kg) respectively: 14.5, 207; 14.1, 167; 13.0, 174; and 12.6, 147. Four Large White x Landrace pigs (32kg) were held at $21 \pm 1^{\circ}\text{C}$ in metabolism cages and pair fed to similar pigs housed at $35 \pm 1^{\circ}\text{C}$. After ten days of acclimation each pig at 35°C was offered one of the four diets at amounts of $120 \pm 0.75 \text{ kg/day}$. Pigs at 21°C were fed exactly the same amount of feed as consumed by their counterparts at 35°C on the previous day. Each diet was fed for five days, during which time total collections of urine and faeces were made. Ferric oxide (10g) was fed to identify the faeces on days one and five. The design was a 2×2 replicated Latin Square and the data were subjected to analysis of variance.

TABLE 1 Means of dry matter intake (DMI), apparent digestibilities of dry matter (ADDM), energy (ADE) and nitrogen (ADN), total nitrogen retained (TNR) and nitrogen retained as a percentage of that ingested

	DMI (g/d)	ADDM (%)	ADE (%)	ADN (%)	TNR (g/d)	TNR (%)
35°C	4417	74.2 ^a	73.9	79.7	52.4 ^a	42.8 ^a
21°C	4414	73.1 ^b	73.3	78.9	48.0 ^b	38.9 ^b
LSD (5%)	93	1.0	1.1	1.3	3.4	2.2
Diet HH	4599 ^a	78.7 ^a	78.4 ^a	81.6 ^a	58.3 ^a	38.3
HL	4352 ^b	77.4 ^a	76.8 ^a	78.6 ^b	46.2 ^b	39.7
LH	4498 ^a	69.0 ^b	69.5 ^b	79.5 ^b	54.5 ^a	43.3
LL	4214 ^c	69.6 ^b	69.8 ^b	77.4 ^b	41.7 ^b	42.2
LSD (5%)	131	1.4	1.6	1.9	4.8	3.1
Period 1	4165 ^c	72.2 ^c	72.3 ^b	77.4 ^b	47.9	41.3
2	4212 ^c	73.4 ^{bc}	73.4 ^{ab}	79.2 ^{ab}	48.6	41.5
3	4460 ^b	74.9 ^a	74.9 ^a	80.4 ^a	51.1	41.4
4	4825 ^a	74.2 ^{ab}	73.8 ^{ab}	80.2 ^a	53.1	39.3
LSD (5%)	131	1.4	1.6	1.9	4.8	3.1

Means with different superscripts differ significantly ($P < 0.05$)

Table 1 indicates that ADDM and TNR were both higher at 35°C than at 21°C . There were no significant interactions. ADDM and ADE were significantly greater on the high energy diet than on the low one, but the corresponding differences in the nitrogen parameters were not significant. TNR (g/day) was higher on the high protein diet ($P < 0.05$). There was a clear effect of acclimation (period), due in part to an increase in feed intake with increasing liveweight.

Since ADN was the same at both temperatures the increased TNR at 35°C was due to a higher utilization of dietary nitrogen. ADDM increased by about 1% per 10°C increase in ambient temperature.

HOLMES, C.W. (1973). *Anim. Prod.* 16: 117.

HOLMES, C.W. (1974). *Anim. Prod.* 19: 211.

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