This method, a combination of paper chromatography and fluorescent spectrography, facilitates greatly the detection of minute quantities of 3,4-benzpyrene and other fluorescent substances with a characteristic band spectrum, as in this way it is possible to avoid elution and subjecting the solution to spectrographic analysis.

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PHYSIOLOGY

Effect of Feeding Two Levels of Dietary Calcium on the Growth of Broiler Chickens

The dietary requirements of calcium for chickens 0–18 weeks of age has been stated by the U.S. National Research Council[1] to be 1·0 per cent of the diet. In the United Kingdom commercial broiler rations contain at least 1·0 per cent but may contain up to 1·4 per cent. Davis[2] has presented evidence taken mainly from laboratory animal experiments indicating that the utilization of dietary protein, fat minerals, and vitamins may be reduced appreciably when the dietary calcium-level exceeds 1·0 per cent. When there is a limited intake of these nutrients, the inclusion of a high level of calcium in the diet may result in a clinical deficiency of them.

During the course of a large-scale experiment conducted by us it was possible to compare the effect of a diet containing approximately 0·8 per cent calcium with that of a diet containing approximately 1·3 per cent calcium on the rate and efficiency of gain of broiler chickens from one day to ten weeks of age. The results of this experiment provide further evidence that the efficiency of utilization of nutrients may be affected by the level of dietary calcium.

The experiment was conducted during March–May 1960 in a commercial-type broiler house designed to accommodate thirty pens, each housing one hundred and fifteen chickens from day old to ten weeks of age. Fifteen pens were allocated at random to a commercial broiler ration containing 1·35 per cent calcium, and the other fifteen pens of chickens were fed the same commercial ration with 0·83 per cent calcium. The latter ration was prepared by excluding calcium carbonate which normally was included to bring the level of calcium up to 1·0 per cent and above. The average levels of protein, calcium and phosphorus determined from five samples of each of the two rations are given in Table 1.

The average gain in live-weight, the average food consumption, and the average food conversion efficiency observed for the first six weeks and for the total ten weeks of the experiment are presented in Table 2. The birds fed the 0·83 per cent calcium diet grew 3·4 per cent faster up to six weeks and also up to ten weeks of age than the birds fed the 1·35 per cent calcium diet. These increases in gain were highly significant ($P<0·001$). Over the first six weeks there was no significant difference in food consumption, but over the total ten-week period the birds on the 0·83 per cent calcium diet consumed 2·7 per cent less food than the birds fed the 1·3 per cent calcium diet. This result was highly significant ($P<0·001$).

Over the six-week and ten-week stages, respectively, the birds fed the 0·83 per cent calcium diet converted their food 3·1 and 5·9 per cent more efficiently than the birds fed the 1·3 per cent calcium diet. Again these results were highly significant ($P<0·001$).

The birds were slaughtered at ten weeks of age, and the resulting carcases were graded according to normal commercial standards. The resulting data are presented in Table 3. There was no significant difference in the percentage of grade *A* or grade *B* carcases from the two experimental groups. However, the average carcase weight of birds fed the 0·83 per cent calcium diet was 3·9 per cent higher than that of the birds fed the 1·35 per cent calcium diet. This highly significant difference ($P<0·001$) resulted wholly from the increased weight of grade *A* carcases, since the weight of grade *B* carcases was not significantly affected.

Table 1. Levels of Crude Protein, Calcium and Phosphorus in Rations

Ration	Crude protein (per cent)	Calcium (per cent)	Phosphorus (per cent)
0·8 per cent calcium	24·38 ± 0·49*	0·83 ± 0·08	0·52 ± 0·02
1·3 per cent calcium	23·63 ± 0·55	1·35 ± 0·11	0·58 ± 0·01

* *S.D.*

Table 2. Average Live-weight Gain, Food Consumption and Food Conversion Efficiency to Six Weeks and Ten Weeks of Age

Ration	Average gain (lb.)	Average food consumed (lb.)	Average food consumed/lb. live-weight gain (lb.)
	0–6 weeks		
0·8 per cent calcium	1·784*	3·606	2·022*
1·3 per cent calcium	1·725	3·601	2·087
S.E. of difference	± 0·014	± 0·047	± 0·017
	0–10 weeks		
0·8 per cent calcium	3·702*	9·334*	2·522*
1·3 per cent calcium	3.580	9·593	2·680
S.E. of difference	± 0·026	± 0·070	± 0·012

* $P < 0·001$

Table 3. Carcase Quality Data

	0·8 per cent calcium diet	1·3 per cent calcium diet	*S.E.* of difference
Percentage of 'Grade *A*' carcases	78·0	82·4	± 2·29
Percentage of 'Grade *B*' carcases	22·0	17·6	± 2·29
Average weight of all carcases (lb.)	3·23*	3·11	± 0·02
Average weight of 'Grade *A*' carcases (lb.)	3·18*	3·06	± 0·02
Average weight of 'Grade *B*' carcases (lb.)	3·33	3·38	± 0·07

* $P < 0·001$.

It should be noted that although the 0·83 per cent calcium diet averaged 0·75 per cent more protein than the 1·35 per cent calcium diet, it is unlikely that this extra protein would have produced the effects which we have attributed to the difference in level of calcium.

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