Research Note

THREE DIETARY PROTEIN LEVELS IN THE PRODUCTION OF SQUAB BROILERS[1]

Broiler chick production has been one of the fastest growing agricultural enterprises in Puerto Rico in recent years, yet even with this increase in local production the majority of the poultry meat consumed on the island is still imported.[2] The conventional broiler cycle from hatching to processing lasts about 7 weeks. Use of a shorter cycle to obtain better tasting meat of lower fat content and more efficient feed conversion might be a beneficial alternative for some local producers. Optimal feeding practices for short-cycle chick production under local conditions might differ in some respects from those used in the conventional cycle. The objective of the experiment reported here was to test isocaloric diets with three different crude protein (CP) contents for chicks processed at 4 weeks of age.

One-day old chicks of a commercial line, vaccinated against marek, chickenpox, aviar tensionavities, New Castle and infectious bronquitis, were brought to the Agricultural Experiment station in Lajas in mid October. One week before the arrival of the chicks, the housing facility was thoroughly cleaned and disinfected. Upon initial weighing, the chicks were divided into three groups of 67 each and placed in pens bedded with rice hulls and equipped with suspended watering troughs. Artificial heating was provided in each pen by means of a four-incandescent-bulb (60 watts) heater.

At night the shed also was artificially lighted. Feed in the form of 4 mm diameter pellets was weighed and placed in a metal tray on the floor. For 6 days each group was fed ad libitum one of the experimental diets A, B and C (table 1), formulated to contain 20, 23 and 26% CP, respectively, and 3.14 Mcal metabolizable energy (MEn)/kg on the as-fed basis.[3] This period of initial feeding was to allow the chicks to become accustomed to the experimental diets.

The study began by subdividing each of the original groups into three smaller groups of 20 chicks each to obtain three replications per treatment. Thus, 180 chicks in nine pens were used. Extra chicks not needed were eliminated from the experiment. The birds continued to receive the same diets as previously, except that feed was in mash form during the 3-week comparison period. Initial weights of the groups were recorded at this time for purposes of statistical evaluation. Artificial heating was discontinued. Suspended cylindrical feeders, periodically adjusted in height from the floor, were kept well supplied with the respective feeds. A sample taken from each lot of the diets was prepared for CP determination by micro-Kjeldahl procedures.

Before slaughter, feed was withheld from the chicks for 1 day and water was also withheld during the final hours. After liveweight (LW) determination the chicks were moved, one group at a time, to the nearby abattoir. At slaughter the carcasses were immediately subjected to standard processing and dressed carcasses, without giblets, were weighed before refrigeration. Statistical analysis of the data was by a one-factor analysis of variance, applicable to an experiment of completely random design.[4]

[1]Submitted to Editorial Board 11 October 1993.

[2]Boletín Informativo del Departamento de Agricultura de Puerto Rico, 1988. Ingreso Agrícola de Puerto Rico 1987-88.

[3]National Research Council, 1984. Nutrient Requirements of Poultry. 8th rev. ed. National Academy Press, Washington, D.C.

[4]Steel, R. G. D. and J. H. Torrie, 1980. Principles and Procedures of Statistics. 2nd ed. McGraw Hill Book Co., New York.

TABLE 1.—*Percentage formulas and analyzed crude protein content of the experimental diets*

Component	Treatment A	B	C
Ground yellow maize	67.52	58.42	49.32
Soybean meal	14.50	18.50	22.40
Tunafish meal	14.50	18.40	22.30
Vegetable oil	2.00	3.20	4.50
Salt	.50	.50	.50
Dicalcium phosphate	.40	.40	.40
Ground limestone	.30	.30	.30
Trace mineral and vitamin supplement	.20	.20	.20
Coccidiostat (Coban)	.08	.08	.08
Crude protein[1]	21.84	24.43	27.66

[1]Dry matter basis.

Mean initial LW at 7 days of age of the chicks assigned to treatments A, B and C were 97.3, 102.0 and 110.8 g. Table 2 presents treatment means during the 21-day comparison period. Treatment B (theoretically 23% CP diet) resulted in the greatest LW gain of 760 g, surpassing C and A by 13 and 34 g, respectively. Daily gains were 34.6, 36.2 and 35.6 g in A, B and C. These differences between treatments were not significant. Wilson et al.[5] showed the dietary protein levels as low as 12, 14, 16, and 18% had no significant effects on chick weight at 4 weeks of age.

Differences in feed intake (20-day total) were not significant. Although the feed-intake/LW gain ratio indicated best efficiency for treatment B, which required .02 and .09 g less feed per gram of gain than C and A, respectively, these differences were not significant. In treatments A, B and C 0.37, 0.39 and 0.45g of CP were consumed per gram of gain, respectively. Korelesky and Rys[6] found that the effi-

TABLE 2.—*Mean liveweight gain, feed intake, carcass weight and dressing percentage, and feed intake per unit increase of liveweight and of carcass weight.*

Criterion		Treatment A	B	C	SE
Liveweight gain per chick	(g)	726	760	747	10.2
Feed intake per chick	(g)	1369	1355	1356	26.4
Feed/gain ratio	(g/g)	1.88	1.79	1.81	0.03
Dressed carcass weight	(g)	528	548	537	6.65
Dressing percentage[a]		64.10	63.56	62.57	—
Feed/carcass ratio[a]	(g/g)	2.79	2.66	2.75	—

[a]Not analyzed statistically.

[5]Wilson, J. L. et al., 1984. Dietary protein levels for broiler breeder males. *Poultry Science* 63: 46. (Abstr.).

[6]Korelesky, J. and R. Rys, 1980. Effect of reduced dietary protein and amino acid levels on the performance of broiler chickens. Nutrition Abstracts and Reviews, Series B 50: 376.

ciency of converting dietary protein to LW gain was up to 30% greater with low-protein feeds (14.8% CP) than with higher ones (22.1% CP), but Nagabhushanam[7] reported that the said efficiency was best with 18 and 22% CP. The mortality rate during the comparison period was only 1.67%.

Differences in dressed carcass weight were not significant. Dressing percentage was highest for treatment A (64.10), while B and C had means lower by 0.54 and 1.53, respectively. These differences were not tested for statistical significance because they are too small to be of practical importance.

The most important conclusion to be drawn from these results is that a 22% CP diet, the level commonly used with broilers in the conventional cycle, is also satisfactory for use in 4-week cycles at the dietary energy level in question. The additional cost that a higher protein diet would entail is not justified. Although treatment B (analyzed 24.4% CP) resulted in the best LW gain, dressed carcass weight, and feed conversion ratio, the present data were insufficient to prove that these small differences were real. Even if real, the magnitude of the effects observed is too small to warrant a 3% higher dietary protein level, which would have a significant impact on least cost formulation. A combination of greater dietary concentrations of both CP and MEn might be beneficial and should be studied. With the management system used herein, it is possible to produce a Cornish hen-like chick with a mean LW of 850 g and dressed carcass weight of 540 g in a 4-week cycle.

Franklyn A. Salas
Department of Animal Science
Paul F. Randel
Department of Animal Science
José R. Latorre
Department of Animal Science

[7]Nagabhushanam, N., 1980. Studies on protein and energy relationships in the diet of starter chicks. Nutrition Abstracts and Reviews, Series B 50: 105.