Indian Journal of Animal Sciences 68 (6) : 580-581, June 1998

Multitrait selection indices in a broiler sire line

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Received : 22 January 1996; Accepted : 21 November 1997

Key words : Broiler, Feed conversion, Multitrait selection indices, Sire line

Broiler breeders are usually interested in developing a broiler which may yield maximum weight at an early age. Economic returns in broiler is mainly governed by the economically important traits used in the construction of selection index. Hazel and Lush (1942) and Finley (1962) suggested that index selection for more than one trait was superior to tandem and independent culling level methods. The present study was undertaken to compare the relative efficiency of various selection indices in the first stage of sire line selection in broiler.

The investigation was conducted on 2 009 broiler chickens progeny produced from 72 sires and 360 dams (1:5). The chicks were obtained in 10 hatches taken at weekly intervals from last week of February to first week of May. Data collected on body weight at 6 and 8 weeks of age, dressed weight at 8 weeks (g), feed consumption, body weight gain (g) and feed conversion efficiency during 6 to 8 weeks, breast angle, shank length and keel bone length at 8 weeks (cm) were used for the construction of selection indices.

The data were corrected for hatch effects by least-square technique (Harvey 1975). The relative economic weights were

Table 1. Partial regression coefficients, expected response (g) and relative efficiency of indices for first stage of sire line

Indices	Body wt. 6 weeks	Body wt. 8 weeks	Feed consumption	Body wt. gain	Feed conversion efficiency	Breast angle	Shank length	Keel bone length	Dressed weight	R_{II}	DH	Relative efficiency (%)
I_1	0.115 (11.790)	0.108 (14.465)	--	--	--	--	--	--	--	0.333	26.355	42.73
I_2	0.143 (11.764)	0.146 (14.611)	0.012 (0.990)	--	--	--	--	--	--	0.333	35.365	57.34
I_3	0.098 (11.996)	0.127 (14.651)	--	--	6.100 (-0.002)	--	--	--	--	0.337	26.645	43.20
I_4	--	--	0.050 (5.199)	0.023 (3.242)	-2.540 (-0.008)	--	--	--	--	0.206	8.433	13.67
I_5	0.116 (11.790)	0.110 (14.573)	--	--	--	--	-1.547 (0.026)	--	--	0.333	26.389	42.79
I_6	0.111 (11.869)	0.101 (14.613)	--	--	--	--	--	4.605 (0.014)	--	0.335	26.523	43.00
I_7	0.115 (11.825)	0.105 (14.579)	--	--	--	0.492 (0.160)	--	--	--	0.334	26.564	43.07
I_8	--	0.091 (13.970)	--	--	--	0.303 (0.142)	-0.991 (0.024)	3.503 (0.038)	--	0.316	14.174	22.98
I_9	--	--	--	--	--	0.040 (0.143)	0.064 (0.010)	0.080 (0.019)	--	0.210	0.172	0.28
I_{10}	0.189 (15.026)	0.079 (20.742)	--	--	--	--	--	--	0.243 (25.907)	0.421	61.675	100.0

Values in parentheses are expected genetic gain, wt = weight.

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assumed to be one for all the traits. The index coefficients and variance were calculated by the method of Falconer (1981). The accuracy of index (R_{IH}) aggregates, genetic economic worth in units (ΔH) and expected genetic gain (ΔG) were calculated (Harris 1964).

The indices constructed for the first stage of sire line selection are given in Table 1. The index I_{10} incorporating the traits body weight at 6 and 8 weeks and dressed weight at 8 weeks was the most efficient. The improvements in the expected genetic gain per generation for the above traits by this index were 15.03, 20.74 and 25.91 g respectively. The R_{IH} (0.421) and ΔH (61.68) values of this index were highest.

The index I_2, with ΔH value (35.365) was the second efficient index. This index was constructed with body weight at 6 and 8 weeks of age and feed consumption from 6 to 8 weeks. The expected genetic gains by this index were 11.76, 14.61 and 8.99 g, respectively, for these three traits. The R_{IH} value of this index was 0.333. The result of this index agrees well with Pym and Nicholls (1979).

The index I_3 constructed on the basis of body weight at 6 and 8 weeks and feed conversion efficiency from 6 to 8 weeks was the third in order of efficiency. The improvements in the expected genetic gain in the traits by this index were 11.996 g, 14.651 g and -0.002, respectively, per generation for the 3 traits. The results of various indices in this investigation agree with those reported by Chaudhary and Dev (1980), Sharma and Mohapatra (1982), Devroy *et al.* (1983), Singh and Mohapatra (1988), Bhushan *et al.* (1993) and Singh *et al.* (1996).

It may be concluded that the body-weight at 6 and 8 weeks, dressed weight at 8 weeks, feed consumption and feed conversion efficiency are more important traits for the selection of broiler chicks in the first stage of sire line. Therefore these traits may be used in the selection of parental stock of broiler sire line.

REFERENCES

Bhushan B, Singh R V and Singh C V. 1993. Construction of multitrait selection indices for first and second stages of dam line. *Indian Journal of Animal Sciences* **63** (4) : 471-74.

Chaudhary M L and Dev D S. 1980. Efficiency of selection for broiler weight at different ages. *Indian Journal of Poultry Science* **15** (3) 182-88.

Devroy A K, Mohapatra S C, Sharma R P, Singh B P and Johari D C. 1983. Relative efficiency of index selection for broiler weight. *Indian Journal of Poultry Science* **18** (1): 52-56.

Falconer D S. 1981. *Introduction of Quantitative Genetics*. 2nd edn. pp. 340. Longman, London.

Finley D J. 1962. Genetic gain under three methods of selection. *Genetic Research* 3 : 417-23.

Harris D L. 1964. Expected and predicted progress from index selection improving estimates of population parameters. *Biometrics* **20** (1) : 46-72.

Harvey W R. 1975. *Least-square Analysis of Data with Unequal Subclass Numbers*. Revised Monograph, USDA, Agricultural Research Service H-4.

Hazel L N and Lush J L. 1942. The efficiency of three methods of selection. *Journal of Heredity* **33** : 393-99.

Pym R A E and Nicholls P J. 1979. Selection for food conversion in broilers : Direct and correlated response to selection for body weight gain, food consumption and food conversion ratio. *British Poultry Science* **24** (1) : 73-86.

Sharma R P and Mohapatra S C. 1982. Efficiency of two stage index selection for selection of broiler parents. *Indian Journal of Poultry Science* **17** (2) : 157-63.

Singh B P and Mohapatra S C. 1988. Relative efficiency of mass and index selection in a broiler male line. XVIII World's Poultry Congress, Nagoya, September 4-9, Proceedings Japan Poultry Science Association. pp. 409-10.

Singh R V, Singh C V, Raj Kumar and Singh Devendra. 1996. Selection index for improvement of feed efficiency in broilers. XX World's Poultry Congress, New Delhi, India, September 2-5, Proceedings, World's Poultry Science Association, pp. 507-15.