

RECORDING IN POULTRY IMPROVEMENT

J. Digges

Steggles Pty. Ltd., Beresfield, N.S.W. 2322

Recording in Poultry Improvement has not received the attention that it deserves. It is a simple operation but it is frequently done inefficiently. The more complicated aspects of breeding tend to receive all the attention while recording systems are given insufficient planning and thought.

The cost of keeping records is considerable, but the cost of ineffective use of records is far greater due to reduced rate of improvement. In large integrated broiler production companies the potential for annual improvement in economic efficiency is in the order of \$1M. A recording system which is 10.0% inefficient reduces profitability i.e. costs the company, \$100,000 in the first year and \$200,000 in the second year etc. This cost is far greater than the cost of keeping records.

This article highlights reasons why records are not used to their full advantages, as well as looking at other aspects of recording.

RECORDING SYSTEMS

Recording for poultry improvement includes between-line comparisons and within-line comparisons. The between-line comparison is based on normal experimental technique and will only be dealt with briefly in this article.

WITHIN LINE RECORDING SYSTEMS

There are numerous basic systems. Each has its place in present day poultry improvement programs.

1. No Records

Useful if selecting for one trait only which has a heritability greater than .15. All individuals to be compared must be available at the same time and have experienced similar environmental effects. Birds are selected at the time of measuring the trait. The no-record system is low cost and effective in some circumstances.

2. Individual Records (No Pedigree)

If selection is for more than one trait or if measurement is over a period of time e.g. egg production, records are necessary. If heritability of all traits is greater than .15 pedigree records are not necessary. Index selection should be used in place of independent culling levels. This will normally require the use of a computer program.

3. Pedigree Records

If selection is based on traits of low heritability, less than .15, Osbourne's theory of family selection should be implemented and pedigree records are necessary. In poultry, in-breeding can be controlled by

avoiding full and half sib-matings with two mating groups. In any case there is no advantage in recording the pedigree beyond the immediate past generation.

MANUAL OR ELECTRONIC

Manual recording should play only a limited role in Poultry Improvement programs. Manual records are generally necessary at some stage but in an efficient program their use will be kept to a minimum. Recording direct onto magnetic tape in the shed, and the use of computers to extract the maximum amount of information from records are the current trend.

Computers are 100% accurate and their speed of operation permits far greater use of records. There still exists a reluctance to use computers due to a fear that the breeder will lose control of the situation. Also computers are very efficient at calculating the wrong results. The error here is due to the data put into the computer or the programmer. All work done by computers requires careful checking and the program should be written to make this possible.

To appreciate the value of computers in recording for poultry improvement we must look at the following points:

1. Cost of Recording

The use of computers and other electronic recording devices will generally not reduce the cost of recording but it will increase efficiency. Be sure that all information recorded is useful. We all tend to accumulate an amass of records even valueless ones. This is an unnecessary cost, and bad records are misleading and obscure the good records. Don't record traits with low heritability (< 0.1) and if pedigree information is not available, don't record traits if environmental variation is too high.

2. Cost of In-accuracy

In-accuracy of recording is due to :

- a) errors in copying records and calculations
- b) using wrong units for measurements.

The first type of error only occurs in manual recording systems. These errors can be overcome by careful checking, but in a poultry breeding program where the performance of several thousand individuals are recorded each week, time and cost do not permit sufficient checking. In manual systems it is common to have a 1% error at each stage of handling. The cost of these errors is calculated below:

Four stage recording system = 4% error
 Cost of rearing birds including meat value = \$2.00
 Cost per thousand birds recorded
 $4\% \times 2 \times 1000 = \80.00

This cost multiplied by the number of birds recorded each year justifies the cost of sophisticated recording equipment.

The size of the unit of measurement comes under the topic of measurement, but I include it here because it affects the value of the records. If the units used are too big, the records lose their value because too many birds fall into each unit. The desired unit can be calculated by using the standard deviation of the trait, the level of selection to be used and the tables for normal distribution.

To calculate the unit of measurement that will include 1% of the population at the critical point between selected and non-selected birds for a 10% selection, we first look at normal distribution tables.

Proportion Selected	Standard Dev. Units
9.5	1.779
10.5	1.732
	<hr/>
	.047

For chickens weight with standard deviation of approximately 150 gms., the required unit of measurement:

$$= .047 \times 150$$

$$= 7.0 \text{ gms.}$$

The unit of measurement is generally about 5% of the standard deviation. It will also be affected by the accuracy of measuring device and the trait.

3. Cost of Inefficient Use of Records

The inefficient use of records is probably the greatest cost or loss in the recording process. This can amount to hundreds or thousands of dollars per year in an intergrated poultry company, and may result in a company having to acquire other breeding lines or selling out. The maximum information must be extracted out of records and used in the selection program. The efficient use of records depends on three things.

- a) An exact knowledge of what has been recorded.

It is not sufficient to say that we have recorded growth rate. The value of the record is affected by the method of husbandry and measurement. The value of a record can be summarized by the heritability standard deviation and genetic correlation with all other economically important traits including those that have not been measured. These characteristics should be calculated or at least estimated for each set of records. The commercial value of the trait recorded greatly affects its value and how the record is used in a selection program.

- b) A sound knowledge of genetic theory is necessary in order to make efficient use of all the information mentioned in a) above. The only efficient way to select for more than one character is using index selection. Index selection is a technique which uses heritability, standard deviation, genetic correlations, and economic values to calculate the relative value of each performance record. Genetic theory also provides restraints to the breeding program to prevent inbreeding etc.

- c) The ability to do complicated calculations accurately and quickly is necessary if the factors mentioned in a) and b) are to be utilized. In other words, it is essential to use computers for efficient utilization of records.

BETWEEN LINE RECORDING SYSTEMS

The design of between-line comparisons is based on normal experimental technique. The first point that I wish to make is that the records kept for between-line comparisons are frequently of very limited value, because the environmental or random error is greater than the minimum economically-important difference and even greater than the total range of genetic differences. If the results are tested for significance, and discarded when there is no significant difference, the loss is only the cost of running the trial. If the results are accepted as showing true genetic difference when they only show chance difference the effect could be far worse.

The layer random sample tests currently being run in Australia all suffer from this problem. In the 25th N.S.W. test which has the best experimental design, the L.S.D. for gross income-rearing cost and CEMA was 64 cents at 5% level and 53 cents at the 10% level. From 9 entries the test only identified one entry as being superior and three entries being inferior to the five entries in the middle which could not be separated at the 5% level. One breed entered by two different hatcheries produced significantly different results.

The second point is to be aware of genetic-environment interactions (particularly nutrition). Interactions pose the insoluble problem of whether to compare breeds under standard conditions or to provide each breed with the conditions that best suit it.

Spend a lot of time on experimental design. Don't attempt the impossible. Be prepared to forget the results if they are not significantly different.

CENTRALIZED RECORDING SYSTEMS

A centralized recording systems is not required for within-line selection in the poultry industry. Each breeding unit is large enough to be self-contained.

There is a need for a centralized recording system for between-line comparison e.g. current random sample tests with increased scope for development entries. The cost of running these tests is high. If each breeding unit ran their own there would be unnecessary duplication.

CONCLUSION

Be sure you know exactly to what your records refer. Throw away useless records. Extract maximum value out of good records by using computers.

* * *