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Breeding Technology : Advantages of Increased Selection Pressure in Breeder

Selection pressure is an important issue for all segments of the turkey industry. For the primary breeding company, selection pressure is directly related to the amount of genetic improvement that can be achieved per generation. For the multiplier, the selection pressure exerted on parent stock breeder males will further enhance the potential of the final product. This fact sheet will illustrate the actual economic advantages of increased selection pressure in breeder males on the commercial final product.

Selection alternatives

As part of Hybrid's continuing program of testing for combining ability of different pure lines and testing of pedigreed poults under commercial conditions to ensure durability, we were able to analyze the performance differences between offspring derived from different groups of breeder males. Each group was formed as a selected percentage of breeder males out of the total available group (selection pressure); selection was done on basis of own performance data for body weight.

The results are given in Figures 1 & 2. The average body weight of final product offspring is plotted against the selected percentage of parent stock males as breeders. The graphs illustrate the effects on final product body weight of no selection within parent stock breeder males (100% of males kept) up to selection of only 14% kept as breeder males.

Theory in practice?

The theoretical effect of increased selection pressure in breeder males can be calculated using the following equation:

$$(\Delta \text{selection intensity} * \text{selection accuracy} * \text{standard deviation}) / 2$$

Δ Selection intensity is the difference between two selected groups of parent stock males in standard deviation units (in our case body weight). Since no selection pressure will be carried out in the parent stock breeder hens the equation includes a division by 2.

Let's examine how this theory works in practice, by comparing the final product performance of commercial Hybrid Converter toms sourced from two groups of breeder toms: one where 60% of the toms are kept as breeders and the other where only 30% is kept.

Percentage selected as breeder toms	60 %	30 %
Selection intensity	0.644	1.159
Accuracy (when selecting on basis of own performance data)	45 %	45 %
Standard Deviation (of the original unselected population)	1885g	1885g
Increase in body weight at final product level when selecting 30 % compared to 60 % as breeder toms	+218.4g	

The average body weight increase at 19 weeks of age can be calculated as follows:

As can be seen from Figures 1 & 2, the theoretical calculation closely matches the actual data derived under field conditions. Due to the variance that exists between and within growers, a 218.4g improvement may not seem significant. However, let's look at the big picture for an integrated company.

The 'big' picture

Let's assume a 5,000 hen breeder flock in production with a ratio of 15 hens per tom. What will the impact of increased selection pressure (30% versus 60%) in the breeder toms be on the economic performance of the whole company (parent stock plus final products)?

For this case 333 toms are needed for semen production. In order to keep 60% as breeder toms, 650 poult need to be placed; assuming 15% losses due to mortality and physical defects. If selection pressure is increased and only 30% will be kept as breeder toms, 650 additional poult are needed. At an assumed poult price of \$12.39 US and assuming that growing costs will be offset by meat revenues, this would mean an additional investment of **\$8,054.00**.

From Hybrid's database on reproductive performance of parent stock flocks (84 closed flocks over 2004), the average number of settable eggs per hen housed equals 93.7. Hatchability over 24 weeks of production averaged 80.4%. The 5,000 hens in production will therefore produce 376,674 poult.

The improvement in body weight due to increased selection pressure from both our theoretical and field results, was 218.4g per tom at 19 weeks of

age and 99.32g per hen at 15 weeks of age (Figure 2). This means **38,500.3 kg** extra live weight from commercial tom flocks at the end of the growing period (376,674 poult * 52 % toms * 90 % livability * 218.4g) and **17,193.5 kg** extra live weight from hen flocks (376,674 poult * 48 % hens * 95 % livability * 100.1g).

At an assumed price of \$0.32 US per pound (~\$0.705 US/kg), this represents an approximate **\$39,200.00** in additional revenue.

Even if only the top half of growers capitalize on this extra genetic potential, the additional investment of \$8,054.00 is still more than doubled in extra revenue!

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Figure 1: Selection Pressure in Parent Stock Toms
(Final product performance toms)

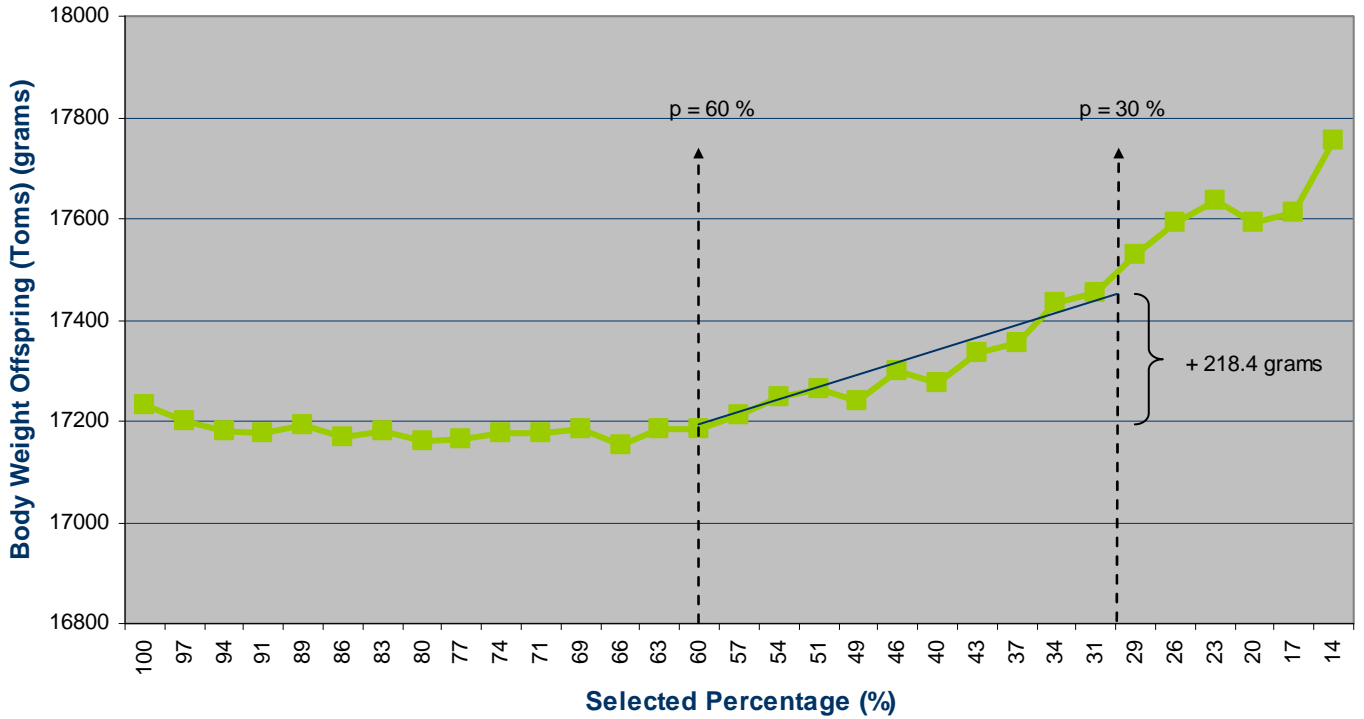


Figure 2: Selection Pressure in Parent Stock Toms
(Final product performance hens)

