

WHAT'S YOUR 'PEF'?

Does the U.S. broiler industry need a single numerical factor to compare live-bird performance among flocks? ■ by Simon Shane

Broiler integrators and producers in Europe, Africa and Asia use a "Production Efficiency Factor" (PEF) to compare the live-bird performance of flocks. This value (see Figure 1) incorporates live weight, age, liveability and feed conversion efficiency. Is a similar factor needed by the U.S. industry?

Under the system in Europe, a flock with acceptable growth and liveability parameters should attain 200 to 225 European PEF units. This single-figure facilitates comparison of performance within and among farms and can be used to assess environmental, climatic and managerial variables.

Since a PEF incorporates terminal weight and age (and hence growth rate), in addition to liveability and feed conversion efficiency, any adverse or beneficial effect relating to health, environmental stress or food quality will be reflected in the PEF. A low PEF value or a declining trend for a complex, region or farm indicates the need for precise evaluation of production parameters including a review of records, management and health to determine the possible causes of inferior production.

U.S. integrators have no single measure of live-bird performance. Commercial data recording systems rank complex performance by production cost expressed as cents per pound live weight as a measure of efficiency. The cost in cents per pound incorporates chicken and feed costs, grower remuneration and other inputs, as well as grow-out factors.

A U.S. production efficiency factor can be derived by paralleling components of the European PEF. The U.S. factor would take into account live weight (expressed in lbs.), age, liveability minus downgrades, age at depletion and the caloric conversion expressed as dietary energy consumed, in megacalories per pound of live weight (Figure 2).

Such a U.S. Production Efficiency Factor, as proposed here, was evaluated using 1997 data reflecting 135 respondents participating in a commercial performance ranking service. Live weight, age in days, caloric conversion and liveability (less whole-bird condemnation and 50 percent of parts condemnation) were tabulated for 14 complexes. These represented the first, tenth, twentieth through to 130th ranked entries.

Specific production efficiency factors were calculated using this U.S. PEF formula. Values ranged from a high of 359 to a low of 304. A regression analysis of variance was then performed against the 14 corresponding cost rankings, which ranged from 27.25 cents/lb. for the first ranked complex to 33.64 cents/lb. for the 130th complex. A correlation coefficient of -0.56 was calculated, indicating a moderate inverse relationship between the U.S. production efficiency factor and the production cost as reflected in the ranking of data by the commercial service (Figure 3).

Figure 1. Calculation of European Production Efficiency Factor

$$\frac{\text{Liveweight (kg)} \times \text{Liveability (\%)}}{\text{Age at depletion (days)} \times \text{Feed conversion efficiency}} \times 100$$

inserting realistic values: $\frac{1.85 \times 95}{44 \times 1.88} \times 100 = 212$

A U.S. performance efficiency factor would relate more directly to live-bird performance and be useful to evaluate flocks and identify deviations from accepted company standards.

Figure 2. Calculation of Proposed U.S. Production Efficiency Factor

$$\frac{\text{Liveweight (lb.)} \times \text{Liveability} - (\text{whole bird condemns} + 50 \text{ percent part condemns})}{\text{Age at depletion (days)} \times \text{Calorie conversion (megacalories/lb. live)}} \times 100$$

inserting realistic values: $\frac{4.77 \times 95.09}{46.8 \times 2.849} \times 100 = 340$

WHAT'S YOUR 'PEF'?

Figure 3. Comparison of Ranking of 14 Complexes on cost, Compared to Proposed U.S. Production Efficiency factor (PEF)

Complex Rank	Cost, cent/lb.	U.S. PEF
1	27.28	359
10	28.49	320
20	28.88	320
30	29.13	353
40	29.33	342
50	29.62	331
60	29.92	354
70	30.25	329
80	30.59	304
90	31.00	330
100	31.31	321
110	31.56	357
120	32.76	291
130	33.64	304
mean	30.269 ± 1.703	329.6 ± 21.44
correlation coefficient = -0.562		

A second evaluation was based on the nine sub-regions comprising eight to 16 complexes incorporating the data from 107 respondents. This analysis generated a mean PEF value of 329.1 with a standard deviation of 5.79. The range of values was 324 to 340. As with the previous analysis, a correlation coefficient of -0.38 confirmed the absence of a statistical relationship between live cost (cents/lb.) and the proposed U.S. production efficiency factor calculated from the live-bird parameters.

A single value incorporating live weight, age at depletion, caloric conversion and product of acceptable quality for processing (liveability minus condemnations) could be used in the USA to compare the performance of flocks. The negative correlation between cost ranking by a commercial service and the U.S. PEF is attributable to factors other than performance which influence the absolute cost of production and relative rank. Considering only the live weight cost expressed as cents per pound limits the scope of live-bird evaluation.

It is possible for managers to apply the cost data to compare complexes within a specific area of operation, or during a given season, provided that appropriate interpretation is applied, and with similar accounting conventions, non-biased data and cost structures. Such a U.S. PEF relates more directly to live-bird performance and, based on the experience with application of the European PEF, would be useful to live-bird managers and health professionals in evaluating flocks and identifying deviations from accepted company standards. ■

Dr. Simon M. Shane, Louisiana State University and Agricultural and Mechanical College, Department of Epidemiology and Community Health, School of Veterinary Medicine, 3110 Vet School, Baton Rouge, Louisiana 70803-8404; (504) 346-3335; Fax: (504) 346-3295