



North Carolina Cooperative Extension Service

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**REPORT ON PULLET REARING PERIOD
32nd NORTH CAROLINA LAYER PERFORMANCE
AND MANAGEMENT TEST¹**

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The North Carolina Layer Performance and Management Test is conducted under the auspices of the Cooperative Extension Service at North Carolina State University and the North Carolina Department of Agriculture. The flock is maintained at the Piedmont Research Station, Salisbury, North Carolina. Mr. Raymond Coltrain is Piedmont Research Station Superintendent; Mr. David Joyce is Resident Manager of the flock; Pam Jenkins, Statistical Research Technician; and Dr. K. E. Anderson is Project Leader. The purpose of this program is to assist poultry industry personnel in North Carolina, across the country, and internationally in the evaluation of commercial layer stocks and management systems.

The data presented herein represents the analysis of the rearing period for the 32nd North Carolina Layer Performance and Management Test. Performance summary tables are available examining open and closed housing types individually as well as the combined results.

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¹The use of trade names in this publication does not imply endorsement by the North Carolina Cooperative Extension Service of the products named nor criticism of similar ones not mentioned.

32nd NORTH CAROLINA LAYER PERFORMANCE AND
MANAGEMENT TEST
Volume 32 No. 2

Report on Pullet Rearing Period

Dates of Importance:

The eggs for the 32nd NCLP&MT were set on November 14, 1995 at the Piedmont Research Station (NCDA) Poultry Unit. The flock was hatched on December 6, 1995 and the pullets were moved to the laying facilities on April 9 and 10, 1996 during their 17th week of age. The age of the flock at transfer was lowered to approximately 17 weeks due to current trends in the industry and requests of the breeders to move the flock prior to excessive egg production in the rearing houses.

Experimental Design:

The test was a factorial arrangement of treatments and the main effects were strain and pullet housing. The analysis was divided by pullet and type of house, then data from both houses were pooled and analyzed.

Strain--Samples of fertile eggs were provided/acquired from the breeders according to the rules which govern the conduct of this test. All eggs were set and hatched concurrently (Hatch/Serology Report Vol. 32, No. 1). A total of nine white-egg and five brown-egg strains were entered in the test for a total of fourteen strains. At hatch the chicks were sexed to remove the males. Each strain was sexed according to breeder recommendations i.e. feather, color, or vent sexing. A minimum of 1000 white and brown-egg pullets/strain were started at the initiation of the test. However, if the number of pullets hatched were below the prescribed numbers, the chicks were divided as equally as possible between the two grow houses.

Pullet Housing--The chicks were randomly divided between two separate brood-grow houses with white-egg and brown-egg replicates being intermingled throughout. The white-egg strains occupied approximately 2/3 of each house and brown-egg strains occupied the other third of each house. All strains were assigned to be represented as equally as possible in all cage rows and cage levels in each house where applicable.

House 6 - is an environmental controlled, closed brood-grow facility with 4 banks of triple-deck cages. Each row and bank of cages were assigned a row number, and each 3-cage section within each row and level/row was assigned a replicate number. Each bank of cages were designated as blocks representing all in house environments for statistical analysis. Thus, each block consisted of two rows containing 48 replicates distributed over all levels. The white and brown-egg strain replicates were represented equally within House 6. The strains were assigned in the same manner to blocks 1 through 4 to insure that each strain was represented at approximately equal frequencies at each level in each block. Chicks were brooded in each level of cages on paper within each of the replicates within each row. Each cage [61 cm x 51 cm (24" x 20")] at each cage-level replicate was filled with 10 white-egg or 10 brown-egg (30 chicks per 3 cage replicate) on the day of hatch. The final rearing allowance of 310 sq cm (48 sq in) for all the white and brown-egg layers was established at day 1.

House 8 - is an open-sided brood-grow facility with six rows of 122 cm wide by 102 cm (48" x 40") deep single deck cages and each cage has been assigned a replicate number. The white-egg and brown-egg strain replicates were equally represented in House 8. The strains were assigned in the same manner to rows 1 through 6 to insure that each strain was represented at approximately equal frequencies in each row of cages. Forty white-egg and brown-egg females were started and grown in each replicate for a final rearing allowance of 310 cm² (48 in²) for the white and brown-egg layers.

Pullet Management and Nutrition:

Pullets were given ad libitum access to feed and feeders were resupplied by hand daily. Feed consumption and body weights were monitored bi-weekly beginning at 2 weeks of age. All mortality was recorded daily, but mortality attributed to the removal of males and accidental deaths from a replicate have been excluded from the 32nd NCLP&MT Grow Report from day 1 through 8. Starter (with Amprol at 454 g/ton), Grow and Developer diets are described in diet formulation section. Each pullet placed was provided with 1 kg per bird. Thus, the white-egg and brown-egg replicates in brood-grow House 6 (30 females) were given 31 kg of starter feed per replicate. The white-egg and brown-egg replicates in brood-grow House 8 (40 females) were given 41 kg of starter feed per replicate. Thereafter, all birds were placed onto the grower diet on which they remained until 12 weeks of age. From 12 weeks (Feb. 28, 1996) to approximately 17 weeks (April 4, 1996) of age, all strains were provided the developer diet.

Pullet Vaccination and Beak Trimming Schedule

Pullet vaccination and beak trimming schedules are outlined below. At 10 wk of age the pullet's beaks were evaluated to determine the extent of regrowth. Regrowth was extensive enough to warrant retrimming at 11 wk, therefore all pullets were retrimmed.

| <u>Age</u> | <u>Date</u> | <u>Event</u> |
|-----------------------|--|--|
| Hatch | December 6, 1995 | HVT Marek's Vac. by injection in neck |
| Day 10 | December 16, 1995 | Newcastle (Be) and Bronchitis (Mass.) via aerosol spray (Triple Vac) |
| Day 14 thru Day 16 | December 20, 1995 December 22, 1995 | Precision Beak Trim |
| Day 35 | January 24, 1996 | Newcastle (LaSota) and Bronchitis (Mass.) via aerosol spray (ComboVac) |
| Day 63 | February 7, 1996 | Newcastle (LaSota) and Bronchitis (Mass.) via aerosol spray (ComboVac) |
| Day 70 | February 14, 1996 | Fowl Pox and Avian Encephalomyelitis vaccination via the wing web |

| | | |
|---------|-------------------|--|
| Day 77 | February 21, 1996 | Pullets retrimmed to correct beak regrowth |
| Day 105 | March 21, 1996 | Newcastle (Lasota) and Bronchitis (Mass.) via aerosol spray (ComboVac) |

Lighting Schedule

The lighting schedule for the pullet facilities is outlined below:

| <u>Age</u> | | <u>Photoperiod (hrs/day)</u> | |
|-------------------|---------------------|-------------------------------|-------------------|
| | | <u>Controlled Environment</u> | <u>Open-Sided</u> |
| Days 1-2 | December 6-8, 1995 | 24 | 24 |
| Day 3 | December 9, 1995 | 23 | 23 |
| Day 5 | December 11, 1995 | 22 | 22 |
| Day 7 | December 13, 1995 | 21 | 21 |
| Day 9 | December 15, 1995 | 20 | 20 |
| Day 11 | December 17, 1995 | 19 | 19 |
| Day 13 | December 19, 1995 | 18 | 18 |
| Day 15 | December 21, 1995 | 17 | 17 |
| Day 17 | December 23, 1995 | 16 | 16 |
| Day 19 | December 25, 1995 | 15 | 15 |
| Day 21 | December 27, 1995 | 14 | 14 |
| Day 23 through | December 29 through | | |
| Week 17 | April 4, 1996 | 13 | 13 |
| Week 17 | April 4, 1996 | 14.5 | 14.5 |
| Move to lay house | April 1996 | 15 | 15 |

Diet Formulations

BROOD-GROW PERIOD DIETS

Diet¹ Identification

| Ingredient | Starter | Grower | Developer |
|-----------------|---------------|--------|-----------|
| | ----- % ----- | | |
| Corn | 58.15 | 61.98 | 65.65 |
| Soybean meal | 28.13 | 23.09 | 17.30 |
| Wheat midds | 4.50 | 5.93 | 7.80 |
| Oats | 4.96 | 5.00 | 4.96 |
| Limestone | 1.17 | 1.60 | 1.72 |
| Methionine | .25 | .12 | -- |
| Dicalcium Phos. | 1.67 | 1.73 | 1.79 |
| Salt | .25 | .25 | .25 |
| Vit. premix | .10 | .10 | .10 |
| Min. premix | .05 | .05 | .05 |
| Mold Inhibitor | .10 | .10 | .10 |
| Tracer | .05 | .05 | .05 |
| Lysine | .61 | -- | .22 |
| Protein % | 20.0 | 18.0 | 16.0 |
| ME kcal/kg | 2970.0 | 2970.0 | 2970.0 |
| Calcium % | 0.90 | 1.10 | 1.10 |
| T. Phos. % | .70 | .69 | .69 |
| Lysine % | 1.10 | .95 | .95 |
| TSAA % | .66 | .65 | .65 |

¹Diets in crumblized form.

Starter - Amprol was added at the rate of 454 g/ton of feed; each female fed 1.02 kg of starter.

Grower - fed through 12 weeks of age.

Developer - fed through 17 weeks of age or until moved to layer house.

DESCRIPTION OF DATA TABLE STATISTICS

Rearing period performance of white-egg and brown-egg strains are shown in Tables 1-9 and 10-18, respectively. Following are the descriptions of the observations taken throughout the rearing period. Data presented in this report will be in metric quantities.

Breeder (Strain):

Short identification of the breeder and strain of the stock. See more complete information in the table following the data tables.

Protein per Bird to 119 Days:

Calculated cumulative protein intake per bird to 119 days.

Metabolizable Energy per Bird to 119 Days:

Calculated cumulative metabolizable energy intake per bird to 119 days.

Feed Cost per Bird to 119 Days:

Calculated feed cost per bird to 119 days. Using average regional feed prices; Starter \$182.24/T; Grower \$165.43/T; Developer \$155.45/T.

Livability 1-119 Days:

The percentage of the birds housed which survived during days 1-119. Males and accidental deaths which were removed are excluded from the analysis of livability from day 1 through 8.

Body Weights (2, 4, 6, 8,....17 Weeks):

Bi-weekly average body weights of all birds within representative cages for these measurements were approximately 60 birds/strain/brood-grow house. Cages selected were, as much as possible, a representative sample from all cage levels, rows, and strains.

Feed Consumption (1-2, 3-4, 5-6,....17, 1-17):

Feed consumption per bird within the time periods indicated. The last column in the table is the cumulative feed intake per bird throughout the growing period. Estimated feed consumed is calculated using pullet days which compensates for males removed from the flock at any time.

Statistical Analyses and Separation of Means:

Analyses of variance were performed on all data using the GLM procedure SAS Institute (1989)². Separate analyses were conducted for white and brown-egg strains. Significant differences (P<.01) within white and brown-egg strains are noted by different letters among columns of means. Significant white-egg strains and pullet house effects are noted in Tables 1-3 for the closed pullet facility (House 6); significant interactions between white-egg strain and pullet house are noted in Tables 4-6 for the open pullet facility, and Tables 7-9 for the combined pullet rearing facilities. Significant brown-egg strains and pullet house effects are noted in Tables 10-12 for the closed pullet facility (House 6); significant interactions between brown-egg strain and pullet house are noted in Tables 13-15 for the open pullet facility, and Tables 16-18 for the combined pullet rearing facilities.

Metric Conversions

| | |
|-----------------|-----------------|
| 1 lb = 453.6 g | 1 g = .03527 oz |
| 1 lb = .4536 kg | 1 kg = 2.204 lb |
| 1 oz = 28.35 g | 1 g = 1000 mg |
| | 1 kg = 1000 g |

²SAS Institute, 1989. SAS® User's Guide: Statistics, Version 6 Edition, SAS Institute, Inc., Cary, North Carolina.

Table 1. Feed Consumption of White-egg Entries in Closed Housing, 32nd NCLP & MT

| Breeder | ----- (Week of Age) ----- | | | | | | | | | |
|--------------------|---------------------------|-------------------|-----|-----|--------------------|-------|--------------------|--------------------|-------------------|--------------------|
| | 1-2 | 3-4 | 5-6 | 7-8 | 9-10 | 11-12 | 13-14 | 15-16 | 17 ¹ | 1-17 |
| | ----- (kg per bird) ----- | | | | | | | | | |
| Hy-Line W-36 | .23 ^{BC} | .44 ^B | .47 | .64 | .68 ^{BC} | .73 | .76 ^{ABC} | .86 ^{BC} | .71 ^B | 5.52 ^C |
| Hy-Line W-77 | .23 ^{BC} | .41 ^{BC} | .49 | .68 | .72 ^{ABC} | .80 | .71 ^C | .88 ^{ABC} | .78 ^{AB} | 5.69 ^{BC} |
| Bovans White | .24 ^B | .43 ^{BC} | .48 | .65 | .73 ^{AB} | .77 | .79 ^{AB} | .88 ^{ABC} | .75 ^{AB} | 5.71 ^{BC} |
| H & N "Nick Chick" | .26 ^A | .50 ^A | .53 | .69 | .76 ^A | .80 | .79 ^{AB} | .90 ^{AB} | .82 ^A | 6.05 ^A |
| Shaver White | .23 ^{BC} | .42 ^{BC} | .46 | .63 | .73 ^{AB} | .80 | .79 ^{AB} | .89 ^{ABC} | .70 ^B | 5.66 ^{BC} |
| Shaver 2000 | .23 ^{BC} | .43 ^B | .50 | .68 | .77 ^A | .82 | .81 ^A | .92 ^A | .76 ^{AB} | 5.92 ^{AB} |
| ISA Babcock B300 | .21 ^D | .39 ^C | .49 | .65 | .73 ^{AB} | .75 | .74 ^{BC} | .89 ^{AB} | .81 ^A | 5.65 ^{BC} |
| ISA Experiment | .23 ^{BC} | .42 ^{BC} | .45 | .63 | .66 ^C | .75 | .71 ^C | .83 ^C | .72 ^B | 5.40 ^C |
| Bovans Experiment | .22 ^{CD} | .42 ^{BC} | .47 | .66 | .74 ^{AB} | .77 | .75 ^{ABC} | .87 ^{ABC} | .77 ^{AB} | 5.67 ^{BC} |
| Average | .23 | .43 | .48 | .66 | .72 | .78 | .76 | .88 | .76 | 5.70 |

A,B,C, - Different letters denote significant differences within column (P<.01).

¹Partial week of feed intake prior to being moved into the laying facilities.

Table 2. Feed Cost and Livability of White-egg Entries in Closed Housing, 32nd NCLP & MT

| Breeder | Protein | Met. Energy | Lysine | TSAA | Feed Cost | Livability (1 - 119 d) | Flock Uniformity |
|--------------------|------------------------------------|----------------------|---------------------|---------------------|---------------------|------------------------|--|
| | ----- (per bird to 119 days) ----- | | | | | | |
| | (g) | (kcal) | (g) | (g) | (\$) | (%) | (% of pullets within $\pm 10\%$ of \bar{x}) |
| Hy-Line W-36 | 990 ^{BC} | 16432 ^C | 55.2 ^{BC} | 36.1 ^C | 1.07 ^C | 98.8 | 70.0 |
| Hy-Line W-77 | 1018 ^{ABC} | 16890 ^{ABC} | 56.7 ^{ABC} | 37.1 ^{ABC} | 1.10 ^{ABC} | 99.3 | 82.5 |
| Bovans White | 1019 ^{ABC} | 16921 ^{ABC} | 56.8 ^{ABC} | 37.2 ^{ABC} | 1.10 ^{ABC} | 98.3 | 72.0 |
| H & N "Nick Chick" | 1064 ^A | 17649 ^A | 59.2 ^A | 38.8 ^A | 1.15 ^A | 97.9 | 84.0 |
| Shaver White | 1008 ^{ABC} | 16755 ^{ABC} | 56.2 ^{ABC} | 36.8 ^{ABC} | 1.09 ^{ABC} | 100.0 | 84.0 |
| Shaver 2000 | 1047 ^{AB} | 17382 ^{AB} | 58.3 ^{AB} | 38.2 ^{AB} | 1.13 ^{AB} | 98.8 | 80.0 |
| ISA Babcock B300 | 1003 ^{BC} | 16692 ^{BC} | 56.0 ^{ABC} | 36.7 ^{BC} | 1.08 ^{BC} | 98.3 | 74.0 |
| ISA Experiment | 967 ^C | 16041 ^C | 53.9 ^C | 35.3 ^C | 1.04 ^C | 97.9 | 78.0 |
| Bovans Experiment | 1011 ^{ABC} | 16797 ^{ABC} | 56.4 ^{ABC} | 36.9 ^{ABC} | 1.09 ^{ABC} | 99.5 | 70.0 |
| Average | 1014 | 16840 | 56.5 | 37.0 | 1.10 | 98.8 | 76.9 |

A,B,C - Different letters denote significant differences within columns (P<.01).

Table 3. Body Weight of White-egg Entries in Closed Housing, 32nd NCLP & MT

| Breeder | (Weeks of Age) | | | | | | | | |
|-----------------------|------------------|-----|-----|---------------------|-------------------|------|------|------|---------------------|
| | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 17 ¹ |
| | ----- (kg) ----- | | | | | | | | |
| Hy-Line W-36 | .12 ^B | .28 | .47 | .66 ^{ABCD} | .84 ^B | .92 | 1.09 | 1.24 | 1.29 ^{BC} |
| Hy-Line W-77 | .13 ^A | .30 | .48 | .72 ^A | .91 ^A | 1.00 | 1.15 | 1.31 | 1.44 ^A |
| Bovans White | .12 ^B | .28 | .45 | .66 ^{BCD} | .85 ^B | .92 | 1.12 | 1.23 | 1.31 ^{BC} |
| H & N "Nick Chick" | .12 ^B | .28 | .48 | .70 ^{ABC} | .88 ^{AB} | .97 | 1.15 | 1.26 | 1.34 ^{ABC} |
| Shaver White | .12 ^B | .27 | .46 | .67 ^{ABCD} | .84 ^B | .93 | 1.14 | 1.25 | 1.35 ^{ABC} |
| Shaver 2000 | .12 ^B | .28 | .47 | .70 ^{AB} | .89 ^A | .99 | 1.19 | 1.30 | 1.39 ^{AB} |
| ISA Babcock B300 | .12 ^B | .26 | .45 | .65 ^{CD} | .83 ^B | .90 | 1.07 | 1.23 | 1.32 ^{ABC} |
| ISA Experiment | .12 ^B | .27 | .45 | .64 ^D | .81 ^B | .92 | 1.05 | 1.16 | 1.24 ^C |
| Bovans Experiment | .12 ^B | .27 | .49 | .68 ^{ABCD} | .83 ^B | .94 | 1.12 | 1.26 | 1.34 ^{ABC} |
| Average | .12 | .27 | .47 | .67 | .85 | .94 | 1.12 | 1.25 | 1.33 |

A, B, C, D - Different letters denote significant differences within column (P<.01).

Table 4. Feed Consumption of White-egg Entries in Open Housing, 32nd NCLP & MT

| Breeder | ----- (Week of Age) ----- | | | | | | | | | |
|-----------------------|---------------------------|-------------------|-----|-----|------|-------|-------------------|-------|-------------------|---------------------|
| | 1-2 | 3-4 | 5-6 | 7-8 | 9-10 | 11-12 | 13-14 | 15-16 | 17 ¹ | 1-17 |
| | ----- (kg per bird) ----- | | | | | | | | | |
| Hy-Line W-36 | .15 ^{ABC} | .53 ^{BC} | .54 | .63 | .72 | .78 | .82 ^B | .90 | .73 ^B | 5.80 ^{CD} |
| Hy-Line W-77 | .15 ^{BC} | .46 ^{CD} | .55 | .66 | .78 | .83 | .90 ^A | .95 | .90 ^A | 6.16 ^{AB} |
| Bovans White | .15 ^{ABC} | .53 ^{BC} | .56 | .67 | .78 | .76 | .88 ^A | .93 | .80 ^{AB} | 6.07 ^{ABC} |
| H & N "Nick Chick" | .17 ^A | .68 ^A | .56 | .70 | .78 | .77 | .90 ^A | .95 | .84 ^A | 6.35 ^A |
| Shaver White | .16 ^{AB} | .57 ^B | .56 | .65 | .73 | .81 | .90 ^A | .95 | .83 ^A | 6.16 ^{AB} |
| Shaver 2000 | .17 ^A | .54 ^B | .56 | .66 | .77 | .81 | .90 ^A | .97 | .84 ^A | 6.22 ^{AB} |
| ISA Babcock B300 | .14 ^C | .41 ^D | .52 | .64 | .69 | .74 | .80 ^B | .93 | .81 ^{AB} | 5.70 ^D |
| ISA Experiment | .15 ^{ABC} | .58 ^B | .55 | .66 | .74 | .79 | .82 ^B | .91 | .81 ^{AB} | 6.02 ^{BC} |
| Bovans Experiment | .15 ^{ABC} | .53 ^{BC} | .57 | .66 | .75 | .85 | .85 ^{AB} | .92 | .86 ^A | 6.15 ^{AB} |
| Average | .16 | .54 | .55 | .66 | .75 | .79 | .86 | .94 | .82 | 6.07 |

A,B,C, - Different letters denote significant differences within column (P<.01).

¹Partial week of feed intake prior to being moved into the laying facilities.

Table 5. Feed Cost and Livability of White-egg Entries in Open Housing, 32nd NCLP & MT

| Breeder | Protein | Met. Energy | Lysine | TSAA | Feed Cost | Livability (1 - 119 d) | Flock Uniformity |
|--------------------|------------------------------------|---------------------|--------------------|--------------------|--------------------|------------------------|--|
| | ----- (per bird to 119 days) ----- | | | | | | (% of pullets within $\pm 10\%$ of \bar{x}) |
| | (g) | (kcal) | (g) | (g) | (\$) | (%) | |
| Hy-Line W-36 | 1008 ^B | 16865 ^B | 56.4 ^B | 37.1 ^B | 1.09 ^B | 97.7 | 80.0 |
| Hy-Line W-77 | 1021 ^B | 17127 ^B | 57.1 ^B | 37.6 ^B | 1.11 ^B | 99.4 | 65.0 |
| Bovans White | 1029 ^{AB} | 17205 ^{AB} | 57.5 ^{AB} | 37.8 ^{AB} | 1.11 ^{AB} | 98.1 | 95.0 |
| H & N "Nick Chick" | 1079 ^A | 18003 ^A | 60.3 ^A | 39.6 ^A | 1.17 ^A | 98.5 | 72.5 |
| Shaver White | 1035 ^{AB} | 17311 ^{AB} | 57.9 ^{AB} | 38.1 ^{AB} | 1.12 ^{AB} | 99.2 | 77.5 |
| Shaver 2000 | 1045 ^{AB} | 17489 ^{AB} | 58.4 ^{AB} | 38.4 ^{AB} | 1.13 ^{AB} | 98.8 | 67.5 |
| ISA Babcock B300 | 952 ^C | 15963 ^C | 53.2 ^C | 35.1 ^C | 1.03 ^C | 99.8 | 67.5 |
| ISA Experiment | 1024 ^B | 17092 ^B | 57.2 ^B | 37.6 ^B | 1.11 ^B | 99.0 | 77.5 |
| Bovans Experiment | 1026 ^B | 17156 ^{AB} | 57.3 ^B | 37.7 ^B | 1.11 ^B | 99.8 | 72.5 |
| Average | 1024 | 17135 | 57.2 | 37.7 | 1.11 | 98.9 | 75.0 |

A,B,C - Different letters denote significant differences within columns (P<.01).

Table 6. Body Weight of White-egg Entries in Open Housing, 32nd NCLP & MT

| Breeder | ----- (Weeks of Age) ----- | | | | | | | | |
|-----------------------|----------------------------|--------------------|-----|-------------------|-------------------|--------------------|---------------------|---------------------|---------------------|
| | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 17 ¹ |
| | ----- (kg) ----- | | | | | | | | |
| Hy-Line W-36 | .12 | .25 ^C | .44 | .62 ^C | .81 ^C | .92 ^{BCD} | 1.07 ^{DEF} | 1.21 ^{CD} | 1.30 ^{BC} |
| Hy-Line W-77 | .12 | .28 ^A | .47 | .70 ^A | .89 ^A | 1.03 ^A | 1.21 ^A | 1.35 ^A | 1.45 ^A |
| Bovans White | .12 | .26 ^{ABC} | .46 | .64 ^C | .82 ^{BC} | .94 ^{BCD} | 1.09 ^{CDE} | 1.23 ^{BCD} | 1.30 ^{BC} |
| H & N "Nick Chick" | .11 | .27 ^{ABC} | .48 | .66 ^{BC} | .87 ^{AB} | .97 ^{ABC} | 1.14 ^{BC} | 1.27 ^{BC} | 1.33 ^{ABC} |
| Shaver White | .11 | .26 ^{ABC} | .46 | .65 ^{BC} | .83 ^{BC} | .97 ^{ABC} | 1.13 ^{BCD} | 1.26 ^{BC} | 1.33 ^{ABC} |
| Shaver 2000 | .12 | .27 ^{AB} | .48 | .68 ^{AB} | .90 ^A | .99 ^{AB} | 1.17 ^{AB} | 1.30 ^{AB} | 1.42 ^{AB} |
| ISA Babcock B300 | .12 | .26 ^{BC} | .45 | .64 ^C | .81 ^C | .93 ^{BCD} | 1.11 ^{CDE} | 1.21 ^{CD} | 1.32 ^{ABC} |
| ISA Experiment | .12 | .27 ^{ABC} | .44 | .63 ^C | .78 ^C | .88 ^D | 1.02 ^P | 1.16 ^D | 1.23 ^C |
| Bovans Experiment | .12 | .25 ^{BC} | .44 | .63 ^C | .79 ^C | .91 ^{CD} | 1.06 ^{EF} | 1.21 ^{CD} | 1.29 ^C |
| Average | .12 | .26 | .46 | .65 | .83 | .95 | 1.11 | 1.24 | 1.33 |

A,B,C,D E,F - Different letters denote significant differences within column (P<.01).

Table 7. Feed Consumption of White-egg Entries in All Housing, 32nd NCLP & MT

| Breeder | ----- (Week of Age) ----- | | | | | | | | | |
|---------------------------|---------------------------|-------------------|-----|-----|--------------------|--------------------|--------------------|---------------------|--------------------|---------------------|
| | 1-2 | 3-4 | 5-6 | 7-8 | 9-10 | 11-12 | 13-14 | 15-16 | 17 ¹ | 1-17 |
| ----- (kg per bird) ----- | | | | | | | | | | |
| Hy-Line W-36 | .19 | .48 ^{BC} | .50 | .63 | .70 ^C | .75 ^{BC} | .79 ^{BC} | .87 ^{CD} | .72 ^C | 5.65 ^D |
| Hy-Line W-77 | .19 | .43 ^{CD} | .52 | .67 | .75 ^{ABC} | .81 ^A | .80 ^{ABC} | .91 ^{ABCD} | .83 ^A | 5.91 ^{BC} |
| Bovans White | .20 | .47 ^{BC} | .52 | .66 | .75 ^{AB} | .77 ^{ABC} | .83 ^{AB} | .90 ^{ABCD} | .77 ^{ABC} | 5.88 ^{BCD} |
| H & N "Nick Chick" | .22 | .58 ^A | .55 | .69 | .77 ^A | .79 ^{ABC} | .84 ^{AB} | .92 ^{AB} | .83 ^{AB} | 6.19 ^A |
| Shaver White | .20 | .49 ^B | .51 | .64 | .73 ^{ABC} | .81 ^{AB} | .84 ^{AB} | .92 ^{ABC} | .76 ^{BC} | 5.89 ^{BCD} |
| Shaver 2000 | .20 | .48 ^{BC} | .53 | .67 | .77 ^A | .81 ^A | .85 ^A | .94 ^A | .80 ^{AB} | 6.06 ^{AB} |
| ISA Babcock B300 | .18 | .40 ^D | .50 | .64 | .71 ^{BC} | .74 ^C | .77 ^C | .91 ^{ABCD} | .81 ^{AB} | 5.67 ^{CD} |
| ISA Experiment | .19 | .49 ^B | .50 | .64 | .70 ^C | .77 ^{ABC} | .76 ^C | .87 ^D | .76 ^{BC} | 5.68 ^{CD} |
| Bovans Experiment | .19 | .47 ^{BC} | .52 | .66 | .74 ^{ABC} | .81 ^A | .79 ^{ABC} | .89 ^{BCD} | .81 ^{AB} | 5.89 ^{BCD} |
| Average | .20 | .48 | .52 | .66 | .74 | .78 | .81 | .90 | .79 | 5.87 |

A,B,C,D - Different letters denote significant differences within column (P<.01).

¹Partial week of feed intake prior to being moved into the laying facilities.

Table 8. Feed Cost and Livability of White-egg Entries in All Housing, 32nd NCLP & MT

| Breeder | Protein | Met. Energy | Lysine | TSAA | Feed Cost | Livability (1 - 119 d) | Flock Uniformity |
|--------------------|------------------------------------|----------------------|---------------------|---------------------|---------------------|------------------------|--|
| | ----- (per bird to 119 days) ----- | | | | | | |
| | (g) | (kcal) | (g) | (g) | (\$) | (%) | (% of pullets within $\pm 10\%$ of \bar{x}) |
| Hy-Line W-36 | 999 ^{CD} | 16632 ^{CD} | 55.8 ^{CD} | 36.6 ^{CD} | 1.08 ^{CD} | 98.3 | 74.4 |
| Hy-Line W-77 | 1019 ^{BC} | 16999 ^{BCD} | 56.9 ^{BCD} | 37.4 ^{BCD} | 1.10 ^{BC} | 99.3 | 73.8 |
| Bovans White | 1024 ^{BC} | 17052 ^{BC} | 57.1 ^{BC} | 37.5 ^{BC} | 1.11 ^{BC} | 98.2 | 82.2 |
| H & N "Nick Chick" | 1071 ^A | 17812 ^A | 59.7 ^A | 39.2 ^A | 1.16 ^A | 98.2 | 78.9 |
| Shaver White | 1021 ^{BC} | 17012 ^{BC} | 57.0 ^{BC} | 37.4 ^{BC} | 1.10 ^{BC} | 99.6 | 81.1 |
| Shaver 2000 | 1046 ^{AB} | 17431 ^{AB} | 58.4 ^{AB} | 38.3 ^{AB} | 1.13 ^{AB} | 98.8 | 74.4 |
| ISA Babcock B300 | 979 ^D | 16356 ^D | 54.7 ^D | 36.0 ^D | 1.06 ^D | 99.0 | 71.1 |
| ISA Experiment | 993 ^{CD} | 16527 ^{CD} | 55.4 ^{CD} | 36.3 ^{CD} | 1.07 ^{CD} | 98.4 | 77.8 |
| Bovans Experiment | 1018 ^{BCD} | 16963 ^{BCD} | 56.8 ^{BCD} | 37.3 ^{BCD} | 1.10 ^{BCD} | 99.6 | 71.0 |
| Average | 1019 | 16976 | 56.9 | 37.3 | 1.10 | 99.9 | 76.0 |

A,B,C,D - Different letters denote significant differences within columns (P<.01).

Table 9. Body Weight of White-egg Entries in All Housing, 32nd NCLP & MT

| Breeder | (Weeks of Age) | | | | | | | | |
|--------------------|-------------------|-------------------|-----|--------------------|-------------------|---------------------|---------------------|---------------------|--------------------|
| | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 17 ¹ |
| | (kg) | | | | | | | | |
| Hy-Line W-36 | .12 ^B | .27 ^B | .46 | .65 ^{CD} | .82 ^{BC} | .92 ^{CD} | 1.08 ^{CD} | 1.23 ^{CD} | 1.29 ^{CD} |
| Hy-Line W-77 | .13 ^A | .29 ^A | .48 | .71 ^A | .90 ^A | 1.01 ^A | 1.18 ^{AB} | 1.33 ^A | 1.45 ^A |
| Bovans White | .12 ^B | .27 ^{AB} | .46 | .65 ^{CD} | .83 ^B | .93 ^{BCD} | 1.11 ^{BCD} | 1.23 ^C | 1.31 ^{CD} |
| H & N "Nick Chick" | .12 ^B | .27 ^{AB} | .48 | .68 ^{ABC} | .88 ^A | .97 ^{ABC} | 1.15 ^{ABC} | 1.26 ^{ABC} | 1.34 ^{BC} |
| Shaver White | .12 ^B | .27 ^B | .46 | .66 ^{BCD} | .83 ^B | .95 ^{ABCD} | 1.14 ^{ABC} | 1.25 ^{BC} | 1.34 ^{BC} |
| Shaver 2000 | .12 ^{AB} | .28 ^{AB} | .47 | .69 ^{AB} | .90 ^A | .99 ^{AB} | 1.18 ^A | 1.30 ^{AB} | 1.41 ^{AB} |
| ISA Babcock B300 | .12 ^{AB} | .26 ^B | .45 | .64 ^{CD} | .82 ^{BC} | .91 ^{CD} | 1.09 ^{CD} | 1.22 ^{CD} | 1.32 ^C |
| ISA Experiment | .12 ^B | .27 ^B | .45 | .63 ^D | .79 ^C | .90 ^D | 1.04 ^D | 1.16 ^D | 1.24 ^D |
| Bovans Experiment | .12 ^B | .26 ^B | .47 | .66 ^{BCD} | .81 ^{BC} | .93 ^{BCD} | 1.10 ^{CD} | 1.24 ^{BC} | 1.32 ^C |
| Average | .12 | .27 | .46 | .66 | .84 | .94 | 1.12 | 1.25 | 1.33 |

A,B,C,D E,F - Different letters denote significant differences within column (P<.01).

Table 10. Feed Consumption of Brown-egg Entries in Closed Housing, 32nd NCLP & MT

| Breeder | ----- (Week of Age) ----- | | | | | | | | | |
|-----------------------|---------------------------|-----|-----|-----|------|-------|-------|-------|-------------------|------|
| | 1-2 | 3-4 | 5-6 | 7-8 | 9-10 | 11-12 | 13-14 | 15-16 | 17 ¹ | 1-17 |
| | ----- (kg per bird) ----- | | | | | | | | | |
| ISA Brown | .19 | .42 | .54 | .73 | .83 | .94 | .90 | .96 | .80 ^B | 6.30 |
| Shaver Brown 579 | .20 | .41 | .53 | .72 | .81 | .88 | .87 | .97 | .79 ^B | 6.19 |
| H & N "Brown Nick" | .19 | .42 | .52 | .78 | .80 | .96 | .93 | 1.02 | .84 ^{AB} | 6.45 |
| Bovans Brown | .20 | .42 | .58 | .76 | .84 | .91 | .94 | 1.03 | .90 ^A | 6.57 |
| Hy-Line Brown | .20 | .43 | .54 | .72 | .84 | .94 | .91 | .97 | .81 ^B | 6.35 |
| Average | .19 | .42 | .54 | .74 | .82 | .93 | .91 | .99 | .83 | 6.37 |

A,B, - Different letters denote significant differences within column (P<.01).

¹Partial week of feed intake prior to being moved into the laying facilities.

Table 11. Feed Cost and Livability of Brown-egg Entries in Closed Housing, 32nd NCLP & MT

| Breeder | Protein | Met. Energy | Lysine | TSAA | Feed Cost | Livability (1 - 119 d) | Flock Uniformity |
|--------------------|------------------------------------|--------------|-------------|-------------|-------------|------------------------|--|
| | ----- (per bird to 119 days) ----- | | | | | | |
| | (g) | (kcal) | (g) | (g) | (\$) | (%) | (% of pullets within $\pm 10\%$ of \bar{x}) |
| ISA Brown | 1118 | 18616 | 62.3 | 40.9 | 1.21 | 96.7 | 82.0 |
| Shaver Brown 579 | 1082 | 17979 | 60.3 | 39.5 | 1.17 | 99.5 | 78.0 |
| H & N "Brown Nick" | 1142 | 19030 | 63.6 | 41.8 | 1.24 | 97.9 | 78.0 |
| Bovans Brown | 1135 | 18963 | 63.2 | 41.7 | 1.23 | 98.5 | 78.0 |
| Hy-Line Brown | 1130 | 18816 | 63.0 | 41.4 | 1.22 | 98.7 | 82.0 |
| Average | 1121 | 18680 | 62.5 | 41.1 | 1.21 | 98.2 | 79.6 |

Table 12. Body Weight of Brown-egg Entries in Closed Housing, 32nd NCLP & MT

| Breeder | ----- (Weeks of Age) ----- | | | | | | | | |
|-----------------------|----------------------------|-----|-----|-----|------|------|------|------|-----------------|
| | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 17 ¹ |
| | ----- (kg) ----- | | | | | | | | |
| ISA Brown | .13 | .30 | .50 | .76 | .98 | 1.11 | 1.31 | 1.48 | 1.58 |
| Shaver Brown 579 | .13 | .31 | .56 | .79 | 1.01 | 1.10 | 1.36 | 1.52 | 1.62 |
| H & N "Brown Nick" | .12 | .30 | .57 | .79 | 1.01 | 1.18 | 1.42 | 1.56 | 1.65 |
| Bovans Brown | .13 | .32 | .58 | .82 | 1.06 | 1.18 | 1.43 | 1.62 | 1.74 |
| Hy-line Brown | .13 | .30 | .59 | .80 | 1.02 | 1.17 | 1.39 | 1.55 | 1.63 |
| Average | .13 | .31 | .56 | .79 | 1.02 | 1.15 | 1.38 | 1.55 | 1.64 |

Table 13. Feed Consumption of Brown-egg Entries in Open Housing, 32nd NCLP & MT

| Breeder | ----- (Week of Age) ----- | | | | | | | | | |
|-----------------------|---------------------------|-----|-----|-----|------|-------|--------------------|-------|-----------------|--------------------|
| | 1-2 | 3-4 | 5-6 | 7-8 | 9-10 | 11-12 | 13-14 | 15-16 | 17 ¹ | 1-17 |
| | ----- (kg per bird) ----- | | | | | | | | | |
| ISA Brown | .15 ^A | .49 | .59 | .81 | .83 | .99 | 1.04 ^B | 1.00 | .99 | 6.89 ^{AB} |
| Shaver Brown 579 | .15 ^A | .48 | .59 | .77 | .81 | .99 | .99 ^C | 1.02 | .92 | 6.70 ^B |
| H & N "Brown Nick" | .13 ^B | .44 | .60 | .79 | .88 | 1.03 | 1.05 ^{AB} | 1.08 | .97 | 6.98 ^A |
| Bovans Brown | .15 ^A | .46 | .60 | .82 | .91 | 1.00 | 1.09 ^A | 1.03 | 1.04 | 7.11 ^A |
| Hy-Line Brown | .14 ^{AB} | .51 | .63 | .77 | .85 | 1.04 | 1.05 ^{AB} | 1.07 | 1.00 | 7.07 ^A |
| Average | .15 | .48 | .60 | .79 | .85 | 1.01 | 1.04 | 1.04 | .98 | 6.95 |

A,B, - Different letters denote significant differences within column (P<.01).

¹Partial week of feed intake prior to being moved into the laying facilities.

Table 14. Feed Cost and Livability of Brown-egg Entries in Open Housing, 32nd NCLP & MT

| Breeder | Protein | Met. Energy | Lysine | TSAA | Feed Cost | Livability (1 - 119 d) | Flock Uniformity |
|--------------------|------------------------------------|---------------------|--------------------|--------------------|--------------------|------------------------|--|
| | ----- (per bird to 119 days) ----- | | | | | | |
| | (g) | (kcal) | (g) | (g) | (\$) | (%) | (% of pullets within ±10% of \bar{x}) |
| ISA Brown | 1134 ^{AB} | 19032 ^{AB} | 63.2 ^{AB} | 41.8 ^{AB} | 1.23 ^{AB} | 99.6 | 80.0 |
| Shaver Brown 579 | 1114 ^B | 18686 ^B | 62.2 ^B | 41.1 ^B | 1.21 ^B | 99.4 | 82.5 |
| H & N "Brown Nick" | 1163 ^{AB} | 19529 ^{AB} | 65.0 ^{AB} | 42.9 ^{AB} | 1.26 ^{AB} | 99.4 | 62.5 |
| Bovans Brown | 1171 ^A | 19704 ^A | 65.3 ^A | 43.3 ^A | 1.27 ^A | 99.4 | 77.5 |
| Hy-Line Brown | 1179 ^A | 19786 ^A | 65.8 ^A | 43.5 ^A | 1.28 ^A | 99.4 | 70.0 |
| Average | 1152 | 19347 | 64.3 | 42.5 | 1.25 | 99.4 | 74.5 |

A,B - Different letters denote significant differences within columns (P<.01).

Table 15. Body Weight of Brown-egg Entries in Open Housing, 32nd NCLP & MT

| Breeder | -----(Weeks of Age)----- | | | | | | | | |
|-----------------------|--------------------------|-----|-----|-----|------|------|------|------|-----------------|
| | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 17 ¹ |
| | ----- (kg) ----- | | | | | | | | |
| ISA Brown | .12 | .30 | .52 | .81 | 1.05 | 1.23 | 1.48 | 1.58 | 1.66 |
| Shaver Brown 579 | .12 | .29 | .52 | .78 | 1.01 | 1.22 | 1.42 | 1.56 | 1.71 |
| H & N "Brown Nick" | .12 | .28 | .52 | .77 | 1.04 | 1.23 | 1.51 | 1.65 | 1.76 |
| Bovans Brown | .13 | .30 | .55 | .82 | 1.05 | 1.25 | 1.52 | 1.59 | 1.70 |
| Hy-line Brown | .12 | .30 | .55 | .82 | 1.06 | 1.26 | 1.52 | 1.57 | 1.74 |
| Average | .12 | .29 | .53 | .80 | 1.04 | 1.24 | 1.49 | 1.59 | 1.71 |

Table 16. Feed Consumption of Brown-egg Entries in All Housing, 32nd NCLP & MT

| Breeder | ----- (Week of Age) ----- | | | | | | | | | |
|-----------------------|---------------------------|-----|-----|-----|------|-------|-------|--------------------|-----------------|------|
| | 1-2 | 3-4 | 5-6 | 7-8 | 9-10 | 11-12 | 13-14 | 15-16 | 17 ¹ | 1-17 |
| | ----- (kg per bird) ----- | | | | | | | | | |
| ISA Brown | .17 | .45 | .56 | .76 | .83 | .96 | .96 | .98 ^B | .89 | 6.57 |
| Shaver Brown 579 | .17 | .44 | .56 | .74 | .81 | .93 | .93 | .99 ^B | .85 | 6.43 |
| H & N "Brown Nick" | .16 | .43 | .56 | .78 | .84 | .99 | .99 | 1.05 ^A | .90 | 6.70 |
| Bovans Brown | .18 | .44 | .59 | .79 | .87 | .95 | 1.01 | 1.03 ^{AB} | .97 | 6.83 |
| Hy-Line Brown | .17 | .47 | .58 | .74 | .84 | .99 | .98 | 1.02 ^{AB} | .90 | 6.69 |
| Average | .17 | .45 | .57 | .76 | .84 | .97 | .97 | 1.01 | .90 | 6.65 |

A,B, - Different letters denote significant differences within column (P<.01).

¹Partial week of feed intake prior to being moved into the laying facilities.

Table 17. Feed Cost and Livability of Brown-egg Entries in All Housing, 32nd NCLP & MT

| Breeder | Protein | Met. Energy | Lysine | TSAA | Feed Cost | Livability (1 - 119 d) | Flock Uniformity |
|--------------------|------------------------------------|---------------------|--------------------|--------------------|--------------------|------------------------|--|
| | ----- (per bird to 119 days) ----- | | | | | | |
| | (g) | (kcal) | (g) | (g) | (\$) | (%) | (% of pullets within $\pm 10\%$ of \bar{x}) |
| ISA Brown | 1126 ^{AB} | 18808 ^{AB} | 62.8 ^{AB} | 41.3 ^{AB} | 1.22 ^{AB} | 98.0 | 81.1 |
| Shaver Brown 579 | 1097 ^B | 18319 ^B | 61.2 ^B | 40.3 ^B | 1.19 ^B | 99.4 | 80.0 |
| H & N "Brown Nick" | 1152 ^A | 19270 ^A | 64.3 ^A | 42.3 ^A | 1.25 ^A | 98.6 | 71.1 |
| Bovans Brown | 1152 ^A | 19319 ^A | 64.2 ^A | 42.4 ^A | 1.25 ^A | 98.9 | 77.8 |
| Hy-Line Brown | 1153 ^A | 19281 ^A | 64.4 ^A | 42.4 ^A | 1.25 ^A | 99.0 | 76.7 |
| Average | 1136 | 18998 | 63.4 | 41.8 | 1.23 | 98.8 | 77.3 |

A,B - Different letters denote significant differences within columns (P<.01).

Table 18. Body Weight of Brown-egg Entries in All Housing, 32nd NCLP & MT

| Breeder | ----- (Weeks of Age) ----- | | | | | | | | |
|-----------------------|----------------------------|-----|-----|-----|------|------|------|------|-----------------|
| | 2 | 4 | 6 | 8 | 10 | 12 | 14 | 16 | 17 ¹ |
| | ----- (kg) ----- | | | | | | | | |
| ISA Brown | .13 | .30 | .51 | .78 | 1.01 | 1.16 | 1.38 | 1.52 | 1.61 |
| Shaver Brown 579 | .13 | .30 | .54 | .79 | 1.01 | 1.15 | 1.39 | 1.54 | 1.66 |
| H & N "Brown Nick" | .12 | .29 | .55 | .78 | 1.02 | 1.20 | 1.46 | 1.60 | 1.70 |
| Bovans Brown | .13 | .31 | .57 | .82 | 1.05 | 1.21 | 1.47 | 1.61 | 1.72 |
| Hy-line Brown | .13 | .30 | .57 | .81 | 1.04 | 1.21 | 1.44 | 1.56 | 1.68 |
| Average | .13 | .30 | .55 | .79 | 1.03 | 1.19 | 1.43 | 1.57 | 1.67 |

Entries 32nd NCLP&MT
Stock Suppliers and Categories

| <u>Breeder</u> | <u>Stock</u> | <u>Category</u> ¹ | <u>Source</u> |
|--|------------------------|------------------------------|--|
| H & N International 3825 154th Ave., N.E. Redmond, WA 98052 | "Nick Chick" | I-A | Wheelock Hatchery 2170 Wayne Road Chambersburg, PA 17201 |
| | "Brown Nick" | I-A | (Same) |
| Hy-Line International P.O. Box 310 Dallas Center, IA 50063 | W-36 | I-A | Hy-Line International 4432 Highway 213, Box 309 Mansfield, GA 30255 |
| | W-77 | I-A | (Same) |
| | Hy-Line Brown | I-A | Hy-Line International 1915 Sugar Grove Dallas Center, IA 50063 |
| ISA/Babcock P.O. Box 280 Ithaca, NY 14850-0280 | B300 | I-A | American Selected Products Milton Hatchery 55 Lawton Lane Milton, PA 17847 |
| | ISA Experimental | III-A | ISA Babcock P.O. Box 280 Ithaca, NY 14851 |
| Shaver Poultry Breeding Farms Ltd. P.O. Box 400 Cambridge, Ontario Canada N1R5V9 | Shaver White | I-A | American Selected Products Inc. Milton Hatchery 55 Lawton Lane Milton, PA 17847 |
| | Shaver 2000 | II-A | (Same) |
| | Shaver 579 | II-A | Archer Poultry Limited RR #3 Brighton, Ontario, Canada K0K 1H0 |
| Centurion Poultry 1471 Lane Creek Road Bogart, GA 30622 | Bovans White | I-A | Centurion Poultry Inc. 1471 Lane Creek Road Bogart, GA 30622 |
| | Bovans Experimental | III-A | (Same) |
| | Bovans Brown | I-A | (Same) |
| ISA/Babcock P.O. Box 280 Ithaca, NY 14850-0280 | ISA Brown | I-A | American Selected Products Inc. Milton Hatchery 55 Lawton Lane Milton, PA 17847 |

¹ I = Extensive distribution in southeast United States
 II = Little or no distribution in southeast United States
 III = Unavailable for commercial distribution in United States
 A = Entry requested
 C = Entry not requested