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REPORT ON PULLET REARING PERIOD 36th NORTH CAROLINA LAYER PERFORMANCE AND MANAGEMENT TEST[1]

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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 and Consumer Services. The flock is maintained at the Piedmont Research Station, Salisbury, North Carolina. Mr. Joe Hampton is the Piedmont Research Station Superintendent; Mr. Aaron Sellers is Resident Manager of the flock; Pam Jenkins is the Statistical Research Assistant; 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 36th North Carolina Layer Performance and Management Test.

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[1]The 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.

36th NORTH CAROLINA LAYER PERFORMANCE AND MANAGEMENT TEST
Volume 36, No. 2

Report on Pullet Rearing Period

Dates of Importance:

The eggs were placed into trays and set on March 8, 2005 and hatched on March 30, 2005. The chicks were all sexed according to their genetics (feather, or color), vaccinated for Marek's disease, and wing banded for identification before transfer to the brood/grow house. The pullets were moved to the laying facilities on July 19-21, 2005 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 onset of egg production in the rearing houses.

Experimental Design:

The test was a factorial arrangement of treatments and the main effect was strain. The analysis was divided by pullet strain. The pullet rearing facility consisted of a Quad-deck cage system in a light tight house; all of the birds were reared in the same environment.

Strain--Samples of fertile eggs were provided from the breeders according to the rules, which govern the conductance of the test. All eggs were set and hatched concurrently (Hatch/Serology Report Vol. 36, No. 1). A total of nine white egg and three brown egg strains were entered in the test for a total of twelve 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. For the layer test, a minimum of 924 white and brown egg pullets/strain were wanted for placement 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 levels and replicates within the grow house.

Pullet Housing--The chicks were randomly assigned to the growing cages with white egg and brown egg replicates being intermingled throughout the house. The white egg strains occupied approximately 2/3 of the house and brown egg strains occupied the other 1/3 of the house. All strains were assigned to be represented as equally as possible in all brooding rooms, cage rows, and cage levels throughout the House 8 where applicable.

House 8--is an environmental controlled closed brood-grow facility with 3 banks of quad-deck cages in each room. Each room has been assigned a number and each side of each bank has been assigned a row number, and each cage section within each row and level/row has been assigned a replicate number, for statistical analysis pairs of rows have been designated as blocks. Thus, each block consists of two rows containing 24 replicates on all levels. This allows for a total of 3,744 pullets per room resulting in a total pullet count for this test in House 8 using 3 rearing rooms of 11,232. The white and brown-egg strains were randomly assigned to the replicates in the house. Entrant strains were assigned to the replicates in a restricted randomized manner with the restrictions being that all strains were approximately equally represented in all rows, levels, and rooms. All chicks were brooded in the same cage during the entire 17 wk rearing period. Paper was placed on the cage floor for the first 7 days within each of the replicate series within each row. Each cage within the replicate was filled with 13 white-egg or brown-egg (13 per 24" x 26" cage) pullets on the day of hatch for a rearing allowance of 48 sq in. The same numbers of pullets were grown in each replicate for both white and brown-egg strains. The room dividers were removed for this test so that all birds were essentially reared in a contiguous house.

Pullet Management and Nutrition:

Pullets were fed *ad libitum* 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 (sex slips) and accidental deaths from a replicate have been excluded from the 36th NCLP&MT Grow Report. Each pullet placed was provided with 1 kg of Starter per bird with Amprol, followed by Grower and Developer diets that are provided in the diet formulation section. Thus, the white-egg and brown-egg replicates in brood-grow House 8 (52 females) were given the starter feed to achieve the breeder recommended body weights at each weigh interval. Pullets were moved on to the next tier rearing diet at the point of achieving target body weight goals or after a prescribed time interval. Expected feed transition intervals were; starter 0 to 6 weeks; grower 6 to 12 weeks; developer 12 to 15 weeks; Pre-lay diet 15 to 16 weeks. The strains were grown to the breeder recommended body weights. In this flock, the birds grew in accordance with the guidelines meant that the dietary regimen was administered as discussed previously. The pre-lay diet was provided 10 days prior to reaching the threshold day length of 14 hours.

Precision Beak Trimming:

Beak trimming was begun at 6 days of age using a Lyons Precision beak trimmer, with a 7/64" guide hole. The trim was a block cut with an approximate blade temp of 1100° F (dull red). Beak trimming was completed in less than 3 days.

Pullet Vaccination and Beak Trimming Schedule

Pullet vaccination and beak trimming schedules are outlined in Table 1. Pullets were not retrimmed at any point in the rearing period.

Table 1. Pullet Vaccination and Beak Trimming Schedule

Age	Date	Event
Hatch	March 30, 2005	MVT Marek's vaccination by injection in neck
Day 6-8	April 5-7, 2005	Precision Beak Trim[1] all replicates throughout the flock
Day 10	April 8, 2005	1st Newcastle (B1) and Bronchitis (Mass.) vaccination Via aerosol spray (Triple Vac)
Day 35	May 3, 2005	2nd Newcastle (LaSota) and Bronchitis (Mass.) vaccination via aerosol spray (ComboVac)
Day 63	May 31, 2005	3rd Newcastle (LaSota) and Bronchitis (Mass.) vaccination via aerosol spray (ComboVac)
Day 70	June 7, 2005	Fowl Pox and Avian Encephalomyelitis vaccination via the wig web
Day 77-80	June 14, 2005	Beak Trim those replicates with excessive re-growth to prevent layer house cannibalism
Day 105	July 12, 2005	4th Newcastle (Lasota) and Bronchitis (Mass.) vaccination via aerosol spray (ComboVac)
Week 70	August 2, 2006	5th Newcastle (LaSota) and Bronchitis (Mass.) vaccination via aerosol spray (ComboVac)

Lighting Schedule

The lighting schedule for the pullet controlled environment facility is outlined in Table 2.

Table 2. Pullet House Light Schedule:

Age	Date	Light Intensity	Photoperiod (hr)
Days 1-2	March 29-30, 2005	10 ftc. (100 lux)	24
Day 3	April 1, 2005	1 ftc. (10 lux)	23
Week 1	April 6, 2005	1 to 0.5 ftc. (10 to 5 lux)	22
Week 2	April 13, 2005	1 to 0.5 ftc. (10 to 5 lux)	20
Week 3	April 20, 2005	1 to 0.5 ftc. (10 to 5 lux)	18
Week 4	April 27, 2005	1 to 0.5 ftc. (10 to 5 lux)	16
Week 5	May 4, 2005	1 to 0.5 ftc. (10 to 5 lux)	14
Week 6	May 11, 2005	1 to 0.5 ftc. (10 to 5 lux)	12
Week 7 through	May 18, 2005	1 to 0.5 ftc. (10 to 5 lux)	10
Week 16	July 20, 2005	1 to 0.5 ftc. (10 to 5 lux)	10
Housing of Pullets commences	July 21, 2005	Working Intensity	10

Table 3. Diet Formulations for the Brood-Grow Periods

	Diet[1] Identification			
Ingredient	Starter	Grower	Developer	Pre-Lay
Corn	1011.2	1089.3	1196.1	958.3
Fat (Tallow)	---	---	1.3	82.0
Soybean meal	286.0	50.0	50.0	622.0
EXT/EXP Soy	300.0	333.3	276.0	---
Soybean Hulls	---	---	50.0	---
Wheat Midds	170.0	238.9	200.0	---
Gluten Meal 60%	148.0	200.0	100.0	100.0
D.L. Methionine	1.0	2.0	2.7	3.2
Lysine 78.8%	2.8	3.0	3.0	---
Oyster Shell	---	---	---	75.0
Limestone	32.0	35.1	70.0	113.0
Bi-Carbonate	2.5	2.5	2.5	3.0
Phosphate Mono/D	32.5	32.5	35.0	30.0
Salt	6.5	6.2	6.4	6.0
Vit. Premix	1.0	1.0	1.0	1.0
Min. premix	1.0	1.0	1.0	1.0
Mold Inhibitor	2.0	2.0	2.0	1.0
T-Premix	1.0	1.0	1.0	1.0
.06% Sel. Premix	1.0	1.0	1.0	1.0
Choline Cl 60%	1.5	1.2	1.0	2.5
Total	2000	2000	2000	2000
Protein %	20.0	16.6	14.8	21.5
ME kcal/kg	2802	2802	2802	2928
Calcium %	1.02	1.05	1.75	4.01
T. Phos. %	0.79	0.79	0.75	0.64
Lysine %	0.50	0.50	0.40	0.43
TSAA %	0.73	0.69	0.65	0.89

[1]Diets were acquired from Southern States Cooperative in mash form and Lance Minear, Nutritionist for Southern States, provided assistance in formulation.

Note: The Starter, Grower, Developer, and Pre-lay diets were administered in order to maintain a growth pattern and target weights as closely as possible to the breeder recommendations.

DESCRIPTION OF DATA TABLE STATISTICS

Rearing period performance of white egg and brown egg strains are shown in Tables 4-6 and 7-9, respectively. Following are the descriptions of the observations taken throughout the rearing period. Data presented in this report will be in metric.

Breeder (Strain):

Short identification of the breeder and strain of the stock is shown in more complete detail in Table 10 following the data tables.

Protein per Bird to 112 Days:
Calculated cumulative protein intake per bird to 112 days.

Metabolizable Energy per Bird to 112 Days:
Calculated cumulative metabolizable energy intake per bird to 112 days.

Lysine intake per Bird to 112 Days:
Calculated cumulative lysine intake per bird to 112 days.

Total Sulfur Amino Acids (TSAA) intake per Bird to 112 Days:
Calculated cumulative TSAA intake per bird to 112 days.

Feed Cost per Bird to 112 Days:
Calculated feed cost per bird to 112 days. Using average contract feed prices; Starter $166.00/T; Grower $160.47/T; Developer 1 $159.60/T, Developer 2 $159.20/T, and Pre-Lay Diet $188.40.

Livability 1-112 Days:
The percentage of the birds housed which survived during days 1-112. Males and accidental deaths, which were removed are excluded from the analysis of livability.

Flock Uniformity at 112 Days:
The percentage of the pullets whose body weight falls within ±10% of the mean body weight at 112 days of age. This is based on the individual body weight from at least 100 pullets from each strain.

Body Weights (0, 2, 4, 6, 8....16 Weeks):
Initial body weights were taken at time of placement in the brood/grow house 8. Bi-weekly average body weights of all birds within representative cages. Sample sizes for these 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....16, 1-16 Weeks):
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 of SAS Institute (1989)[1]. 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.

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

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

Table 4. Bi-weekly Body Weights of White-Egg Entries, 36th NCLP&MT

Breeder	(Weeks of Age) 0	2	4	6	8	10	12	14	16
	(kg)								
LSL-Lite	0.040^{A}	0.137^{A}	0.263^{A}	0.483^{A}	0.656^{A}	0.841^{AB}	0.996^{AB}	1.117^{ABC}	1.176^{ABCD}
Bovans White E[1]	0.040^{A}	0.127^{B}	0.246^{B}	0.457^{B}	0.636^{AB}	0.847^{AB}	0.994^{AB}	1.123^{AB}	1.189^{ABC}
Bovans White	0.038^{B}	0.131^{AB}	0.247^{B}	0.456^{B}	0.618^{BC}	0.793^{C}	0.936^{C}	1.043^{E}	1.099^{E}
Dekalb White E[1]	0.040^{A}	0.128^{B}	0.241^{BC}	0.452^{B}	0.632^{A}	0.834^{BC}	0.989^{AB}	1.111^{ABCD}	1.207^{AB}
Dekalb White	0.040^{A}	0.129^{B}	0.250^{AB}	0.458^{B}	0.636^{A}	0.812^{BCD}	0.974^{BC}	1.094^{BCDE}	1.146^{CDE}
W-36	0.037^{C}	0.127^{B}	0.240^{B}	0.444^{B}	0.606^{BC}	0.795^{CD}	0.949^{C}	1.070^{D}	1.148^{BCDE}
W-98	0.038^{B}	0.138^{A}	0.264^{A}	0.486^{A}	0.659^{A}	0.884^{A}	1.020^{A}	1.146^{A}	1.209^{A}
CV-20	0.035^{D}	0.119^{C}	0.232^{C}	0.417^{C}	0.597^{C}	0.772^{D}	0.927^{C}	1.048^{E}	1.120^{DE}
ISA White E[1]	0.040^{A}	0.129^{B}	0.247^{B}	0.459^{B}	0.619^{BC}	0.808^{BCD}	0.958^{BC}	1.076^{CDE}	1.136^{CDE}
Average	0.039	0.130	0.248	0.457	0.629	0.821	0.971	1.092	1.159

^{ABCDE}Denotes significant differences between strains.

[1]E Indicates an Experimental Line.

Table 5. Bi-weekly Feed Consumption of White-Egg Entries, 36th NCLP&MT

Breeder	(Weeks of Age) 1-2	3-4	5-6	7-8	9-10	11-12	13-14	15-16	1-16
	(kg per bird)								
LSL-Lite	0.228	0.453^{A}	0.628^{AB}	0.940^{CDE}	1.022^{B}	1.029^{BC}	1.045^{B}	0.883^{BC}	6.228^{BC}
Bovans White E[1]	0.221	0.429^{AB}	0.624^{AB}	0.979^{ABC}	1.047^{B}	1.063^{ABC}	1.085^{AB}	0.913^{AB}	6.361^{AB}
Bovans White	0.211	0.409^{B}	0.571^{C}	0.894^{E}	0.950^{C}	1.008^{C}	0.993^{C}	0.845^{C}	5.880^{D}
Dekalb White E[1]	0.218	0.438^{A}	0.624^{AB}	0.993^{AB}	1.052^{B}	1.081^{AB}	1.081^{AB}	0.910^{AB}	6.398^{AB}
Dekalb White	0.214	0.442^{A}	0.606^{B}	0.925^{DE}	1.002^{BC}	1.018^{C}	1.043^{BC}	0.874^{C}	6.125^{C}
W-36	0.216	0.428^{AB}	0.605^{BC}	0.951^{BCD}	1.001^{BC}	1.016^{C}	1.052^{B}	0.890^{AB}	6.159^{BC}
W-98	0.218	0.443^{A}	0.647^{A}	1.005^{A}	1.115^{A}	1.095^{A}	1.122^{A}	0.928^{A}	6.574^{A}
CV-20	0.207	0.425^{AB}	0.602^{BC}	0.958^{ABCD}	0.998^{BC}	1.024^{BC}	1.056^{B}	0.904^{AB}	6.174^{BC}
ISA White E[1]	0.217	0.452^{A}	0.612^{AB}	0.961^{ABCD}	1.024^{B}	1.016^{C}	1.059^{B}	0.875^{B}	6.217^{BC}
Average	0.217	0.435	0.613	0.956	1.024	1.039	1.059	0.892	6.235

^{ABCD}Denotes significant differences between strains.

[1]E Indicates an Experimental Line.

Table 6. Total Nutrient Intake, Feed Cost, Livability, and Flock Uniformity of White-Egg Entries, 36th NCLP&MT

Breeder	Protein	Met. Energy	Lysine	TSAA	Feed Cost	Livability (1-112 d)	Flock Uniformity
	(per bird to 112 days)						(% of pullets within ±10% of x̄)
	(g)	(kcal)	(g)	(g)	($)	(%)	
LSL-Lite	855.0	14,111	24.6	34.9	0.90	99.4	91.3
Bovans White E[1]	858.3	14,070	25.4	35.0	0.90	99.6	87.9
Bovans White	811.3	13,304	24.0	33.1	0.85	99.3	81.1
Dekalb White E[1]	833.0	13,607	24.8	33.9	0.87	98.6	82.4
Dekalb White	843.8	13,836	24.8	34.4	0.89	99.9	88.6
W-36	842.6	13,981	24.1	34.4	0.89	99.9	82.2
W-98	897.2	14,825	26.0	36.6	0.95	99.6	91.8
CV-20	840.4	14,010	23.7	34.4	0.89	99.8	86.9
ISA White E[1]	835.8	13,848	23.9	34.1	0.89	99.7	83.2
Average	845.8	13,944	24.6	34.5	0.89	99.5	86.2

[1]E Indicates an Experimental Line.

Table 7. Bi-weekly Body Weights of Brown-Egg Entries, 36th NCLP&MT

Breeder	(Weeks of Age) 0	2	4	6	8	10	12	14	16
	(kg)								
Bovans Brown	0.039[B]	0.135	0.267	0.526	0.755[A]	0.991[AB]	1.171[A]	1.328[A]	1.417[A]
Bovans Goldline	0.042[A]	0.140	0.273	0.535	0.768[A]	1.009[A]	1.185[A]	1.337[A]	1.427[A]
Hy-Line Brown	0.037[C]	0.133	0.267	0.509	0.723[B]	0.946[B]	1.118[B]	1.249[B]	1.342[B]
Average	0.039	0.136	0.269	0.523	0.749	0.982	1.158	1.304	1.396

[ABC]Denotes significant differences between strains.

Table 8. Bi-weekly Feed Consumption of Brown-Egg Entries, 35th NCLP&MT

	(Weeks of Age)								
Breeder	1-2	3-4	5-6	7-8	9-10	11-12	13-14	15-16	1-16
	(kg per bird)								
Bovans Brown	0.213	0.447	0.690[A]	1.065	1.143	1.065	1.173[A]	0.958[A]	6.755[A]
Bovans Goldline	0.205	0.443	0.682[A]	1.072	1.144	1.070	1.159[A]	0.949[A]	6.725[A]
Hy-Line Brown	0.209	0.447	0.636[B]	1.022	1.103	1.044	1.086[B]	0.879[B]	6.427[B]
Average	0.209	0.446	0.669	1.053	1.139	1.060	1.139	0.929	6.636

[AB]Denotes significant differences between strains.

Table 9. Total Nutrient Intake, Feed Cost, Livability, and Flock Uniformity of Brown-Egg Entries, 36th NCLP&MT

Breeder	Protein	Met. Energy	Lysine	TSAA	Feed Cost	Livability (1-112 d)	Flock Uniformity
	(per bird to 112 days)						(% of pullets within ±10% of $\bar{x}$)
	(g)	(kcal)	(g)	(g)	($)	(%)	
Bovans Brown	916.2[A]	15,032.0[A]	27.0[A]	37.3[A]	0.96[AB]	98.5	93.9
Bovans Goldline	927.5[A]	15,398.5[A]	26.6[A]	37.9[A]	0.98[A]	98.9	93.0
Hy-Line Brown	852.8[B]	14,178.1[B]	24.2[B]	34.8[B]	0.91[B]	98.2	88.1
Average	898.8	14,869.2	25.9	36.7	0.95	98.5	91.7

[AB]Denotes significant differences between strains.

Table 10. Entries in the 36th NCLP&MT by Breeder, Stock Suppliers, and Categories

Breeder	Stock	Category[1]	Source
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
	Hy-Line Brown	I-A	(Same)
	W-98	I-A	Hy-Line North America 79 Industrial Rd E-town, PA 17022
	CV-20	I-A	(Same)
Lohmann Tierzucht Inc., N.A. 2433 Bethany Rd Sycamore, IL 60178	Lohmann LSL-Lite	I-A	Hy-Line North America 79 Industrial Rd E-town, PA 17022
Centurion Poultry 1471 Lane Creek Road Bogart, GA 30622	Bovans White	I-A	Centurion Poultry Inc. P.O. Box 591 86 O'Neal Road Lexington, GA 3064822
	Bovans White Experimental	III-A	(Same)
	Bovans Brown	I-A	(Same)
	Bovans Goldline	I-A	(Same)
Centurion Poultry 1471 Lane Creek Road Bogart, GA 30622	Dekalb White	I-A	Centurion Poultry Inc. P.O. Box 591 86 O'Neal Road Lexington, GA 3064822
	Dekalb White Experimental	III-A	(Same)
ISA North America Box 400 Cambridge, Ontario Canada N1R 5V9	ISA White Ex-perimental	III-A	Cox Brothers Poultry Farm R.R. #1 Maitland, Nova Scotia Canada B0N 1T0

[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.