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REPORT ON PULLET REARING PERIOD 35th NORTH CAROLINA LAYER PERFORMANCE AND MANAGEMENT TEST[1]

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. Raymond Coltrain 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 35th 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.

35th NORTH CAROLINA LAYER PERFORMANCE AND MANAGEMENT TEST
Volume 35 No. 2

Report on Pullet Rearing Period

Dates of Importance:

The eggs for the 35th NCLP&MT were set on December 18, 2002 at the North Carolina Department of Agriculture and Consumer Services, Piedmont Research Station, Poultry Unit at Salisbury, NC. The flock was hatched on January 8, 2003 and the pullets were moved to the laying facilities on April 30 to May 1, 2003 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/acquired 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. 35, No. 1). A total of seven white egg and three brown egg strains were entered in the test for a total of ten 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 624 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 cage rows, cage levels, and throughout the length of the house 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 2 rearing rooms of 7,488. 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 35th 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 here 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. This meant that the dietary regimen would be altered in order to meet the birds body weight goals. In this flock, the birds grew extremely well which meant that the dietary regimen was altered in order to slow the development of the pullets to prevent overweight pullets. This was accomplished by switching to the Grower diet at approximately 4 weeks, to the Developer 1 at approximately 6 weeks, and Developer 2 at 12 weeks of age. 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 below. At 10 wk of age the pullets' beaks were evaluated to determine the extent of regrowth. Regrowth was determined to be excessive in the brown egg strains, therefore the pullets were retrimmed at 11 weeks of age.

Age	Date	Event
Hatch	January 8, 2003	MVT Marek's Vac. By injection in neck
Day 7 thru Day 9	January 15, 2003 thru January 17, 2003	Precision Beak Trim[1] all replicates of the flock
Day 10	January 18, 2003	Newcastle (B1) and Bronchitis (Mass.) Via aerosol spray (Triple Vac)
Day 35	February 12, 2003	Newcastle (LaSota) and Bronchitis (Mass.) Via aerosol spray (ComboVac)
Day 63	March 12, 2003	Newcastle (LaSota) and Bronchitis (Mass.) Via aerosol spray (ComboVac)
Day 70	March 19, 2003	Fowl Pox and Avian Encephalomyelitis Vaccination via the wig web
Day 77 thru Day 80	March 26, 2003 thru March 30, 2003	Beak Trim those replicates designated as regrowth to curb layer house mortality
Day 105	April 23, 2003	Newcastle (Lasota) and Bronchitis (Mass.) Via aerosol spray (ComboVac)

[1]Brown-egg strains were trimmed due to regrowth of the beak trimming done at 7 days, all brown egg strains were retrimmed.

Lighting Schedule

The lighting schedule for the pullet controlled environment facility is outlined below:

Age	Date	Photoperiod (hrs/day)
Days 1-2	January 8 to 9, 2003	24
Day 3	January 11, 2003	23
Day 5	January 13, 2003	22
Day 7	January 15, 2003	21
Day 9	January 17, 2003	20
Day 11	January 19, 2003	19
Day 13	January 21, 2003	18
Day 15	January 23, 2003	17
Day 17	January 25, 2003	16
Day 19	January 27, 2003	15
Day 21	January 29, 2003	14
Day 23	January 31, 2003	13
Day 25	February 2, 2003	12
Day 27	February 4, 2003	11
Day 29	February 6, 2003	9
Day 42	February 21, 2003	8.5
Week 13	April 9, 2003	10
Week 14	April 16, 2003	11
Week 15	April 23, 2003	12
Week 16	April 30, 2003	13
Week 17 (Move to house 5)	April 30 to May 1, 2003	14
Week 18	May 14, 2003	14.5

Diet Formulations

BROOD-GROW PERIOD DIETS
Diet[1] Identification

Ingredient	Starter	Grower	Developer 1	Developer 2	Pre-Lay
Corn	1011.2	1089.3	1209.4	1196.1	958.3
Fat (Tallow)	---	---	---	1.3	82.0
Soybean meal	286.0	50.0	50.0	50.0	622.0
EXT/EXP Soy	300.0	333.3	200.0	276.0	---
Soybean Hulls	---	---	50.0	50.0	---
Wheat Midds	170.0	238.9	302.0	200.0	---
Gluten Meal 60%	148.0	200.0	100.0	100.0	100.0
D.L. Methionine	1.0	2.0	3.1	2.7	3.2
Lysine 78.8%	2.8	3.0	5.0	3.0	---
Oyster Shell	---	---	---	---	75.0
Limestone	32.0	35.1	32.0	70.0	113.0
Bi-Carbonate	2.5	2.5	2.5	2.5	3.0
Phosphate Mono/D	32.5	32.5	33.0	35.0	30.0
Salt	6.5	6.2	6.0	6.4	6.0
Vit. Premix	1.0	1.0	1.0	1.0	1.0
Min. premix	1.0	1.0	1.0	1.0	1.0
Mold Inhibitor	2.0	2.0	2.0	2.0	1.0
T-Premix	1.0	1.0	1.0	1.0	1.0
.06% Sel. Premix	1.0	1.0	1.0	1.0	1.0
Choline Cl 60%	1.5	1.2	1.0	1.0	2.5
Total	2000	2000	2000	2000	2000
Calculated Nutrient Values					
Protein %	20.0	16.6	14.1	14.8	21.5
ME kcal/kg	2802	2802	2802	2802	2928
Calcium %	1.02	1.05	1.00	1.75	4.01
T. Phos. %	0.79	0.79	0.75	0.75	0.64
Lysine %	0.50	0.50	0.49	0.40	0.43
TSAA %	0.73	0.69	0.65	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 1, Developer 2, 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 1-3 and 4-6, 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 the table 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 who's 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)[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.

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

Table 1. Body Weight of White-Egg Entries, 35th NCLP&MT

	(Weeks of Age)								
Breeder	0	2	4	6	8	10	12	14	16
	(kg)								
Dekalb White	.039^{BC}	.132^{BC}	.266^{C}	.42	.59	.72^{B}	.85	.98^{C}	1.07
W-36	.041^{AB}	.139^{AB}	.272^{ABC}	.42	.60	.75^{B}	.88	1.03^{ABC}	1.13
W-98	.036^{D}	.143^{A}	.288^{A}	.45	.64	.81^{A}	.92	1.08^{A}	1.19
CV-20	.042^{A}	.137^{ABC}	.273^{ABC}	.43	.60	.76^{AB}	.89	1.04^{ABC}	1.14
Bovans White Exp	0.40^{B}	.138^{AB}	.285^{AB}	.44	.62	.77^{AB}	.91	1.05^{AB}	1.17
Bovans White	0.42^{A}	.142^{A}	.2682^{ABC}	.44	.61	.75^{B}	.87	1.00^{BC}	1.09
LSL-Lite	0.38^{C}	.130^{C}	.269^{BC}	.43	.61	.75^{B}	.89	1.01^{BC}	1.12
Average	0.39	.137	.276	.43	.61	.76	.89	1.03	1.13

^{ABC} Denotes significant differences between strains

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

Table 2. Feed Consumption of White-Egg Entries, 35th 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)								
Dekalb White	.22	.38	.51	.73	$.82^{D}$	$.91^{C}$	$.88^{D}$	1.12^{C}	5.57^{C}
W-36	.24	.40	.55	.80	$.95^{ABC}$	$.99^{AB}$	$.97^{ABC}$	1.21^{AB}	6.11^{AB}
W-98	.22	.40	.54	.79	$.98^{A}$	1.03^{AB}	1.03^{A}	1.27^{A}	6.27^{A}
CV-20	.24	.40	.55	.80	$.96^{AB}$	1.01^{AB}	$.97^{ABC}$	1.21^{AB}	6.14^{A}
Bovans White Exp	.24	.41	.57	.82	1.01^{A}	1.04^{A}	1.00^{AB}	1.24^{A}	6.33^{A}
Bovans White	.23	.41	.55	.78	$.91^{BC}$	$.96^{BC}$	$.94^{BCD}$	1.20^{AB}	5.99^{AB}
LSL-Lite	.21	.40	.53	.77	$.88^{CD}$	$.90^{C}$	$.92^{CD}$	1.15^{BC}	5.74^{BC}
Average	.23	.40	.54	.78	.93	.98	.96	1.20	6.02

^{ABCD} Denotes significant differences between strains

Table 3. Feed Cost and Livability of White-Egg Entries, 35th 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 mean or $\bar{X}$)
	(g)	(kcal)	(g)	(g)	($)	(%)	
Dekalb White	834.4^{C}	15145^{D}	48.6^{D}	35.9^{D}	0.95^{D}	2.6^{AB}	85.0
W-36	923.7^{AB}	16711^{AB}	53.7^{AB}	39.8^{AB}	1.06^{AB}	1.0^{BC}	79.2
W-98	964.8^{A}	17451^{A}	56.0^{A}	41.6^{A}	1.10^{A}	0.6^{C}	85.8
CV-20	883.1^{BC}	15957^{BCD}	51.4^{BCD}	38.0^{BCD}	1.01^{BCD}	0.7^{C}	78.3
Bovans White Exp	890.8^{BC}	16148^{BCD}	51.9^{BCD}	38.3^{BCD}	1.02^{BCD}	3.1^{A}	88.3
Bovans White	900.8^{B}	16274^{BC}	52.4^{BC}	38.7^{BC}	1.03^{BC}	2.1^{ABC}	85.0
LSL-Lite	871.7^{BC}	15298^{CD}	50.1^{CD}	36.6^{CD}	0.97^{CD}	4.8^{A}	87.5
Average	895.6	16141	52.0	38.4	1.02	2.1	84.2

^{ABCD} Denotes significant differences between strains

Table 4. Body Weight of Brown-Egg Entries, 35th NCLP&MT

Breeder	0	2	4	6	8	10	12	14	16
	(Weeks of Age)								
	(kg)								
Hy-Line Brown	0.37[B]	.135	.30	.48	.70	.90	1.02	1.18	1.33
Bovans Brown	0.37[B]	.134	.29	.48	.68	.89	1.06	1.24	1.40
Bovans Goldline	0.41[A]	.143	.31	.51	.68	.90	1.02	1.21	1.36
Average	.038	.137	.30	.49	.67	.90	1.03	1.21	1.36

[AB]Denotes significant differences between strains.

Table 5. Feed Consumption of Brown-Egg Entries, 35th NCLP&MT

Breeder	1-2	3-4	5-6	7-8	9-10	11-12	13-14	15-16	1-16
	(Weeks of Age)								
	(kg per bird)								
Hy-Line Brown	.21	.42	.59	.86[A]	1.03	.97	.89	1.10[B]	6.07
Bovans Brown	.21	.43	.56	.77[B]	.99	.99	.93	1.19[A]	6.06
Bovans Goldline	.22	.43	.61	.81[AB]	1.02	.95	.89	1.15[AB]	6.09
Average	.21	.43	.59	.81	1.01	.97	.90	1.15	6.07

[AB]Denotes significant differences between strains.

Table 6. Nutrient Intake, Feed Cost, and Livability of Brown-Egg Entries, 35th 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 mean or $\bar{X}$)
	(g)	(kcal)	(g)	(g)	($)	(%)	
Hy-Line Brown	929.3	16507	53.6	39.4	1.04	2.7	84.2
Bovans Brown	922.8	16711	53.7	39.8	1.06	1.5	70.8
Bovans Goldline	930.3	16856	54.1	40.1	1.06	1.0	77.5
Average	927.5	16691	53.8	39.7	1.05	1.7	77.5

Entries 35th NCLP&MT
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
	W-98	I-A	(Same)
	CV-20	I-A	(Same)
	Hy-Line Brown	I-A	(Same)
Lohmann Tierzucht Inc., N.A. 2433 Bethany Rd Sycamore, IL 60178	Lohmann LSL-Lite	I-A	Brickland Enterprises Inc. P.O. Box 626 Blackstone, VA 2382
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

[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