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**REPORT ON PULLET REARING PERIOD
34th NORTH CAROLINA LAYER PERFORMANCE
AND MANAGEMENT TEST¹**

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Vol. 34, No. 2
February 2001

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 the Piedmont Research Station Superintendent; Mr. David Joyce 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 34th North Carolina Layer Performance and Management Test.

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In memory of

Dr. Grady A. Martin, Professor of Poultry Science and Genetics passed away on January 29, 2001 at the age of 77. Dr. Martin the founder and first principle investigator of the North Carolina Layer Performance and Management Test, established this test in 1958 and was the Principle Investigator until his retirement in 1985. Grady is survived by his wife Geneva,

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.

Employment and program opportunities are offered to all people regardless of race, color, national origin, sex, age or handicap. North Carolina State University, North Carolina A&T State University, U.S. Department of Agriculture, and local governments cooperating.

Scholarship Fund was established at North Carolina State University if you wish to make a contribution in memory of Dr. Grady Martin. Information on the scholarship fund can be obtained at (919)515-2614.

**34th NORTH CAROLINA LAYER PERFORMANCE AND
MANAGEMENT TEST
Volume 34 No. 2**

Report on Pullet Rearing Period

Dates of Importance:

The eggs for the 34th NCLP&MT were set on July 18, 2000 at the Piedmont Research Station (NCDA) Poultry Unit. The flock was hatched on August 9, 2000 and the pullets were moved to the laying facilities on November 29-30, 2000 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 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. 34, No. 1). A total of six white egg and three brown egg strains were entered in the test for a total of nine 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 1000 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 in House 8 of 14,976. 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 for the white-egg layers. The same number 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 and accidental deaths from a replicate have been excluded from the 34th NCLP&MT Grow Report from day 1 through 8. Starter (with Amprol at 454 g/ton), Grower and Developer diets are provided in the diet formulation section. Each pullet placed was provided with 1 kg of Starter per bird. Thus, the white-egg and brown-egg replicates in brood-grow House 8 (52 females) were given 52 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 to 16 weeks of age, all strains were provided with the developer diet. 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. This was accomplished by switching to the grower diet at 4 weeks of age and to the finisher at 8 weeks of age.

Precision Beak Trimming:

Beak trimming was begun at 14 days of age using a Lyons Precision beak trimmer, with an 14/64" 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 not extensive enough to warrant retrimming at 11 wk, therefore no pullets were retrimmed.

<u>Age</u>	<u>Date</u>	<u>Event</u>
Hatch	August 9, 2000	MVT Merek's Vac. By injection in neck
Day 10	August 19, 2000	Newcastle (B1) and Bronchitis (Mass.) Via aerosol spray (Triple Vac)
Day 14 thru Day 16	August 23, 2000 August 25, 2000	Precision Beak Trim ¹ all replicates of the flock
Day 35	September 13, 2000	Newcastle (LaSota) and Bronchitis (Mass.) Via aerosol spray (ComboVac)
Day 63	October 11, 2000	Newcastle (LaSota) and Bronchitis (Mass.) Via aerosol spray (ComboVac)
Day 70	October 18, 2000	F o w l P o x a n d A v i a n Encephalomyelitis Vaccination via the wig web
Day 77 thru Day 80	October 25, 2000 October 28, 2000	Beak Trim those replicates designated as regrowth to curb layer house mortality
Day 105	November 22, 2000	Newcastle (Lasota) and Bronchitis (Mass.) Via aerosol spray (ComboVac)
Week 70	December 13, 2001	Newcastle (LaSota) and Bronchitis (Mass.) Via aerosol spray (ComboVac)

¹Brown-egg strains were trimmed due to regrowth of the beak trimming done at 14 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	August 9 to 10, 2000	24
Day 3	August 11, 2000	23
Day 5	August 13, 2000	22
Day 7	August 15, 2000	21
Day 9	August 17, 2000	20
Day 11	August 19, 2000	19
Day 13	August 21, 2000	18
Day 15	August 23, 2000	17
Day 17	August 25, 2000	16
Day 19	August 27, 2000	15
Day 21	August 29, 2000	14
Day 23	August 31, 2000	13
Day 25	September 2, 2000	12
Day 27	September 4, 2000	11
Day 29	September 6, 2000	10
Day 42	September 20, 2000	9.5
Day 44	September 22, 2000	9
Week 13	November 8, 2000	10
Week 14	November 15, 2000	11
Week 15	November 22, 2000	12
Week 16	November 29, 2000	13
Week 17 (Move to houses 4&5)	November 29 to 30, 2000	14
Week 18	December 13, 2000	14.5

Diet Formulations

BROOD-GROW PERIOD DIETS

Diet¹ Identification

Ingredient	Starter	Grower	Developer
	-----%-----		
Corn	55.42	68.40	70.40
Soybean meal	31.60	23.50	18.60
Wheat Midds	5.00	3.20	3.75
Fat (Feed Grade)	2.30		.50
Gluten Meal 60%	1.60		
D.L. Methionine		.03	.09
Lysine 78.8%			.05
Soybean Hulls	.22	.33	.33
Limestone	1.75	1.75	3.85
Bi-Carbonate	.25	.20	.17
Phosphate Mono/D	2.00	1.83	1.65
Salt	.25	.30	.30
Vit. premix	.05	.05	.05
Min. premix	.05	.05	.05
Mold Inhibitor	.10	.10	.10
T-Premix	.05	.05	.05
.06% Selenium Premix	.03	.02	.03
Choline Cl 60%	.34	.19	.03
Protein %	21.0	17.0	15.0
ME kcal/kg	2970.0	2970.0	2970.0
Calcium %	0.90	1.10	1.87
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 1-3 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. See more complete information 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.

Feed Cost per Bird to 112 Days:

Calculated feed cost per bird to 112 days. Using average regional feed prices; Starter \$157.10/T; Grower \$146.20/T; Developer \$145.19/T and Pre-Lay Diet \$170.00.

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 from day 1 through 8.

Body Weights (2, 4, 6, 8...16 Weeks):

Bi-weekly average body weights of all birds within representative cages. Sample size 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.

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

Metric Conversions

$$1 \text{ lb} = 453.6 \text{ g}$$

$$1 \text{ lb} = .4536 \text{ kg}$$

$$1 \text{ oz} = 28.35 \text{ g}$$

$$1 \text{ g} = .03527 \text{ oz}$$

$$1 \text{ kg} = 2.204 \text{ lb}$$

$$1 \text{ g} = 1000 \text{ mg}$$

$$1 \text{ kg} = 1000 \text{ g}$$

Table 1. Body Weight¹ of White-Egg Entries, 34th NCLP&MT

Breeder	------(Weeks of Age)-----							
	2	4	6	8	10	12	14	16
	------(kg)-----							
	-							
Bovans White	.14	.28	.45	.64	.79	.93	1.03	1.14
Bovans White(Exp.)	.14	.29	.45	.66	.84	.97	1.08	1.20
Hy-Line W-98	.15	.31	.49	.70	.90	1.06	1.17	1.30
Hy-Line W-36	.13	.28	.44	.64	.81	.97	1.08	1.21
Dekalb White	.14	.30	.46	.64	.81	.95	1.05	1.17
Dekalb Sigma	.13	.27	.43	.63	.81	.96	1.08	1.20
Average	.14	.29	.45	.65	.83	.97	1.08	1.20

^{ABC} Denotes significant differences between strains

¹The average initial body weight was 36.9g ± 0.2.

Table 2. Feed Consumption of White-Egg Entries, 34th 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)-----								
	--								
Bovans White	.28	.39	.46	.71	.84	.95	.89	.94	5.46
Bovans White (Exp.)	.30	.39	.49	.77	.92	1.01	.95	1.00	5.83
Hy-Line W-98	.28	.41	.50	.78	.90	1.02	.95	1.08	5.92
Hy-Line W-36	.28	.38	.46	.72	.89	1.04	.97	1.04	5.78
Dekalb White	.28	.40	.48	.70	.85	.96	.91	.96	5.54
Dekalb Sigma	.28	.39	.48	.77	.92	1.03	.98	1.09	5.94
Average									

^{AB} Denotes significant differences between strains

Table 3. Feed Cost and Livability of White-Egg Entries, 34th NCLP&MT

Breeder	Pro- tein	Met. Energy	Lysine	TSAA	Feed Cost	Livability (1-112 d)	Flock Uniformity
	------(per bird to 112 days)-----						
	(g)	(kcal)	(g)	(g)	(\$)	(%)	(% of pullets within $\pm 10\%$ of \bar{x})
Bovans White						99.3 ^A	
Bovans White (Exp.)						98.4 ^B	
Hy-Line W-98						99.5 ^A	
Hy-Line W-36						98.8 ^B	
Dekalb White						98.6 ^B	
Dekalb Sigma						97.9 ^C	
Average						98.8	

^{ABC} Denotes significant differences between strains

Table 4. Body Weight¹ of Brown-Egg Entries, 34th NCLP&MT

Breeder	------(Weeks of Age)-----							
	2	4	6	8	10	12	14	16
	------(kg)-----							
Bovans Brown	.14	.31	.52	.77	.98	1.15	1.28	1.47
Dekalb Brown	.15	.31	.53	.80	1.01	1.18	1.31	1.47
Hy-Line Brown	.14	.31	.52	.77	.99	1.16	1.30	1.46
Average	.14	.31	.52	.78	.99	1.16	1.30	1.47

¹The average initial body weight was 37.6g ± 0.6.

Table 5. Feed Consumption of Brown-Egg Entries, 34th 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)-----								
	--								
Bovans Brown	.25	.39	.56	.85	.95	1.04	.94	1.04	6.02
Dekalb Brown	.28	.40	.56	.88	.96	1.04	.94	1.41	6.47
Hy-Line Brown	.26	.39	.56	.86	.97	1.05	.95	1.03	6.07
Average	.26	.39	.56	.86	.96	1.04	.94	1.16	6.17

Table 6. Nutrient Intake, Feed Cost, and Livability of Brown-Egg Entries, 34th NCLP&MT

Breeder	Pro- tein	Met. Energy	Lysine	TSAA	Feed Cost	Livability (1-112 d)	Flock Uniformity
	------(per bird to 112 days)-----						(% of pullets within $\pm 10\%$ of \bar{x})
	(g)	(kcal)	(g)	(g)	(\$)	(%)	
Bovans Brown						97.6 ^B	
Dekalb Brown						98.6 ^A	
Hy-Line Brown						98.5 ^A	
Average						98.2	

^{AB} Denotes significant differences between strains

Entries 34th NCLP&MT
Stock Suppliers and Categories

<u>Breeder</u>	<u>Stock</u>	<u>Category</u> ¹	<u>Source</u>
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)
	Hy-Line Brown	I-A	(Same)
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)
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 Sigma	I-A	(Same)
	Dekalb Brown	I-A	(Same)

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