

**FINAL REPORT OF THE THIRTY EIGHTH
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 North Carolina Layer Performance and Management Program, 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 the Director for the program and 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 first production cycle and molt of the 38th North Carolina Layer Performance and Management Test (Cage Production). Performance summary tables are available for each strain, and molt treatment.

Copies of current and past reports are maintained for public access at
http://www.ces.ncsu.edu/depts/poulsci/tech_info.html#layer

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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.

38th NORTH CAROLINA LAYER PERFORMANCE AND MANAGEMENT TEST

Volume 38 No. 5

Report on First Laying Cycle, Molt, and Second Laying Cycle

Entries and Strains:

A total of eleven white egg, seven brown egg strains, and one heritage strain were entered for a total of nineteen strains that were accepted in accordance with the rules and regulations of the test. The strain names and egg color designations are shown in Table 1. In this report the production data will only represent the hens which are housed in cages (Participation C).

**Table 1. 38th North Carolina Layer Performance and Management Test
Strain Code Assignments and**

Strain No.	Source of Stock	Source Code	Strain	Participation ¹
1	Hy-Line	HL	W-36	C
2	Hy-Line	HL	W-98	C, CF
3	Lohmann	L	H&N Nick Chick	C
4	Lohmann	L	LSL Lite	C
5	ISA	ISA	Bovans White	C
6	ISA	ISA	Shaver White	C
7	ISA	ISA	Dekalb White	C
8	ISA	ISA	Babcock White	C
9	ISA	ISA	EXP. White	C
10	Novogen	N	White	C
11	ISA	ISA	Bovans Robust	C
12	Hy-Line	HL	Brown	C, CF, R
13	Hy-Line	HL	Silver Brown	C, CF, R
14	Tetra Americana	TA	TETRA Brown	C, CF
15	Tetra Americana	TA	TETRA Amber	C, CF
16	ISA	ISA	Brown	C, CF
17	ISA	ISA	Bovans Brown	C, CF
18	Novogen	N	Brown	C
19	NCSU	NC	BPR	C, CF, R

¹Participation for each strain in the different components of the tests are indicated by the following codes, a strain may have more than one code: Cage=C; Cage Free = CF; Range = R

In the layer test, approximately 760 white and brown egg type pullets/strain were placed at the initiation of the rearing portion of the test. However, if the number of hens needed were below the prescribed numbers, they were divided as equally as possible between the levels and replicates within the layer house and placement into the layer test was adjusted appropriately.

Dates of Importance:

The nineteen entries were hatched on January 6, 2010. The chicks were all sexed according to their genetics (vent, feather, or color), vaccinated for Marek's disease, and wing banded for identification before being transferred to the brood/grow house. Table 1 shows the source of the laying stock, strain which was entered, and participation in the test environments and Table 36 provides the breeder, source of eggs, and entry status of each strain(Cage, Cage Free, or Range Environment).

The rearing phase for the range, cage free, and the cage reared pullets complete the grow phase at 16 wks, then transitioned to the laying phase during their 17th wk of age. First cycle production records commenced on May 5, 2010 (17 weeks of age), through the molt period which was induced on May 4, 2011. The molt records commenced on May 4, 2011 (69 weeks of age), and ended on June 1, 2011 (73 weeks of age). The second cycle began on June 1, 2011 (73 weeks of age) and ended on February 15, 2012 (110 weeks of age) This report includes production data summarized from 17 to 69 weeks, 69 to 73 weeks, and 73-110 weeks. A table showing the changes in body weights from 17 to 69 wk of age, weight loss during the molt period, and overall weight gain is included in the information.

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 58 % of the house and brown egg strains occupied the other 42 % of the house. All strains were assigned to be represented as equally as possible in each of room, row, and levels.

The chicks from the brown egg strains destined for the range study were randomly assigned to the growing pens throughout House 2. This work will not be reported further until the single cycle report.

House 8--is an environmental controlled closed brood-grow facility with 3 banks of quad-deck cages in each room. Each room was assigned a number, each side of each bank was assigned a row number, 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 consisted 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. The 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 in², 4.7 cm (1.8 in) of feeder space/bird and 1:6.5 nipple drinkers to bird ratio. 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.

Layer Housing:

The hens were randomly assigned to the replicate cages with white egg and brown egg strains being intermingled throughout the houses. The white egg strains occupied 58% of the house and brown egg strains occupied the other 42%. All strains were assigned to be represented as equally as possible in all rows, and levels.

Laying Hen Cage Facilities reported in this test consist of two houses. House 4 is a high rise, environmentally controlled facility with three banks of Quad-deck (4-tier) high cages. There are a total of 216 replicates which can support 4,428 hens. House 5 is a standard height totally enclosed force ventilated laying house with a scraper pit manure handling system. It has 2 banks of tri-deck (3 levels) cages and two banks with quad-deck (4 levels) cages. There are a total of 252 replicates in house 5 which can support 5,166 hens.

Table 2. Description of Replicates and Hen populations in the Cage Layer Housing

House	Replicates	Hens/rep.	hens/cage	Hen No.	Total Hens
4	108	21	7	2,268	
4	108	20	5	2,160	4,428
5	126	21	7	2,646	
5	126	20	5	2,520	5,166

Cage Layout Description

In both houses, each side of a bank was designated as a row and each row was divided into 9 8-foot replicates/level. The replicates are equipped with feed hoppers to supply and monitor feed consumption for each individual replicate and the feed is distributed by an automatic feeding system. The white-egg and brown-egg 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 cage sizes.

Test Design:

The arrangement for the laying test involved a completely randomized design and the main effects were set up in a factorial arrangement. The main effects within Houses 4 and 5 were strain and density. Following are general descriptions of the main effects:

Strain

The samples of fertile eggs from commercial breeder flocks were provided directly by the breeders involved. All eggs were set and hatched concurrently. A total of eleven white egg strains, 7 brown egg strains, and 1 heritage strain participated in the test. See the 38th Hatch Report (Vol. 38, No. 1) for details.

Density

In Houses 4 and 5, all individual replicates within each block contained one strain of layers. The cage density in both houses was dictated by the cage size that was either 61 or 81 cm wide and 41 cm deep. This allowed for two density combinations of 73 in² (471 cm²) at 7 hens/cage (81 x 41 cm) and 77 in² (497 cm²) at 5 hens/cage (61x 41 cm).

Table 3. Population and Density Allocations in Houses 4 and 5

Hens per Cage	Cage Size Width Depth	Floor Space per Bird	Feeder Space per Bird	Water Nipples per Cage
5	61 cm x 40.7 cm	497 cm ² (77 in ²)	12.2 cm 4.8 in	2
7	81.2 cm x 40.7 cm	471 cm ² (73 in ²)	11.6 cm 4.6 in	2

Table 4. Laying House and Molting Lighting Schedules

Age	Date	House 4 (Light Hours)	House 5 (Light Hours)
Housing Pullets	April 28 to May 5, 2010	10.0	10.0
17 Weeks ¹	May 5, 2010	11.0	11.0
18 Weeks	May 12, 2010	11.5	11.5
19 Weeks	May 19, 2010	12.0	12.0
20 Weeks	May 26, 2010	12.5	12.5
21 Weeks	June 2, 2010	13.0	13.0
22 Weeks	June 9, 2010	13.5	13.5
23 Weeks	June 16, 2010	14.0	14.0
24 Weeks	June 23, 2010	14.25	14.25
25 Weeks	June 30, 2010	14.5	14.5
26 Weeks	July 7, 2010	14.75	14.75
27 Weeks	July 14, 2010	15.0	15.0
28 Weeks	July 21, 2010	15.25	15.25
29 Weeks	July 28, 2010	15.5	15.5
30 Weeks	Aug. 4, 2010	15.75	15.75
31 Weeks	Aug. 11, 2010	16.0	16.0
Through 69 Weeks	May 4, 2011	16.0	16.0
73 Weeks through	June 1, 2011	See Molt Lighting Program	
110 Weeks	Feb. 15, 2012		

Layer Management (Molting):

The molt was conducted utilizing all hens involved in the layer test except for rows 1 and 2 in both Houses 4 and 5.

Full Fed Control (NM) replicates were assigned rows 1 and 2 and were maintained according to the standard management program as outlined previously. The laying house will be partitioned such that the lighting program will be consistent for maximum egg production.

Non-anorexic Molt Program (NA) hens were fed a low protein, low energy diet with supplemental Ca for maintenance. It was designed to keep hens out of production and provide balanced nutrition for body maintenance only. The diet is bulky, such that a full trailer load will only weigh 2/3 of a normal full load. The birds in the replicates being molted were weighed every other day until target weight was reached then that replicate and sister replicates were returned to the resting diet until the end of the molting period. The induced molt was started at 69 wks of age.

The research project was to develop a standard weight loss curve which can be utilized by the egg industry in managing a non-anorexic molt program. Body weights were taken every other day. On 2 selected strains body weights were taken daily.

Procedural steps:

Day -7 Sample of birds will be weighed to determine the pre-molt weight. Target weight loss (25 % body weight) will be calculated using the pre-molt weight.

Day 0 NA program instigated with the remaining layer feed being removed and replaced with the NA molt diet and daylight hours reduced. Controlled light housing, reduce the day length to 9 hr. Remove morbid birds before feed restriction.

Day +28 Body weights were taken then the birds were fed layer diet and light stimulated.

Specific monitored criteria for all of the molt programs include the following:

The birds to attain approximately 25% body weight loss. Maintain house temperature at 80± 5° F, but the birds should not pant. House temperature management reacted to ambient environmental temperatures and weight loss rates.

The 1st post-molt production period light schedule is the guide by which the lights will be adjusted following the molt. Actual house conditions and the flock's reaction to the NCSU Non-Fasting Molting Program may affect how the light stimulation will actually be given. In general the hens ceased egg production by Day 6-10 of the molt program. However, some of the Brown egg strains never achieved 0 egg production. The hens were allowed to consume all of the molt feed provided between feedings. The molting ration is designed to keep hens out of production and to provide for skeletal and muscle maintenance. Livability was excellent with this program.

Table 5. Molting Lighting Schedules

Age	Date	House 4 (Light Hours)	House 5 (Light Hours)
Through 69 Weeks	May 4, 2011	16.0	16.0
69 Weeks	May 4, 2011	9.0 hr	9.0 hr
73 Weeks	June 1, 2011	15.5	15.5
74 weeks	June 8, 2011	16.0	16.0
75 Weeks through end of test (110 wk)	June 15, 2011 to Feb. 15, 2012	16.0	16.0

Layer Nutrition:

Layer diets are identified as Diets D, E, F, G, H, I, M, N, and O which consist of a pre-lay diet and a series of layer diets formulated to assure a daily protein, mineral and amino acid intake as shown below. Feed was offered ad libitum in accordance with the guidelines that all birds should receive acceptable nutrient intake at all times depending on the bird's age and production rate as shown in the Laying House Feeding Program Table.

The diets provided during the molt, consisted of a low protein/energy diet and a Resting Diet described in the Molt Diets Table which follow. The molt diets were formulated to provide nutrition for body maintenance. The Resting Diet provides layer with the nutrients needed to maintain a static body weight with no egg production.

Table 6. Minimum Daily Intake of Nutrients Per Bird at Various Stages of Production in the 38th NCLP&MT

Production Stage	Pre-Peak > 87%	87-80%	80-70%	<70%
White Egg Layers				
Protein ¹ (g/day)	19	18	17	16
Calcium (g/day)	4.0	4.1	4.2	4.3
Lysine (mg/day)	820	780	730	690
TSAA (mg/day)	700	670	630	590
Brown Egg Layers				
Protein ¹ (g/day)	20	19	18	17
Calcium (g/day)	4.0	4.0	4.1	4.2
Lysine (mg/day)	830	820	780	730
TSAA (mg/day)	710	700	670	630

¹ If the egg production is higher than predicted values protein intake should be increased by 1%

Note: House temperatures dictate the body maintenance demand of the hen if the house temperature is 75 to 80°F feed protein content should be increased accordingly to compensate for metabolic heat needed to maintain a homeostatic body temperature. If the house temperature is at or above 85°F no adjustment is needed.

Table 7. 38th NCLP&MT Laying House Feeding Program

Rate of Production	Consumption Per 100 Birds/Day (kg)	Diet Fed	
		White Egg Strains	Brown Egg Strains
Weeks 17-26	< 9.52	D	D
Pre-Peak and > 87%	< 9.52	D	D
	9.57-10.39	F	E
	10.43-11.29	H	G
	11.34-12.20	I	H
	12.25-13.11	M	I
	>13.15	N	M
80-87%	< 9.52	F	E
	9.57-10.39	G	F
	10.43-11.29	I	H
	11.34-12.20	M	I
	12.25-13.11	N	M
	>13.15	O	N
70-80%	< 9.52	H	G
	9.57-10.39	I	H
	10.43-11.29	M	I
	11.34-12.20	N	M
	12.25-13.11	O	N
	>13.15	O	O
< 70%	< 9.52	H	G
	9.57-10.39	I	H
	10.43-11.29	N	M
	11.34-12.20	O	N
	12.25-13.11	O	O
	>13.15	O	O

Note: Low house temperatures and egg production higher than breeder guides for any given hen age will require an adjustment to the dietary phase feeding program to ensure the hens are in a positive nutrient status.

Table 8. 38th NCLP&MT Laying Periods Feed Formulations D through H

Ingredients	D	E	F	G	H
Corn	866.71	925.46	997.91	1068.19	1131.97
Soybean meal	663.18	621.10	552.33	499.80	457.65
Wheat Midds					
Fat (Tallow)	110.88	102.43	87.73	74.61	64.32
Gluten Meal 60%	95.83	88.37	100.00	99.23	90.80
D.L. Methionine	3.08	2.89	2.52	2.26	2.48
Lysine 78.8%					
Soybean Hulls					
Ground Limestone	132.42	133.70	135.07	134.02	132.50
Coarse Limestone	75.00	75.00	75.00	75.00	75.00
Bi-Carbonate	3.00	3.00	3.00	3.00	3.00
Phosphate Mono/D	36.77	34.73	32.84	30.36	28.79
Salt	6.00	5.99	5.95	5.93	5.92
Vit. premix	1.00	1.00	1.00	1.00	1.00
Min. premix	1.00	1.00	1.00	1.00	1.00
Mold Inhibitor	1.00	1.00	1.00	1.00	1.00
T-Premix	1.00	1.00	1.00	1.00	1.00
.06% Selenium Premix	1.00	1.00	1.00	1.00	1.00
Choline Cl 60%	2.14	2.33	2.65	2.59	2.57
Calculated Analysis					
Protein %	22.0	21.0	20.00	19.00	18.0
ME kcal/kg	2926.0	2926.0	2926.0	2926.0	2926.0
Calcium %	4.45	4.45	4.45	4.40	4.35
T. Phos. %	0.71	0.68	0.65	0.61	0.59
Lysine %	1.15	1.09	1.00	0.93	0.87
TSAA %	0.89	0.85	0.81	0.77	0.75

Table 9. 38th NCLP&MT Laying Periods Feed Formulations I through O

Ingredients	I	M	N	O
Corn	1199.47	1258.28	1309.81	1371.93
Soybean meal	406.08	363.91	340.24	333.87
Wheat Midds				
Fat (Tallow)	52.26	43.80	38.85	14.71
Gluten Meal 60%	89.84	82.64	61.54	25.79
D.L. Methionine	2.02	1.62	1.75	1.80
Lysine 78.8%				
Soybean Hulls				
Ground Limestone	158.82	160.10	161.33	167.71
Coarse Limestone	50.00	50.00	50.00	50.00
Bi-Carbonate	3.00	3.00	3.00	3.00
Phosphate Mono/D	26.79	24.75	22.60	20.30
Salt	5.90	5.89	5.89	5.89
Vit. premix	1.00	1.00	1.00	1.00
Min. premix	1.00	1.00	1.00	1.00
Mold Inhibitor	1.00	1.00	1.00	1.00
T-Premix	1.00	1.00	1.00	1.00
.06% Selenium Premix	1.00	1.00	1.00	1.00
Choline Cl 60%	0.83	1.02		
Calculated Analysis				
Protein %	17.00	16.00	15.00	14.00
ME kcal/kg	2926.0	2926.0	2926.0	2860.0
Calcium %	4.35	4.35	4.35	4.45
T. Phos. %	0.56	0.52	0.49	0.47
Lysine %	0.80	0.74	0.70	0.68
TSAA %	0.70	0.65	0.62	0.58

Table 10. 38th NCLP&MT Laying Periods Feed Formulations Molt and Resting Diets

Ingredient	Molt Diets	
	<u>Low ME</u>	<u>Resting</u>
Corn	702.50	1427.70
Corn Gluten Meal		
Soybean Hulls	1164.77	226.00
Soybean Meal 48%		117.00
Wheat Midds	18.26	186.50
Coarse Limestone	17.78	16.50
Phosphate Mono/D	69.84	4.00
Bentonite		
Salt	9.16	5.00
Methionine	2.69	1.30
Choline Chloride		
Vit. premix	1.00	1.00
Min. premix	1.00	1.00
T - Premix	1.00	1.00
Fat	9.99	10.00
MYC-OUT 65	1.00	2.00
.06% Sel Premix	1.00	1.00
Total	2000	2000
Calculated Analysis		
Protein %	9.92	11.75
Me kcal/kg	1650	2859
Calcium %	1.33	3.80
T. Phos %	0.88	0.44
Lysine %	0.42	0.55
TSAA %	0.35	0.49

Data Collection Schedule and Procedures:

Age at 50% Production (Maturity) - The first day at which the birds in the individual replicates achieved 50% production.

Egg Production - All eggs that had the potential of being marketed were credited toward the test unit's (replicate) egg production, regardless of the shell condition at the time of collection. All eggs were collected and recorded daily. Egg production was summarized at twenty-eight day intervals, and was calculated and reported on a Hen-Housed and Hen-Day basis.

Egg Weight--At twenty-eight day intervals, all eggs produced in the previous 24-hour period were weighed and sorted by size (See egg size distribution). Percentages of eggs within each size category, average egg weight (g), and egg mass (g) were calculated and reported.

Egg Quality--At twenty-eight day intervals, all eggs produced within the previous 24 hours were examined by candling light and graded according to current USDA standards for egg quality. Eggs were graded in the pilot processing facility and handled as they would be in a commercial off-line facility.

Egg Size Distribution--At twenty-eight day intervals, all eggs produced within the previous 24 hours were weighed and sorted according to current USDA standards for egg size.

Egg Income--Egg income was calculated using current year regional average prices for farm value of eggs based on egg production and quality evaluation.

Feed Consumption and Conversion--All feed offered for consumption was recorded for each replicate. At twenty-eight day intervals, feed not consumed was weighed back and feed consumption was calculated. Daily feed intake (kg/100 hens/day) was calculated and reported for each strain.

Feed Costs--Feed costs were based on the actual current feed prices for each feed delivery which were calculated and summarized for the complete production cycle.

Body weights—Birds were weighed and weights recorded at housing (17 wk), end of 1st cycle (69 wks), start of the 2nd cycle (73 wk), and at the end of the 2nd cycle (110 wk). Body weight gain for the 1st cycle was calculated and reported for each strain. In the Molt period lowest body weight, percent weight loss, 73 wk body weights were taken or calculated and reported for each strain.

Mortality--All mortalities were recorded daily, and obvious accidents or hens used for experiment sampling were not included in reported mortalities.

Statistical Analyses and Separation of Means:

All data were subjected to ANOVA utilizing the GLM procedure of SAS, with main effects of strain and density. Separate analyses were conducted for white and brown egg strains. Significant differences ($P < 0.01$) within white and brown egg strains are noted by differing letters among columns of means. The layer houses were not significant; therefore, data for houses 4 and 5 were pooled in this analysis. First and second order interactions were tested for significance. The LS Means from the GLM Procedure were separated via the PDIFF option.

DESCRIPTION OF DATA TABLE STATISTICS

First cycle performance of white and brown egg strains are shown on Tables 14 to 19. The molt period performance and weight loss data of the white egg strains are shown on Tables 20 to 27 and for the brown egg strains Tables 28 to 35. The post molt performance of the white egg strains are shown on Tables 36 to 41 and for the brown egg strains Tables 42 to 47. Overall performance of the white egg strains are shown on Tables 48 to 53 and for the brown egg strains Tables 54 to 59. Overall body weight gains of the white egg strains are shown on Tables 60 and for the brown egg strains Tables 61.

Breeder (Strain):

Short identification codes of the breeder and strain of the stock were developed. See more complete information following data tables in Table 64.

Hen Housed Eggs per Bird:

The total number of eggs produced divided by the number of birds housed at 119 days.

Hen Day Egg Production:

The average daily number of eggs produced per 100 hens per day.

Egg Mass:

The average daily production of egg mass in grams per hen day.

Mortality:

The percentage of birds which died between 119 through 483 days of age, 483 through 512 which occurred during the molt period, and 512-763 are reported separately. These percentages are combined for the 119 through 763 report tables.

Feed Consumption:

The kilograms of feed consumed daily per 100 hens.

Feed Conversion:

The grams of egg produced per gram of feed consumed.

Egg Weight:

The average egg weight (gms) for each period sampled. Weight of all eggs collected from previous 24 hours divided by the number of eggs collected.

Egg Income:

The calculated income per hen housed at 119 days, from egg production using current year regional average egg prices 5/5/2010 to 6/1/2011 and from 6/1/2011 to 2/15/2012.

Table 11. Three Year Regional Average Egg Prices

Grade	Size	\$\$/Dozen 1 st Cycle and Molt	\$\$/Dozen 2nd Cycle
A	Extra Large	1.19	1.33
A	Large	1.16	1.29
A	Medium	0.93	1.04
A	Small	0.79	0.91
A ¹	Pee Wee	0.39	0.46
B ²	All	0.61	0.68
Checks ²	All	0.61	0.68

¹Based upon pricing calculation D.D. Bell (PeeWee \$= A Small \$ x 0.5)

²Based upon pricing calculation D.D. Bell (Checks and B \$= A Large \$ x 0.53)

Grade Information:

The average grade of all eggs sampled according to USDA grading standards over all sampling periods. Grades are established by personnel trained in USDA grading standards.

Egg Size Distribution:

Following are the size classifications used for establishing the USDA egg size grading. There has been blending of egg size in this test with the weight cut off between medium and large being 23.5. This maximizes the number of USDA large eggs just as would occur in a commercial plant. The proportion of the eggs falling into the following size categories are reported in the tables.

Table 12. USDA Egg Weights Used To Establish The Egg Size Distribution Weighted for Large Eggs.

Size Category	Ounces/Dozen
Pee Wee	< 18
Small	18 – 21
Medium	21 - 23.5
Large	23.5 – 27
Extra Large	> 27

Feed Cost:

The calculated feed cost per hen housed at 119 days, using the pounds/diet consumed and the average price of each diet per ton.

Table 13. The Average Contract Feed Price For Feed Purchases During The First Cycle.

<u>Diets</u>	<u>Price Per Ton 1st Cycle</u>	<u>Price Per Ton 2nd Cycle</u>
D	325.30	
E	333.13	426.63
F	344.43	416..40
G	360.23	436.40
H	376.58	427.90
I	399.70	396.87
Molt Diet LP/LE	336.40	
Resting	362.00	
M		380.34
N		368.80
O		341.12

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 14. EFFECT OF WHITE EGG STRAIN AND DENSITY ON PERFORMANCE OF HENS IN THE 38th NCLP&MT (119-483 DAYS)

Breeder	Density ¹	Feed Consumption	Feed Conversion	Eggs Per Bird Housed	Egg Production	Egg Mass	Mortality	Age at 50% Production
(Strain)	(in ² /hen)	(kg/100/hen/d)	(g egg/g feed)		(HD%)	(g/HD)	(%)	(Days)
Hy-Line	73	9.8	0.50	294.6	82.1	49.5	1.8	145.8
W-36	77	10.1	0.49	299.1	82.9	50.3	1.6	146.5
	Average	10.0 ^D	0.49 ^{AB}	296.9 ^{DE}	82.5 ^E	49.9 ^C	1.7 ^E	146.1 ^B
Hy-Line	73	10.9	0.47	293.3	82.5	52.2	4.8	140.7
W-98	77	10.8	0.49	292.1	84.0	53.6	6.3	139.5
	Average	10.8 ^{ABC}	0.48 ^B	292.7 ^E	83.3 ^{DE}	52.9 ^B	5.5 ^{ABCDE}	140.1 ^E
H&N	73	10.7	0.48	301.9	85.5	52.7	7.0	143.9
Nick Chick	77	11.0	0.48	307.3	87.2	54.0	5.0	142.7
	Average	10.8 ^{ABC}	0.48 ^B	304.6 ^{ABCD}	86.3 ^{AB}	53.4 ^{AB}	6.0 ^{ABCD}	143.3 ^{CD}
Lohmann	73	11.0	0.48	300.1	86.1	53.0	9.5	144.9
LSL-Lite	77	11.0	0.48	311.0	87.4	53.8	5.0	144.9
	Average	11.0 ^A	0.48 ^B	305.6 ^{ABC}	86.8 ^{AB}	53.4 ^{AB}	7.3 ^{ABC}	144.9 ^{BC}
Bovans	73	10.5	0.49	299.4	86.6	52.5	10.6	144.2
White	77	10.7	0.48	305.3	87.0	52.5	8.1	146.0
	Average	10.6 ^{BC}	0.48 ^B	302.3 ^{BCD}	86.8 ^{AB}	52.5 ^B	9.4 ^A	145.1 ^{BC}
Shaver	73	9.8	0.50	298.1	84.0	50.6	4.8	149.5
White	77	10.0	0.50	305.1	85.3	51.0	2.1	149.5
	Average	9.9 ^D	0.50 ^A	301.6 ^{CD}	84.6 ^{CD}	50.8 ^C	3.4 ^{CDE}	149.5 ^A
DeKalb	73	10.9	0.48	309.7	86.2	53.1	4.4	142.8
White	77	11.0	0.48	310.6	87.1	54.0	4.3	143.8
	Average	10.9 ^{AB}	0.48 ^B	310.2 ^{AB}	86.7 ^{AB}	53.6 ^{AB}	4.3 ^{BCDE}	143.3 ^{CD}
ISA Babcock	73	11.0	0.49	311.5	86.5	54.1	2.0	143.2
White	77	10.9	0.49	313.9	87.4	54.6	3.1	141.5
	Average	11.0 ^{AB}	0.49 ^{AB}	312.7 ^A	86.9 ^A	54.4 ^A	2.5 ^{DE}	142.3 ^{DE}
ISA	73	10.3	0.51	300.4	86.1	52.7	7.7	141.1
Exp. White	77	10.7	0.50	313.5	87.2	53.6	4.2	141.0
	Average	10.5 ^C	0.50 ^A	307.0 ^{ABC}	86.7 ^{AB}	53.1 ^B	5.9 ^{ABCD}	141.0 ^{DE}
Novogen	73	10.8	0.48	299.0	84.4	53.4	7.0	146.3
White	77	10.7	0.48	304.8	84.7	52.9	3.8	146.2
	Average	10.8 ^{ABC}	0.48 ^B	301.9 ^{CD}	84.5 ^{CD}	53.1 ^B	5.4 ^{BCDE}	146.2 ^B
Bovans	73	10.6	0.49	300.0	85.4	52.7	8.1	146.4
Robust	77	10.6	0.49	301.2	85.4	52.7	7.0	144.0
	Average	10.6 ^{BC}	0.49 ^{AB}	300.6 ^{CDE}	85.4 ^{BC}	52.7 ^B	7.5 ^{AB}	145.2 ^{BC}
All	73	10.6	0.49	300.7 ^Z	85.0 ^Z	52.4 ^Z	6.2	144.4
Strains	77	10.7	0.49	305.8 ^Y	86.0 ^Y	53.0 ^Y	4.6	144.1

¹All strains were housed such that each strain is equally represented in each density.

A,B,C,D,E - Different letters denote significant differences (P<.01), comparisons made among strain average values.

Y,Z - Different letters denote significant differences (P<.01), comparisons made among density average values.

TABLE 15. EFFECT OF WHITE EGG STRAIN AND DENSITY ON EGG WEIGHT AND EGG SIZE DISTRIBUTION OF HENS IN THE 38th NCLP&MT (119-483 DAYS)

Breeder	Density ¹	Egg Weight	Pee Wee	Small	Medium	Large	Extra Large
(Strain)	(in ² /hen)	(g/egg)	(%)	(%)	(%)	(%)	(%)
Hy-Line	73	59.3	0.3	6.8	11.0	27.6	53.9
W-36	77	59.8	0.4	4.2	12.7	25.7	56.8
	Average	59.5 ^{DE}	0.3	5.5 ^{BCD}	11.9 ^A	26.6 ^{BC}	55.4 ^{DE}
Hy-Line	73	62.6	0.1	4.0	9.7	15.3	70.6
W-98	77	63.0	0.3	3.9	9.1	14.5	72.1
	Average	62.8 ^A	0.2	3.9 ^D	9.4 ^B	14.9 ^F	71.4 ^A
H&N	73	60.7	0.1	4.8	9.7	23.7	61.4
Nick Chick	77	60.9	0.2	5.2	10.0	21.7	62.7
	Average	60.8 ^{BC}	0.2	5.0 ^{BCD}	9.8 ^{AB}	22.7 ^{CDE}	62.1 ^{BC}
Lohmann	73	60.5	0.0	6.8	8.0	25.2	59.6
LSL-Lite	77	60.3	0.1	5.5	10.2	23.6	60.4
	Average	60.4 ^{CD}	0.1	6.1 ^{AB}	9.1 ^B	24.4 ^{CD}	60.0 ^{CD}
Bovans	73	59.3	0.3	5.4	12.3	28.5	53.2
White	77	59.1	0.4	6.6	11.2	29.1	52.6
	Average	59.2 ^{EF}	0.3	6.0 ^{ABC}	11.7 ^A	28.8 ^B	52.9 ^{EF}
Shaver	73	58.6	0.2	7.2	10.2	34.6	47.6
White	77	58.6	0.5	8.3	9.0	33.9	48.2
	Average	58.6 ^F	0.4	7.7 ^A	9.6 ^B	34.2 ^A	47.9 ^F
DeKalb	73	60.6	0.2	6.0	8.8	23.2	61.8
White	77	60.7	0.3	6.2	8.2	20.6	64.5
	Average	60.7 ^{BC}	0.2	6.1 ^{AB}	8.5 ^B	21.9 ^{DE}	63.1 ^{BC}
ISA Babcock	73	61.6	0.1	3.6	8.8	19.9	67.1
White	77	61.6	0.3	4.6	8.9	19.9	65.8
	Average	61.6 ^B	0.2	4.1 ^{CD}	8.8 ^B	19.9 ^E	66.5 ^{AB}
ISA	73	60.4	0.2	4.8	10.1	24.8	59.9
Exp. White	77	60.5	0.2	4.8	9.4	24.7	60.6
	Average	60.5 ^{CD}	0.2	4.8 ^{BCD}	9.7 ^{AB}	24.7 ^{BCD}	60.2 ^{CD}
Novogen	73	61.9	0.1	4.5	7.8	20.3	66.7
White	77	61.0	0.2	5.7	8.8	23.9	61.1
	Average	61.5 ^B	0.1	5.1 ^{BCD}	8.3 ^B	22.1 ^{DE}	63.9 ^{BC}
Bovans	73	60.5	0.2	6.5	9.4	21.2	62.5
Robust	77	60.6	0.3	5.8	9.7	23.7	59.9
	Average	60.5 ^C	0.2	6.1 ^{AB}	9.6 ^B	22.4 ^{DE}	61.2 ^{BC}
All	73	60.5	0.2	5.5	9.6	24.0	60.4
Strains	77	60.6	0.3	5.5	9.7	23.7	60.4

¹All strains were housed such that each strain is equally represented in each density

A,B,C,D,E,F - Different letters denote significant differences (P<.01), comparisons made among strain average values.

TABLE 16. EFFECT OF WHITE EGG STRAIN AND DENSITY ON EGG QUALITY, INCOME AND FEED COSTS OF HENS IN THE 38th NCLP&MT (119-483 DAYS)

Breeder	Density ¹	Grade A	Grade B	Cracks	Loss	Egg Income	Feed Costs
(Strain)	(in ² /hen)	(%)	(%)	(%)	(%)	(\$/hen)	(\$/hen)
Hy-Line	73	96.0	1.8	1.8	0.4	26.90	12.58
W-36	77	96.4	1.0	2.5	0.1	27.61	13.17
	Average	96.2 ^{AB}	1.4 ^D	2.1 ^A	0.3	27.26 ^D	12.88 ^{CD}
Hy-Line	73	94.6	2.9	2.3	0.3	27.12	13.97
W-98	77	94.3	3.8	1.7	0.2	27.01	13.44
	Average	94.4 ^C	3.3 ^A	2.0 ^{AB}	0.3	27.06 ^D	13.70 ^{ABC}
H&N	73	95.8	2.4	1.5	0.3	27.93	13.67
Nick Chick	77	96.5	1.8	1.3	0.3	28.49	13.65
	Average	96.2 ^{AB}	2.1 ^{BCD}	1.4 ^{ABC}	0.3	28.21 ^{ABC}	13.66 ^{ABC}
Lohmann	73	96.5	2.3	0.8	0.4	27.74	13.69
LSL-Lite	77	95.9	2.5	1.4	0.2	28.75	14.31
	Average	96.2 ^{AB}	2.4 ^{ABCD}	1.1 ^C	0.3	28.25 ^{ABC}	14.00 ^{AB}
Bovans	73	95.6	2.3	1.7	0.3	27.38	13.13
White	77	95.2	3.0	1.6	0.2	27.87	13.60
	Average	95.4 ^{ABC}	2.7 ^{ABC}	1.7 ^{ABC}	0.2	27.62 ^{BCD}	13.36 ^{BCD}
Shaver	73	95.0	2.2	2.5	0.3	27.13	12.58
White	77	95.9	2.2	1.7	0.2	27.85	12.74
	Average	95.4 ^{ABC}	2.2 ^{BCD}	2.1 ^{AB}	0.2	27.49 ^{CD}	12.66 ^D
DeKalb	73	96.6	2.0	1.4	0.1	28.79	14.15
White	77	96.6	1.9	1.2	0.2	28.84	14.17
	Average	96.6 ^A	2.0 ^{CD}	1.3 ^{BC}	0.1	28.81 ^A	14.16 ^{AB}
ISA Babcock	73	95.2	2.8	1.6	0.4	28.88	14.34
White	77	95.9	2.2	1.3	0.6	28.99	14.17
	Average	95.5 ^{ABC}	2.5 ^{ABC}	1.5 ^{ABC}	0.5	28.94 ^A	14.25 ^A
ISA	73	96.2	2.2	1.4	0.2	27.83	12.95
Exp. White	77	96.2	2.2	1.2	0.4	29.02	13.84
	Average	96.2 ^{AB}	2.2 ^{BCD}	1.3 ^{BC}	0.3	28.42 ^{AB}	13.40 ^{ABCD}
Novogen	73	95.0	2.4	2.0	0.6	27.61	13.88
White	77	95.6	2.2	2.0	0.3	28.15	13.75
	Average	95.3 ^{ABC}	2.3 ^{ABCD}	2.0 ^{AB}	0.4	27.88 ^{BCD}	13.82 ^{AB}
Bovans	73	94.7	3.6	1.4	0.3	27.49	13.49
Robust	77	95.1	2.7	1.5	0.6	27.54	13.43
	Average	94.9 ^{BC}	3.2 ^{AB}	1.5 ^{ABC}	0.4	27.51 ^{CD}	13.46 ^{ABCD}
All	73	95.6	2.4	1.7	0.3	27.71 ^Z	13.49
Strains	77	95.8	2.3	1.6	0.3	28.19 ^Y	13.66

¹All strains were housed such that each strain is equally represented in each density.

A,B,C,D - Different letters denote significant differences (P<.01), comparisons made among strain average values.

Y,Z - Different letters denote significant differences (P<.01), comparisons made among density average values.

TABLE 17. EFFECT OF BROWN EGG STRAIN AND DENSITY ON PERFORMANCE OF HENS IN THE 38th NCLP&MT (119-483 DAYS)

Breeder	Density ¹	Feed Consumption	Feed Conversion	Eggs Per Bird Housed	Egg Production	Egg Mass	Mortality	Age at 50% Production
(Strain)	(in ² /hen)	(kg/100/hen/d)	(g egg/g feed)		(HD%)	(g/HD)	(%)	(Days)
Hy-Line Brown	73	10.5	0.49	292.9	82.1	52.2	4.0	145.8
	77	10.7	0.49	303.5	83.8	53.4	0.8	143.3
	Average	10.6	0.49 ^A	298.2 ^{AB}	83.0 ^B	52.8 ^{AB}	2.4 ^C	144.5 ^{AB}
Hy-Line Silver Brown	73	10.7	0.47	302.7	84.7	50.3	2.6	143.5
	77	10.8	0.46	302.4	85.6	50.8	5.0	143.4
	Average	10.8	0.46 ^{BC}	302.5 ^{AB}	85.2 ^A	50.6 ^D	3.8 ^{BC}	143.5 ^{AB}
TETRA Brown	73	10.8	0.46	283.8	80.4	50.8	7.0	144.3
	77	10.8	0.47	282.5	82.0	51.7	8.8	142.2
	Average	10.8	0.47 ^B	283.2 ^C	81.2 ^C	51.2 ^{CD}	7.9 ^{AB}	143.2 ^{BC}
TETRA Amber	73	10.6	0.46	295.4	82.9	49.3	5.5	141.1
	77	11.0	0.44	292.2	83.7	49.1	7.3	140.5
	Average	10.8	0.45 ^C	293.8 ^B	83.3 ^B	49.2 ^E	6.4 ^{ABC}	140.8 ^C
ISA Brown	73	10.9	0.48	297.7	83.5	53.3	5.1	146.8
	77	11.2	0.47	302.6	85.5	54.0	6.2	144.9
	Average	11.0	0.48 ^{AB}	300.1 ^{AB}	84.5 ^{AB}	53.7 ^A	5.7 ^{ABC}	145.8 ^A
Bovans Brown	73	10.6	0.49	304.1	84.8	52.8	5.6	144.5
	77	10.9	0.49	305.8	85.3	53.7	2.7	144.2
	Average	10.8	0.49 ^A	305.0 ^A	85.0 ^A	53.2 ^{AB}	4.1 ^{ABC}	144.4 ^{AB}
Novogen Brown	73	10.9	0.47	290.2	83.5	51.4	9.9	144.7
	77	10.9	0.47	297.6	84.5	52.6	6.2	144.7
	Average	10.9	0.47 ^B	293.9 ^B	84.0 ^{AB}	52.0 ^{BC}	8.1 ^A	144.7 ^{AB}
All Strains	73	10.7	0.47	295.3	83.1 ^Z	51.4 ^Z	5.7	144.4
	77	10.9	0.47	298.1	84.3 ^Y	52.2 ^Y	5.3	143.3
NCSU Barred	73	9.1	0.32	191.5	55.0	29.9	4.7	159.0
Plym. Rock	77	9.9	0.30	183.6	55.2	31.0	9.5	171.7

¹All strains were housed such that each strain is equally represented in each density.

A,B,C,D - Different letters denote significant differences (P<.01), comparisons made among strain average values.

Y,Z - Different letters denote significant differences (P<.01), comparisons made among density average values.

TABLE 18. EFFECT OF BROWN EGG STRAIN AND DENSITY ON EGG WEIGHT AND EGG SIZE DISTRIBUTION OF HENS IN THE 38th NCLP&MT (119-483 DAYS)

Breeder	Density ¹	Egg Weight	Pee Wee	Small	Medium	Large	Extra Large
(Strain)	(in ² /hen)	(g/egg)	(%)	(%)	(%)	(%)	(%)
Hy-Line	73	62.8	0.0	1.3	8.3	20.5	69.6
Brown	77	62.9	0.1	1.2	7.9	20.2	70.3
	Average	62.8 ^A	0.0	1.3 ^C	8.1 ^C	20.4 ^C	69.9 ^A
Hy-Line	73	58.7	0.4	3.7	13.4	37.5	44.8
Silver Brown	77	58.5	0.0	2.9	15.3	34.2	47.4
	Average	58.6 ^D	0.2	3.3 ^B	14.4 ^A	35.9 ^A	46.1 ^D
TETRA	73	62.2	0.0	3.1	8.9	19.8	67.6
Brown	77	62.2	0.1	2.9	8.8	21.1	66.9
	Average	62.2 ^{AB}	0.1	3.0 ^B	8.8 ^{BC}	20.5 ^C	67.3 ^{AB}
TETRA	73	58.7	0.1	5.2	13.7	32.5	48.0
Amber	77	57.7	0.0	7.7	15.3	36.0	40.8
	Average	58.2 ^D	0.1	6.5 ^A	14.5 ^A	34.3 ^A	44.4 ^D
ISA	73	62.8	0.0	3.5	6.8	19.5	69.9
Brown	77	62.2	0.2	3.8	8.7	20.2	67.0
	Average	62.5 ^{AB}	0.1	3.6 ^B	7.7 ^C	19.9 ^C	68.4 ^A
Bovans	73	61.4	0.0	2.7	9.4	25.9	61.9
Brown	77	62.1	0.1	2.1	8.8	23.6	65.1
	Average	61.7 ^{BC}	0.1	2.4 ^{BC}	9.1 ^{BC}	24.8 ^B	63.5 ^{BC}
Novogen	73	60.6	0.3	3.3	10.2	26.5	59.4
Brown	77	61.5	0.2	2.8	10.7	22.8	63.2
	Average	61.0 ^C	0.3	3.0 ^B	10.4 ^B	24.7 ^B	61.3 ^C
All	73	61.0	0.1	3.3	10.1	26.0	60.2
Strains	77	61.0	0.1	3.3	10.8	25.5	60.1
NCSU Barred	73	52.5	1.3	19.0	26.3	36.6	16.1
Plym. Rock	77	52.7	2.0	17.2	26.6	36.1	17.0

¹All strains were housed such that each strain is equally represented in each density.

A,B,C,D - Different letters denote significant differences (P<.01), comparisons made among strain average values.

TABLE 19. EFFECT OF BROWN EGG STRAIN AND DENSITY ON EGG QUALITY, INCOME AND FEED COSTS OF HENS IN THE 38th NCLP&MT (119-483 DAYS)

Breeder	Density ¹	Grade A	Grade B	Cracks	Loss	Egg Income	Feed Costs
(Strain)	(in ² /hen)	(%)	(%)	(%)	(%)	(\$/hen)	(\$/hen)
Hy-Line	73	96.1	1.5 ^{de}	2.1	0.3	27.61	13.88
Brown	77	96.3	1.8 ^{bcd}	1.7	0.3	28.61	14.64
	Average	96.2 ^{AB}	1.6	1.9	0.3	28.11 ^{AB}	14.26
Hy-Line	73	95.7	2.5 ^{bcd}	1.5	0.3	27.72	14.36
Silver Brown	77	97.3	1.0 ^c	1.5	0.2	28.01	14.33
	Average	96.5 ^A	1.8	1.5	0.2	27.87 ^{AB}	14.34
TETRA	73	94.9	2.2 ^{bcd}	2.4	0.5	26.30	14.09
Brown	77	95.3	2.9 ^{bcd}	1.6	0.2	26.36	14.02
	Average	95.1 ^{ABC}	2.6	2.0	0.4	26.33 ^C	14.05
TETRA	73	95.0	2.9 ^{bcd}	1.7	0.4	26.85	14.22
Amber	77	96.3	1.7 ^{bcd}	1.9	0.2	26.45	14.25
	Average	95.6 ^{AB}	2.3	1.8	0.3	26.65 ^C	14.24
ISA	73	93.4	4.8 ^a	1.6	0.3	27.57	14.56
Brown	77	94.8	3.6 ^a	1.5	0.2	28.08	14.80
	Average	94.1 ^C	4.2	1.5	0.2	27.83 ^{AB}	14.68
Bovans	73	96.4	1.6 ^{cde}	1.9	0.2	28.51	14.31
Brown	77	95.3	3.0 ^{bc}	1.5	0.2	28.56	14.50
	Average	95.8 ^{AB}	2.3	1.7	0.2	28.54 ^A	14.41
Novogen	73	94.7	3.1 ^b	1.9	0.3	26.77	14.11
Brown	77	95.3	2.9 ^{bcd}	1.6	0.2	27.60	14.34
	Average	95.0 ^{BC}	3.0	1.7	0.3	27.18 ^{BC}	14.23
All	73	95.2	2.7	1.9	0.3	27.33	14.22
Strains	77	95.8	2.4	1.6	0.2	27.67	14.41
NCSU Barred	73	87.4	9.0	2.9	0.7	15.36	12.13
Plym. Rock	77	94.2	3.2	1.5	1.1	15.06	12.54

¹All strains were housed such that each strain is equally represented in each density.

A,B,C - Different letters denote significant differences (P<.01), comparisons made among strain average values.

a,b,c,d,e - Different letters denote significant differences (P<.01) in the strain*density interactions.

TABLE 20. EFFECT OF WHITE EGG STRAIN AND DENSITY ON PERFORMANCE OF HENS IN THE 38th NCLP&MT (483-511 DAYS) NON-MOLTED

Breeder	Density ¹	Feed Consumption	Feed Conversion	Eggs Per Bird Housed	Egg Production	Egg Mass	Mortality
(Strain)	(in ² /hen)	(kg/100/hen/d)	(g egg/g feed)		(HD%)	(g/HD)	(%)
Hy-Line	73	9.9	0.53	21.3	78.0	51.5	0.0
W-36	77	10.3	0.52	22.3	80.9	53.7	1.3
	Average	10.1 ^C	0.52	21.8	79.4	52.6 ^C	0.6
Hy-Line	73	11.8	0.50	22.6	84.1	59.0	0.0
W-98	77	13.0	0.45	24.7	83.8	58.1	0.0
	Average	12.4 ^{AB}	0.48	23.7	84.0	58.6 ^A	0.0
H&N	73	12.4	0.48	22.4	87.2	58.6	1.2
Nick Chick	77	11.7	0.50	23.0	86.5	58.6	0.0
	Average	12.0 ^{AB}	0.49	22.7	86.8	58.6 ^A	0.6
Lohmann	73	12.1	0.51	21.8	92.4	60.7	0.0
LSL-Lite	77	12.0	0.48	22.6	85.0	56.1	0.0
	Average	12.0 ^{AB}	0.49	22.2	88.7	58.4 ^{AB}	0.0
Bovans	73	11.8	0.48	22.6	88.1	56.7	1.2
White	77	12.1	0.49	22.8	89.3	58.9	0.0
	Average	11.9 ^{AB}	0.49	22.7	88.7	57.8 ^{AB}	0.6
Shaver	73	10.9	0.51	23.7	86.5	55.4	0.0
White	77	11.3	0.48	23.0	85.0	53.0	1.7
	Average	11.1 ^{BC}	0.49	23.3	85.7	54.2 ^{BC}	0.8
DeKalb	73	12.9	0.45	25.4	87.8	57.4	1.6
White	77	13.1	0.45	23.6	85.9	57.5	4.7
	Average	13.0 ^A	0.45	24.5	86.8	57.5 ^{AB}	3.2
ISA Babcock	73	12.1	0.52	25.4	92.1	63.5	0.0
White	77	11.4	0.49	23.1	83.4	56.0	0.0
	Average	11.7 ^{AB}	0.51	24.2	87.7	59.7 ^A	0.0
ISA	73	11.2	0.51	22.5	86.7	56.8	0.0
Exp. White	77	11.8	0.47	21.1	82.5	55.1	1.7
	Average	11.5 ^{BC}	0.49	21.8	84.6	55.9 ^{ABC}	0.8
Novogen	73	11.7	0.48	22.0	82.5	55.6	0.0
White	77	11.4	0.50	22.7	85.5	56.8	1.3
	Average	11.5 ^{BC}	0.49	22.4	84.0	56.2 ^{ABC}	0.6
Bovans	73	11.2	0.52	22.7	86.6	58.2	1.2
Robust	77	12.4	0.46	21.9	85.9	57.0	2.5
	Average	11.8 ^{AB}	0.49	22.3	86.2	57.6 ^{AB}	1.9
All	73	11.6	0.50	22.9	86.5	57.6	0.5
Strains	77	11.9	0.48	22.8	84.9	56.4	1.2

¹All strains were housed such that each strain is equally represented in each density.

A,B,C - Different letters denote significant differences (P<.01), comparisons made among strain average values.

TABLE 21. EFFECT OF WHITE EGG STRAIN AND DENSITY ON EGG WEIGHT AND EGG SIZE DISTRIBUTION OF HENS IN THE 38th NCLP&MT (483-511 DAYS) NON-MOLTED

Breeder	Density ¹	Egg Weight	Pee Wee	Small	Medium	Large	Extra Large
(Strain)	(in ² /hen)	(g/egg)	(%)	(%)	(%)	(%)	(%)
Hy-Line	73	66.2	0.0	0.0	0.0	21.7	78.3
W-36	77	66.3	0.0	0.0	0.0	21.3	77.3
	Average	66.3 ^{BCD}	0.0	0.0	0.0	21.5 ^{BC}	77.8 ^{AB}
Hy-Line	73	70.2	0.0	0.0	0.0	1.9	93.7
W-98	77	69.4	0.0	0.0	0.0	8.1	91.9
	Average	69.8 ^A	0.0	0.0	0.0	5.0 ^C	92.8 ^A
H&N	73	67.2	0.0	0.0	0.0	17.1	82.9
Nick Chick	77	67.8	0.0	0.0	0.0	15.8	81.4
	Average	67.5 ^{BC}	0.0	0.0	0.0	16.4 ^C	82.2 ^A
Lohmann	73	65.7	0.0	0.0	0.0	23.4	76.6
LSL-Lite	77	65.9	0.0	0.0	0.0	20.1	79.9
	Average	65.8 ^{CD}	0.0	0.0	0.0	21.7 ^{BC}	78.3 ^{AB}
Bovans	73	64.3	0.0	0.0	0.0	34.5	61.0
White	77	65.9	0.0	0.0	0.0	30.8	69.2
	Average	65.1 ^{DE}	0.0	0.0	0.0	32.6 ^{AB}	65.1 ^{BC}
Shaver	73	64.0	0.0	0.0	0.0	35.7	64.3
White	77	62.4	0.0	0.0	0.0	57.0	43.0
	Average	63.2 ^E	0.0	0.0	0.0	46.4 ^A	53.7 ^C
DeKalb	73	65.3	0.0	0.0	0.0	23.7	74.8
White	77	66.9	0.0	0.0	0.0	19.0	81.0
	Average	66.1 ^{BCD}	0.0	0.0	0.0	21.4 ^{BC}	77.9 ^{AB}
ISA Babcock	73	69.0	0.0	0.0	0.0	13.0	87.0
White	77	67.1	0.0	0.0	0.0	16.4	82.4
	Average	68.0 ^{AB}	0.0	0.0	0.0	14.7 ^C	84.7 ^A
ISA	73	65.5	0.0	0.0	0.0	22.5	77.6
Exp. White	77	66.7	0.0	0.0	0.0	12.3	87.7
	Average	66.1 ^{BCD}	0.0	0.0	0.0	17.4 ^{BC}	82.6 ^A
Novogen	73	67.4	0.0	0.0	0.0	17.8	82.3
White	77	66.5	0.0	0.0	0.0	18.1	81.9
	Average	66.9 ^{BCD}	0.0	0.0	0.0	17.9 ^{BC}	82.1 ^A
Bovans	73	67.1	0.0	0.0	0.0	18.2	80.4
Robust	77	66.5	0.0	0.0	0.0	24.7	75.3
	Average	66.8 ^{BCD}	0.0	0.0	0.0	21.5 ^{BC}	77.9 ^{AB}
All	73	66.5	0.0	0.0	0.0	20.8	78.1
Strains	77	66.5	0.0	0.0	0.0	22.1	77.4

¹All strains were housed such that each strain is equally represented in each density.

A,B,C,D - Different letters denote significant differences (P<.01), comparisons made among strain average values.

TABLE 22. EFFECT OF WHITE EGG STRAIN AND DENSITY ON EGG QUALITY, INCOME AND FEED COSTS OF HENS IN THE 38th NCLP&MT (483-511 DAYS) NON-MOLTED

Breeder	Density ¹	Grade A	Grade B	Cracks	Loss	Egg Income	Feed Costs
(Strain)	(in ² /hen)	(%)	(%)	(%)	(%)	(\$/hen)	(\$/hen)
Hy-Line	73	98.5	1.5	0.0	0.0	2.09	1.21
W-36	77	91.6	3.2	3.9	1.4	2.07	1.27
	Average	95.0	2.3	2.0	0.7	2.08	1.24 ^C
Hy-Line	73	91.2	4.4	0.0	4.4	2.01	1.44
W-98	77	97.2	2.8	0.0	0.0	2.41	1.72
	Average	94.2	3.6	0.0	2.2	2.21	1.58 ^{AB}
H&N	73	98.3	0.0	1.7	0.0	2.19	1.42
Nick Chick	77	93.0	2.8	1.3	2.9	2.11	1.40
	Average	95.7	1.4	1.5	1.5	2.15	1.41 ^{BC}
Lohmann	73	97.2	2.8	0.0	0.0	2.12	1.27
LSL-Lite	77	100.0	0.0	0.0	0.0	2.23	1.43
	Average	98.6	1.4	0.0	0.0	2.17	1.35 ^{BC}
Bovans	73	92.6	1.5	1.4	4.6	2.01	1.35
White	77	92.7	5.6	1.7	0.0	2.17	1.38
	Average	92.6	3.6	1.5	2.3	2.09	1.36 ^{BC}
Shaver	73	93.9	3.7	2.4	0.0	2.26	1.33
White	77	95.2	0.0	4.8	0.0	2.19	1.36
	Average	94.6	1.9	3.6	0.0	2.22	1.35 ^{BC}
DeKalb	73	85.3	4.9	8.3	1.6	2.26	1.68
White	77	96.4	0.0	3.6	0.0	2.29	1.60
	Average	90.9	2.5	5.9	0.8	2.27	1.64 ^A
ISA Babcock	73	93.9	2.2	3.8	0.0	2.43	1.49
White	77	97.5	0.0	1.3	1.3	2.20	1.41
	Average	95.7	1.1	2.5	0.6	2.32	1.45 ^{ABC}
ISA	73	94.3	2.9	2.9	0.0	2.16	1.31
Exp. White	77	93.8	2.0	4.2	0.0	2.02	1.35
	Average	94.1	2.4	3.5	0.0	2.09	1.33 ^C
Novogen	73	95.3	3.1	1.7	0.0	2.12	1.39
White	77	95.1	3.5	1.5	0.0	2.19	1.35
	Average	95.2	3.3	1.6	0.0	2.15	1.37 ^{BC}
Bovans	73	95.5	1.7	1.5	1.4	2.14	1.31
Robust	77	95.2	4.8	0.0	0.0	2.10	1.42
	Average	95.3	3.2	0.7	0.7	2.12	1.37 ^{BC}
All	73	94.2	2.6	2.1	1.1	2.16	1.38
Strains	77	95.2	2.2	2.0	0.5	2.18	1.43

¹All strains were housed such that each strain is equally represented in each density.

A,B,C - Different letters denote significant differences (P<.01), comparisons made among strain average values.

TABLE 23. EFFECT OF WHITE EGG STRAIN AND DENSITY ON BODY WEIGHT OF HENS IN THE 38th NCLP&MT (483-511 DAYS) NON-MOLTED

Breeder	Density ¹	17 Wk Body Wt	69 Wk Body Wt	1st Cycle Wt Gain	Lowest Body Wt	Molt Wt Loss	73 Wk Body Wt
(Strain)	(in ² /hen)	(kg)	(kg)	(%)	(kg)	(%)	(kg)
Hy-Line	73	1.23	1.81	47.4	1.76	3.0	1.76
W-36	77	1.19	1.77	48.1	1.74	0.1	1.77
	Average	1.21 ^{CDE}	1.79 ^{BC}	47.7 ^B	1.75 ^{BCD}	1.5 ^{ABC}	1.76 ^{BCD}
Hy-Line	73	1.29	2.06	59.0	1.94	5.3	1.95
W-98	77	1.28	2.04	59.3	1.93	5.5	1.93
	Average	1.29 ^{AB}	2.05 ^A	59.2 ^A	1.93 ^A	5.4 ^A	1.94 ^A
H&N	73	1.27	1.79	40.8	1.77	-1.5	1.81
Nick Chick	77	1.30	1.91	47.6	1.90	-0.7	1.93
	Average	1.28 ^{AB}	1.85 ^{BC}	44.2 ^{BC}	1.83 ^{ABC}	-1.1 ^{BC}	1.87 ^{AB}
Lohmann	73	1.23	1.81	47.5	1.81	-1.0	1.83
LSL-Lite	77	1.27	1.77	39.0	1.75	-0.6	1.78
	Average	1.25 ^{BCD}	1.79 ^{BCD}	43.3 ^{BC}	1.78 ^{BCD}	-0.8 ^{BC}	1.80 ^{ABCD}
Bovans	73	1.20	1.73	44.3	1.73	-2.1	1.77
White	77	1.15	1.74	51.3	1.72	-1.0	1.76
	Average	1.18 ^E	1.74 ^{CD}	47.8 ^B	1.72 ^{CD}	-1.5 ^{BC}	1.76 ^{BCD}
Shaver	73	1.20	1.68	40.6	1.68	-1.9	1.71
White	77	1.19	1.62	35.6	1.61	-1.9	1.65
	Average	1.19 ^{DE}	1.65 ^D	38.1 ^C	1.65 ^D	-1.9 ^{BC}	1.68 ^D
DeKalb	73	1.24	1.78	42.7	1.71	3.4	1.71
White	77	1.28	1.88	46.6	1.82	2.6	1.82
	Average	1.26 ^{BC}	1.83 ^{BC}	44.7 ^{BC}	1.76 ^{BCD}	3.0 ^{AB}	1.77 ^{BCD}
ISA Babcock	73	1.32	1.87	41.4	1.87	-1.0	1.89
White	77	1.32	1.89	43.8	1.85	0.7	1.88
	Average	1.32 ^A	1.88 ^B	42.6 ^{BC}	1.86 ^{AB}	-0.2 ^{ABC}	1.88 ^{AB}
ISA	73	1.30	1.82	39.8	1.74	3.5	1.75
Exp. White	77	1.28	1.71	33.9	1.67	1.1	1.69
	Average	1.29 ^{AB}	1.77 ^{BCD}	36.8 ^C	1.70 ^{CD}	2.3 ^{ABC}	1.72 ^{CD}
Novogen	73	1.29	1.82	41.4	1.82	-2.2	1.86
White	77	1.26	1.82	44.0	1.82	-2.5	1.86
	Average	1.27 ^{AB}	1.82 ^{BC}	42.7 ^{BC}	1.82 ^{ABC}	-2.3 ^C	1.86 ^{ABC}
Bovans	73	1.20	1.74	44.8	1.73	-0.6	1.75
Robust	77	1.30	1.85	41.9	1.84	-1.2	1.87
	Average	1.25 ^{BCD}	1.79 ^{BC}	43.4 ^{BC}	1.79 ^{BC}	-0.9 ^{BC}	1.81 ^{ABC}
All	73	1.25	1.81	44.5	1.78	0.4	1.80
Strains	77	1.26	1.82	44.6	1.78	0.2	1.81

¹All strains were housed such that each strain is equally represented in each density.

A,B,C,D,E - Different letters denote significant differences (P<.01), comparisons made among strain average values.

TABLE 24. EFFECT OF WHITE EGG STRAIN AND DENSITY ON PERFORMANCE OF HENS IN THE 38th NCLP&MT (483-511 DAYS) NON-ANOREXIC MOLT PROGRAM

Breeder (Strain)	Density ¹ (in ² /hen)	Feed Consumption (kg/100/hen/d)	Feed Conversion (g egg/g feed)	Eggs		Egg Mass (g/HD)	Mortality (%)
				Per Bird Housed	Egg Production (HD%)		
Hy-Line	73	5.0	0.19	3.9	14.1	9.3	1.1
W-36	77	5.2	0.18	3.9	14.1	9.2	0.6
	Average	5.1 ^F	0.18 ^{BC}	3.9 ^C	14.1 ^C	9.3 ^C	0.8 ^C
Hy-Line	73	5.5	0.22	4.9	16.9	11.7	1.5
W-98	77	5.3	0.22	4.6	16.6	11.6	2.9
	Average	5.4 ^{EF}	0.22 ^A	4.7 ^{AB}	16.8 ^{BC}	11.7 ^{AB}	2.2 ^{BC}
H&N	73	6.0	0.18	4.1	16.0	10.7	2.7
Nick Chick	77	6.0	0.18	4.3	16.2	10.7	1.1
	Average	6.0 ^{CDE}	0.18 ^{BCD}	4.2 ^{BC}	16.1 ^C	10.7 ^{BC}	1.9 ^{BC}
Lohmann	73	6.4	0.17	4.1	16.4	10.9	3.7
LSL-Lite	77	6.2	0.17	4.3	16.1	10.7	1.7
	Average	6.3 ^{BCD}	0.17 ^{BCD}	4.2 ^{BC}	16.3 ^C	10.8 ^{BC}	2.7 ^{ABC}
Bovans	73	6.5	0.15	3.5	14.4	9.4	1.1
White	77	6.3	0.16	4.0	16.0	10.3	4.5
	Average	6.4 ^{ABC}	0.15 ^D	3.7 ^C	15.2 ^C	9.9 ^C	2.8 ^{ABC}
Shaver	73	5.7	0.16	3.7	14.3	9.1	2.7
White	77	5.6	0.18	4.2	15.3	9.7	1.7
	Average	5.7 ^{DEF}	0.17 ^{BCD}	3.9 ^C	14.8 ^C	9.4 ^C	2.2 ^{BC}
DeKalb	73	6.9	0.18	5.2	19.3	12.7	6.1
White	77	6.8	0.20	5.5	20.8	13.7	4.6
	Average	6.9 ^{AB}	0.19 ^B	5.3 ^A	20.0 ^A	13.2 ^A	5.4 ^A
ISA Babcock	73	6.2	0.16	3.8	14.3	9.6	2.1
White	77	6.1	0.16	4.0	15.0	10.0	2.2
	Average	6.1 ^{CD}	0.16 ^{CD}	3.9 ^C	14.6 ^C	9.8 ^C	2.2 ^{BC}
ISA	73	6.9	0.18	4.6	18.7	12.4	5.3
Exp. White	77	7.2	0.18	5.2	19.6	12.8	3.9
	Average	7.1 ^A	0.18 ^{BCD}	4.9 ^A	19.1 ^{AB}	12.6 ^A	4.6 ^{AB}
Novogen	73	6.4	0.16	3.8	15.0	10.1	2.7
White	77	6.1	0.17	4.2	15.5	10.3	1.1
	Average	6.3 ^{BCD}	0.17 ^{BCD}	4.0 ^C	15.2 ^C	10.2 ^{BC}	1.9 ^{BC}
Bovans	73	6.5	0.15	3.6	15.1	9.9	5.8
Robust	77	5.9	0.18	4.0	15.9	10.4	2.8
	Average	6.2 ^{CD}	0.16 ^{CD}	3.8 ^C	15.5 ^C	10.2 ^{BC}	4.3 ^{AB}
All	73	6.2	0.17	4.1	15.9	10.5	3.2
Strains	77	6.1	0.18	4.4	16.5	10.9	2.5

¹All strains were housed such that each strain is equally represented in each density.

A,B,C,D,E,F - Different letters denote significant differences (P<.01), comparisons made among strain average values.

TABLE 25. EFFECT OF WHITE EGG STRAIN AND DENSITY ON EGG WEIGHT AND EGG SIZE DISTRIBUTION OF HENS IN THE 38th NCLP&MT (483-511 DAYS) NON-ANOREXIC MOLT PROGRAM

Breeder	Density ¹	Egg Weight	Pee Wee	Small	Medium	Large	Extra Large
(Strain)	(in ² /hen)	(g/egg)	(%)	(%)	(%)	(%)	(%)
Hy-Line	73	65.8	0.0	0.0	0.0	22.6	77.5
W-36	77	65.4	0.0	0.0	0.0	25.7	74.3
	Average	65.6 ^{BC}	0.0	0.0	0.0	24.1 ^{BC}	75.9 ^{CD}
Hy-Line	73	69.3	0.0	0.0	0.0	3.5	95.9
W-98	77	69.9	0.0	0.0	0.0	1.6	98.4
	Average	69.6 ^E	0.0	0.0	0.0	2.5 ^E	97.2 ^A
H&N	73	66.5	0.0	0.0	0.0	22.6	77.4
Nick Chick	77	66.3	0.0	0.0	0.0	14.0	85.1
	Average	66.4 ^{CD}	0.0	0.0	0.0	18.3 ^{CD}	81.2 ^{BC}
Lohmann	73	66.3	0.0	0.0	0.0	22.3	77.7
LSL-Lite	77	66.1	0.0	0.0	0.0	14.0	86.0
	Average	66.2 ^{CD}	0.0	0.0	0.0	18.2 ^{CD}	81.9 ^{BC}
Bovans	73	65.6	0.0	0.0	0.0	25.8	74.2
White	77	64.5	0.0	0.0	0.0	31.8	68.2
	Average	65.1 ^B	0.0	0.0	0.0	28.8 ^B	71.2 ^D
Shaver	73	64.0	0.0	0.0	0.0	41.0	58.5
White	77	63.7	0.0	0.0	0.0	39.1	59.7
	Average	63.8 ^A	0.0	0.0	0.0	40.1 ^A	59.1 ^E
DeKalb	73	66.1	0.0	0.0	0.0	18.4	81.6
White	77	66.3	0.0	0.0	0.0	17.1	82.9
	Average	66.2 ^{CD}	0.0	0.0	0.0	17.8 ^{CD}	82.3 ^{BC}
ISA Babcock	73	66.9	0.0	0.0	0.0	13.4	86.6
White	77	67.0	0.0	0.0	0.0	15.6	84.4
	Average	67.0 ^D	0.0	0.0	0.0	14.5 ^D	85.5 ^B
ISA	73	66.8	0.0	0.0	0.0	18.0	81.3
Exp. White	77	65.7	0.0	0.0	0.0	24.5	75.5
	Average	66.2 ^{BCD}	0.0	0.0	0.0	21.3 ^{BCD}	78.4 ^{BCD}
Novogen	73	67.1	0.0	0.0	0.0	15.8	84.2
White	77	67.1	0.0	0.0	0.0	19.6	79.6
	Average	67.1 ^{CD}	0.0	0.0	0.0	17.7 ^{CD}	81.9 ^{BC}
Bovans	73	66.0	0.0	0.0	0.0	20.7	79.3
Robust	77	65.4	0.0	0.0	0.0	25.6	74.4
	Average	65.7 ^{BCD}	0.0	0.0	0.0	23.2 ^{BCD}	76.8 ^{BCD}
All	73	66.4	0.0	0.0	0.0	20.4	79.5
Strains	77	66.1	0.0	0.0	0.0	20.8	79.0

¹All strains were housed such that each strain is equally represented in each density.

A,B,C,D - Different letters denote significant differences (P<.01), comparisons made among strain average values.

TABLE 26. EFFECT OF WHITE EGG STRAIN AND DENSITY ON EGG QUALITY, INCOME AND FEED COSTS OF HENS IN THE 38th NCLP&MT (483-511 DAYS) NON-ANOREXIC MOLT PROGRAM

Breeder	Density ¹	Grade A	Grade B	Cracks	Loss	Egg Income	Feed Costs
(Strain)	(in ² /hen)	(%)	(%)	(%)	(%)	(\$/hen)	(\$/hen)
Hy-Line	73	95.0	1.4	3.6	0.0	0.37	0.54
W-36	77	94.9	0.6	4.6	0.0	0.37	0.56
	Average	94.9	1.0	4.1	0.0	0.37 ^D	0.55 ^C
Hy-Line	73	90.3	5.7	3.4	0.6	0.46	0.64
W-98	77	92.5	4.7	2.8	0.0	0.43	0.57
	Average	91.4	5.2	3.1	0.3	0.44 ^{BC}	0.61 ^{BC}
H&N	73	93.2	4.4	2.3	0.0	0.39	0.61
Nick Chick	77	96.6	1.6	0.9	0.9	0.41	0.63
	Average	94.9	3.0	1.6	0.4	0.40 ^{CD}	0.62 ^{BC}
Lohmann	73	94.7	3.0	2.3	0.0	0.40	0.64
LSL-Lite	77	95.6	2.2	2.2	0.0	0.41	0.64
	Average	95.1	2.6	2.3	0.0	0.40 ^{CD}	0.64 ^B
Bovans	73	92.2	3.7	4.2	0.0	0.33	0.63
White	77	95.9	2.0	2.1	0.0	0.38	0.62
	Average	94.0	2.8	3.1	0.0	0.36 ^D	0.62 ^B
Shaver	73	94.1	2.9	2.4	0.6	0.35	0.59
White	77	93.8	0.8	4.2	1.2	0.39	0.61
	Average	94.0	1.9	3.3	0.9	0.37 ^D	0.60 ^{BC}
DeKalb	73	97.3	1.8	0.9	0.0	0.50	0.74
White	77	95.9	2.8	1.3	0.0	0.53	0.73
	Average	96.6	2.3	1.1	0.0	0.52 ^A	0.73 ^A
ISA Babcock	73	95.3	1.3	3.5	0.0	0.37	0.66
White	77	92.7	2.6	4.7	0.0	0.38	0.64
	Average	94.0	2.0	4.1	0.0	0.38 ^{CD}	0.65 ^B
ISA	73	95.6	1.7	2.1	0.7	0.45	0.69
Exp. White	77	98.1	0.0	1.9	0.0	0.51	0.76
	Average	96.8	0.8	2.0	0.3	0.48 ^{AB}	0.73 ^A
Novogen	73	92.6	4.6	2.8	0.0	0.36	0.64
White	77	92.3	4.0	3.0	0.7	0.39	0.65
	Average	92.5	4.3	2.9	0.4	0.38 ^{CD}	0.65 ^B
Bovans	73	96.4	2.8	0.8	0.0	0.35	0.62
Robust	77	94.3	3.9	1.8	0.0	0.38	0.59
	Average	95.4	3.3	1.3	0.0	0.37 ^D	0.61 ^{BC}
All	73	94.2	3.0	2.6	0.2	0.39	0.64
Strains	77	94.8	2.3	2.7	0.3	0.42	0.64

¹All strains were housed such that each strain is equally represented in each density.

A,B,C,D - Different letters denote significant differences (P<.01), comparisons made among strain average values.

TABLE 27. EFFECT OF WHITE EGG STRAIN AND DENSITY ON BODY WEIGHT OF HENS IN THE 38th NCLP&MT (483-511 DAYS) NON-ANOREXIC MOLT PROGRAM

Breeder	Density ¹	17 Wk Body Wt	69 Wk Body Wt	1st Cycle Wt Gain	Lowest Body Wt	Molt Wt Loss	73 Wk Body Wt	Days to 0% Production
(Strain)	(in ² /hen)	(kg)	(kg)	(%)	(kg)	(%)	(kg)	
Hy-Line	73	1.20	1.81	51.2	1.39	19.4	1.46	8.3
W-36	77	1.21	1.80	48.1	1.32	20.9	1.42	7.9
	Average	1.21 ^{FG}	1.80 ^B	49.6 ^{AB}	1.35 ^B	20.2	1.44 ^{CD}	8.1 ^{BCD}
Hy-Line	73	1.34	1.98	48.3	1.49	18.4	1.62	7.7
W-98	77	1.32	2.00	51.8	1.51	19.0	1.62	7.0
	Average	1.33 ^{AB}	1.99 ^A	50.0 ^A	1.50 ^A	18.7	1.62 ^A	7.3 ^D
H&N	73	1.26	1.83	45.6	1.39	20.3	1.46	8.7
Nick Chick	77	1.28	1.85	44.1	1.37	20.4	1.47	8.4
	Average	1.27 ^{DE}	1.84 ^B	44.8 ^{ABCD}	1.38 ^B	20.4	1.46 ^{BCD}	8.6 ^{BCD}
Lohmann	73	1.28	1.81	41.9	1.35	20.4	1.44	8.8
LSL-Lite	77	1.29	1.85	42.9	1.39	20.6	1.47	9.3
	Average	1.29 ^{CD}	1.83 ^B	42.4 ^D	1.37 ^B	20.5	1.46 ^{BCD}	9.1 ^{AB}
Bovans	73	1.21	1.82	50.6	1.35	18.5	1.48	7.2
White	77	1.20	1.75	46.8	1.33	17.5	1.45	8.0
	Average	1.20 ^G	1.79 ^B	48.7 ^{ABC}	1.34 ^{BC}	18.0	1.46 ^{BCD}	7.6 ^{CD}
Shaver	73	1.20	1.69	41.3	1.26	18.7	1.37	7.4
White	77	1.23	1.73	40.8	1.29	17.8	1.42	8.4
	Average	1.21 ^{FG}	1.71 ^C	41.0 ^{DE}	1.28 ^C	18.3	1.40 ^D	7.9 ^{BCD}
DeKalb	73	1.28	1.77	38.4	1.34	20.5	1.41	8.3
White	77	1.30	1.82	39.8	1.38	16.3	1.52	7.8
	Average	1.29 ^{BCD}	1.80 ^B	39.1 ^{DE}	1.36 ^B	18.4	1.47 ^{BCD}	8.1 ^{BCD}
ISA Babcock	73	1.35	1.92	42.6	1.45	21.9	1.50	8.6
White	77	1.35	1.94	44.0	1.47	19.9	1.56	8.9
	Average	1.35 ^A	1.93 ^A	43.3 ^{CD}	1.46 ^A	20.9	1.53 ^B	8.7 ^{ABC}
ISA	73	1.32	1.80	36.2	1.38	17.0	1.49	9.8
Exp. White	77	1.32	1.78	35.1	1.33	15.0	1.51	10.0
	Average	1.32 ^{ABC}	1.79 ^B	35.7 ^E	1.35 ^B	16.0	1.50 ^{BC}	9.9 ^A
Novogen	73	1.27	1.78	41.1	1.34	21.1	1.41	8.6
White	77	1.24	1.77	42.6	1.31	20.2	1.41	8.9
	Average	1.25 ^{DE}	1.78 ^{BC}	41.9 ^D	1.32 ^{BC}	20.7	1.41 ^D	8.7 ^{ABC}
Bovans	73	1.23	1.80	46.6	1.37	18.1	1.48	8.3
Robust	77	1.26	1.77	40.9	1.33	19.1	1.43	8.8
	Average	1.24 ^{EF}	1.79 ^B	43.8 ^{BCD}	1.35 ^B	18.6	1.45 ^{BCD}	8.6 ^{BCD}
All	73	1.27	1.82	44.0	1.37	19.5	1.47	8.3
Strains	77	1.27	1.82	43.4	1.37	18.8	1.48	8.5

¹All strains were housed such that each strain is equally represented in each density.

A,B,C,D,E,F,G - Different letters denote significant differences (P<.01), comparisons made among molt program average values.

TABLE 28. EFFECT OF BROWN EGG STRAIN AND DENSITY ON PERFORMANCE OF HENS IN THE 38th NCLP&MT (483-511 DAYS) NON-MOLTED

Breeder	Density ¹	Feed Consumption	Feed Conversion	Eggs Per Bird Housed	Egg Production	Egg Mass	Mortality
(Strain)	(in ² /hen)	(kg/100/hen/d)	(g egg/g feed)		(HD%)	(g/HD)	(%)
Hy-Line	73	11.8	0.47	21.6	82.2	55.1	0.0
Brown	77	11.2	0.51	23.0	84.3	56.7	0.0
	Average	11.5	0.49	22.3 ^{AB}	83.3 ^{ABC}	55.9 ^{AB}	0.0
Hy-Line	73	10.5	0.50	22.5	83.6	52.0	1.2
Silver Brown	77	11.3	0.48	23.9	86.5	53.8	2.5
	Average	10.9	0.49	23.2 ^A	85.1 ^{AB}	52.9 ^{BC}	1.9
TETRA	73	10.7	0.44	19.0	70.6	46.9	1.2
Brown	77	12.4	0.44	19.8	80.6	54.8	1.3
	Average	11.5	0.44	19.4 ^C	75.6 ^D	50.8 ^C	1.2
TETRA	73	10.7	0.47	21.3	79.5	49.1	1.2
Amber	77	12.7	0.40	20.5	79.3	50.2	1.3
	Average	11.7	0.43	20.9 ^{BC}	79.4 ^{CD}	49.7 ^C	1.2
ISA	73	11.5	0.52	23.0	87.5	59.2	0.0
Brown	77	11.8	0.48	22.9	84.7	55.7	0.0
	Average	11.6	0.50	22.9 ^A	86.1 ^A	57.4 ^A	0.0
Bovans	73	11.1	0.50	23.1	86.3	55.7	1.6
Brown	77	11.8	0.50	23.2	87.3	59.2	0.0
	Average	11.5	0.50	23.2 ^A	86.8 ^A	57.4 ^A	0.8
Novogen	73	11.2	0.46	19.2	77.9	50.8	0.0
Brown	77	12.1	0.46	21.3	83.6	54.5	0.0
	Average	11.6	0.46	20.3 ^C	80.7 ^{BCD}	52.6 ^{BC}	0.0
All	73	11.1	0.48	21.4	81.1	52.7 ^Z	0.7
Strains	77	11.9	0.47	22.1	83.8	55.0 ^Y	0.7
NCSU Barred	73	9.1	0.30	11.7	44.0	26.6	0.0
Plym. Rock	77	11.5	0.24	10.9	43.2	26.2	0.0

¹All strains were housed such that each strain is equally represented in each density.

A,B,C,D - Different letters denote significant differences (P<.01), comparisons made among strain average values.

Y,Z - Different letters denote significant differences (P<.01), comparisons made among density average values.

TABLE 29. EFFECT OF BROWN EGG STRAIN AND DENSITY ON EGG WEIGHT AND EGG SIZE DISTRIBUTION OF HENS IN THE 38th NCLP&MT (483-511 DAYS) NON-MOLTED

Breeder	Density ¹	Egg Weight	Pee Wee	Small	Medium	Large	Extra Large
(Strain)	(in ² /hen)	(g/egg)	(%)	(%)	(%)	(%)	(%)
Hy-Line	73	67.0	0.0	0.0	0.0	21.8	78.2
Brown	77	67.2	0.0	0.0	0.0	15.5	84.5
	Average	67.1 ^A	0.0	0.0	0.0	18.7 ^C	81.4 ^A
Hy-Line	73	62.2	0.0	0.0	1.6	56.2	42.3
Silver Brown	77	62.2	0.0	0.0	1.5	56.0	42.6
	Average	62.2 ^B	0.0	0.0	1.5	56.1 ^A	42.4 ^C
TETRA	73	66.4	0.0	0.0	0.0	22.0	78.0
Brown	77	67.9	0.0	0.0	0.0	27.0	73.0
	Average	67.2 ^A	0.0	0.0	0.0	24.5 ^C	75.5 ^A
TETRA	73	61.8	0.0	0.0	0.0	54.3	45.7
Amber	77	63.3	0.0	0.0	0.0	56.6	43.4
	Average	62.6 ^B	0.0	0.0	0.0	55.5 ^A	44.6 ^C
ISA	73	67.6	0.0	0.0	0.0	19.3	79.0
Brown	77	65.7	0.0	0.0	0.0	29.3	70.7
	Average	66.6 ^A	0.0	0.0	0.0	24.3 ^C	74.8 ^A
Bovans	73	64.5	0.0	0.0	0.0	31.3	68.8
Brown	77	67.8	0.0	0.0	0.0	21.4	78.6
	Average	66.1 ^A	0.0	0.0	0.0	26.3 ^{BC}	73.7 ^{AB}
Novogen	73	65.1	0.0	0.0	0.0	39.6	60.4
Brown	77	65.2	0.0	0.0	0.0	44.4	55.7
	Average	65.2 ^A	0.0	0.0	0.0	42.0 ^{AB}	58.0 ^{BC}
All	73	64.9	0.0	0.0	0.2	34.9	64.6
Strains	77	65.6	0.0	0.0	0.2	35.7	64.1
NCSU Barred	73	60.5	0.0	0.0	0.0	61.13	34.70
Plym. Rock	77	60.8	0.0	0.0	6.7	50.23	43.10

¹All strains were housed such that each strain is equally represented in each density.

A,B,C - Different letters denote significant differences (P<.01), comparisons made among strain average values.

TABLE 30. EFFECT OF BROWN EGG STRAIN AND DENSITY ON EGG QUALITY, INCOME AND FEED COSTS OF HENS IN THE 38th NCLP&MT (483-511 DAYS) NON-MOLTED

Breeder	Density ¹	Grade A	Grade B	Cracks	Loss	Egg Income	Feed Costs
(Strain)	(in ² /hen)	(%)	(%)	(%)	(%)	(\$/hen)	(\$/hen)
Hy-Line	73	98.6	0.0	1.4	0.0	2.12	1.39
Brown	77	95.3	3.0	1.8	0.0	2.22	1.37
	Average	96.9	1.5	1.6	0.0	2.17 ^{AB}	1.38
Hy-Line	73	96.9	3.1	0.0	0.0	2.16	1.25
Silver Brown	77	97.1	1.5	1.5	0.0	2.29	1.39
	Average	97.0	2.3	0.7	0.0	2.22 ^A	1.32
TETRA	73	95.6	3.1	1.4	0.0	1.83	1.29
Brown	77	93.0	3.5	3.6	0.0	1.88	1.35
	Average	94.3	3.3	2.5	0.0	1.85 ^C	1.32
TETRA	73	94.1	6.0	0.0	0.0	2.02	1.29
Amber	77	96.5	1.6	1.9	0.0	1.97	1.47
	Average	95.3	3.8	1.0	0.0	2.00 ^{BC}	1.38
ISA	73	94.7	3.6	0.0	1.8	2.16	1.35
Brown	77	92.1	4.6	3.4	0.0	2.16	1.42
	Average	93.4	4.1	1.7	0.9	2.16 ^{AB}	1.38
Bovans	73	95.4	4.6	0.0	0.0	2.23	1.34
Brown	77	91.5	5.9	2.7	0.0	2.19	1.41
	Average	93.4	5.2	1.3	0.0	2.21 ^{AB}	1.37
Novogen	73	93.9	6.1	0.0	0.0	1.83	1.23
Brown	77	98.5	1.5	0.0	0.0	2.07	1.38
	Average	96.2	3.8	0.0	0.0	1.95 ^C	1.31
All	73	95.6	3.8	0.4	0.3	2.05	1.30
Strains	77	94.9	3.0	2.1	0.0	2.11	1.40
NCSU Barred	73	95.8	0.0	0.0	4.2	1.05	1.08
Plym. Rock	77	93.3	6.7	0.0	0.0	1.02	1.32

¹All strains were housed such that each strain is equally represented in each density.

A,B,C - Different letters denote significant differences (P<.01), comparisons made among strain average values.

TABLE 31. EFFECT OF BROWN EGG STRAIN AND POPULATION ON BODY WEIGHT OF HENS IN THE 38th NCLP&MT (483-511DAYS) NON-MOLTED

Breeder	Density ¹	17 Wk Body Wt	69 Wk Body Wt	1st Cycle Wt Gain	Lowest Body Wt	Molt Wt Loss	73 Wk Body Wt
(Strain)	(in ² /hen)	(kg)	(kg)	(%)	(kg)	(%)	(kg)
Hy-Line	73	1.47	2.05	39.9	2.04	-0.8	2.07
Brown	77	1.54	2.14	39.8	2.13	-1.4	2.17
	Average	1.50	2.10 ^B	39.8	2.08 ^{ABC}	-1.1	2.12 ^{ABC}
Hy-Line	73	1.54	2.16	41.0	2.11	2.2	2.12
Silver Brown	77	1.57	2.22	41.0	2.21	-4.6	2.31
	Average	1.55	2.19 ^A	41.0	2.16 ^A	-1.2	2.22 ^A
TETRA	73	1.48	1.98	33.8	1.93	2.4	1.93
Brown	77	1.48	2.01	36.1	1.99	-1.3	2.03
	Average	1.48	1.99 ^B	34.9	1.96 ^C	0.6	1.98 ^C
TETRA	73	1.56	2.14	36.8	2.10	0.1	2.13
Amber	77	1.55	2.18	40.6	2.18	-1.1	2.21
	Average	1.56	2.16 ^{AB}	38.7	2.14 ^{AB}	-0.5	2.17 ^{AB}
ISA	73	1.53	2.06	35.1	2.05	0.3	2.06
Brown	77	1.56	2.06	32.3	2.05	-1.2	2.08
	Average	1.54	2.06 ^B	33.7	2.05 ^{ABC}	-0.4	2.07 ^{BC}
Bovans	73	1.53	2.04	33.3	2.00	0.9	2.02
Brown	77	1.55	2.04	31.8	2.01	0.1	2.03
	Average	1.54	2.04 ^B	32.6	2.01 ^{BC}	0.5	2.02 ^{BC}
Novogen	73	1.56	2.05	31.0	1.98	2.5	2.00
Brown	77	1.54	2.04	32.3	2.01	0.4	2.03
	Average	1.55	2.04 ^B	31.7	1.99 ^C	1.5	2.01 ^C
All	73	1.52	2.07	35.8	2.03	1.1 ^Y	2.05
Strains	77	1.54	2.10	36.3	2.08	-1.3 ^Z	2.12
NCSU Barred	73	1.24	2.09	69.0	2.08	-1.6	2.12
Plym. Rock	77	1.27	2.20	73.7	2.19	-1.6	2.23

¹All strains were housed such that each strain is equally represented in each density.

A,B,C - Different letters denote significant differences (P<.01), comparisons made among strain average values.

Y,Z - Different letters denote significant differences (P<.01), comparisons made among density average values.

TABLE 32. EFFECT OF BROWN EGG STRAIN AND DENSITY ON PERFORMANCE OF HENS IN THE 38th NCLP&MT (483-511 DAYS) NON-ANOREXIC MOLT PROGRAM

Breeder	Density ¹	Feed Consumption	Feed Conversion	Eggs Per Bird Housed	Egg Production	Egg Mass	Mortality
(Strain)	(in ² /hen)	(kg/100/hen/d)	(g egg/g feed)		(HD%)	(g/HD)	(%)
Hy-Line	73	5.3	0.20	4.1	15.3	10.2	0.5
Brown	77	4.8	0.21	4.2	15.1	10.0	2.2
	Average	5.1 ^C	0.20 ^{AB}	4.2 ^B	15.2 ^B	10.1 ^B	1.4
Hy-Line	73	5.4	0.21	4.9	18.1	11.3	1.6
Silver Brown	77	5.9	0.24	5.9	22.9	14.2	1.1
	Average	5.7 ^{AB}	0.23 ^A	5.4 ^A	20.5 ^A	12.8 ^A	1.4
TETRA	73	6.0	0.18	3.9	15.7	10.5	2.1
Brown	77	5.8	0.17	3.9	14.9	9.9	1.1
	Average	5.9 ^A	0.18 ^C	3.9 ^B	15.3 ^B	10.2 ^B	1.6
TETRA	73	5.1	0.17	3.6	14.1	8.9	3.2
Amber	77	5.0	0.22	4.5	17.9	11.0	2.3
	Average	5.1 ^C	0.20 ^{ABC}	4.1 ^B	16.0 ^B	10.0 ^B	2.7
ISA	73	5.1	0.19	3.6	14.1	9.4	3.7
Brown	77	5.1	0.19	3.7	14.4	9.4	3.9
	Average	5.1 ^{BC}	0.19 ^{BC}	3.7 ^B	14.3 ^B	9.4 ^B	3.8
Bovans	73	5.3	0.20	4.2	16.6	10.9	3.7
Brown	77	5.2	0.21	4.4	16.3	10.8	5.6
	Average	5.3 ^{BC}	0.21 ^{AB}	4.3 ^B	16.5 ^B	10.8 ^B	4.6
Novogen	73	5.4	0.18	3.6	14.4	9.3	3.7
Brown	77	5.3	0.19	3.9	15.3	9.9	4.4
	Average	5.3 ^{ABC}	0.18 ^{BC}	3.8 ^B	14.8 ^B	9.6 ^B	4.1
All	73	5.4	0.19 ^Z	4.0	15.5	10.1	2.7
Strains	77	5.3	0.20 ^Y	4.4	16.7	10.8	3.0

¹All strains were housed such that each strain is equally represented in each density.

A,B,C,D - Different letters denote significant differences (P<.01), comparisons made among strain average values.

Y,Z - Different letters denote significant differences (P<.01), comparisons made among density average values.

TABLE 33. EFFECT OF BROWN EGG STRAIN AND DENSITY ON EGG WEIGHT AND EGG SIZE DISTRIBUTION OF HENS IN THE 38th NCLP&MT (483-511 DAYS) NON-ANOREXIC MOLT PROGRAM

Breeder	Density ¹	Egg Weight	Pee Wee	Small	Medium	Large	Extra Large
(Strain)	(in ² /hen)	(g/egg)	(%)	(%)	(%)	(%)	(%)
Hy-Line	73	67.1	0.0	0.6	0.0	17.7	81.0
Brown	77	66.4	0.0	1.0	0.0	18.4	80.6
	Average	66.7 ^A	0.0	0.8	0.0	18.1 ^C	80.8 ^A
Hy-Line	73	62.6	0.0	0.0	0.6	51.7	45.7
Silver Brown	77	62.2	0.0	0.0	0.0	50.7	49.3
	Average	62.4 ^C	0.0	0.0	0.3	51.2 ^A	47.5 ^C
TETRA	73	66.9	0.0	0.0	0.0	17.6	81.4
Brown	77	66.7	0.0	0.0	0.0	23.9	76.1
	Average	66.8 ^A	0.0	0.0	0.0	20.8 ^C	78.7 ^A
TETRA	73	63.4	0.0	0.0	0.8	48.5	49.8
Amber	77	62.1	0.0	0.8	0.0	58.7	40.5
	Average	62.8 ^C	0.0	0.4	0.4	53.6 ^A	45.2 ^C
ISA	73	66.5	0.0	0.0	0.0	28.2	71.8
Brown	77	65.6	0.0	0.0	0.0	26.8	73.2
	Average	66.1 ^{AB}	0.0	0.0	0.0	27.5 ^{BC}	72.5 ^{AB}
Bovans	73	65.6	0.0	0.0	0.0	26.1	73.9
Brown	77	66.2	0.0	0.0	0.7	20.2	78.6
	Average	65.9 ^{AB}	0.0	0.0	0.3	23.2 ^C	76.2 ^A
Novogen	73	64.3	0.0	0.0	0.0	38.4	61.6
Brown	77	65.2	0.0	0.0	0.0	32.2	67.0
	Average	64.7 ^B	0.0	0.0	0.0	35.3 ^B	64.3 ^B
All	73	65.2	0.0	0.1	0.2	32.6	66.5
Strains	77	64.9	0.0	0.3	0.1	33.0	66.5

¹All strains were housed such that each strain is equally represented in each density.

A,B,C - Different letters denote significant differences (P<.01), comparisons made among strain average values.

TABLE 34. EFFECT OF BROWN EGG STRAIN AND DENSITY ON EGG QUALITY, INCOME AND FEED COSTS OF HENS IN THE 38th NCLP&MT (483-511 DAYS) NON-ANOREXIC MOLT PROGRAM

Breeder	Density ¹	Grade A	Grade B	Cracks	Loss	Egg Income	Feed Costs
(Strain)	(in ² /hen)	(%)	(%)	(%)	(%)	(\$/hen)	(\$/hen)
Hy-Line	73	95.4	1.9	2.0	0.7	0.39	0.56
Brown	77	96.9	1.4	1.7	0.0	0.40	0.51
	Average	96.2	1.7	1.9	0.4	0.40 ^B	0.53 ^{AB}
Hy-Line	73	90.1	4.8	3.0	2.1	0.44	0.58
Silver Brown	77	97.6	1.7	0.7	0.0	0.57	0.59
	Average	93.9	3.2	1.9	1.1	0.51 ^A	0.58 ^A
TETRA	73	90.0	5.7	3.3	1.0	0.36	0.58
Brown	77	92.0	5.4	2.6	0.0	0.36	0.59
	Average	91.0	5.6	2.9	0.5	0.36 ^B	0.59 ^A
TETRA	73	92.4	3.9	2.8	0.9	0.34	0.50
Amber	77	94.1	2.7	3.3	0.0	0.43	0.49
	Average	93.3	3.3	3.0	0.4	0.38 ^B	0.49 ^B
ISA	73	93.5	5.2	1.3	0.0	0.35	0.51
Brown	77	93.4	3.5	3.1	0.0	0.35	0.50
	Average	93.5	4.3	2.2	0.0	0.35 ^B	0.50 ^B
Bovans	73	96.9	0.9	2.3	0.0	0.41	0.53
Brown	77	93.6	3.8	2.1	0.6	0.41	0.55
	Average	95.2	2.3	2.2	0.3	0.41 ^B	0.54 ^{AB}
Novogen	73	95.6	3.6	0.8	0.0	0.34	0.50
Brown	77	95.5	2.8	0.9	0.9	0.37	0.52
	Average	95.6	3.2	0.8	0.4	0.36 ^B	0.51 ^B
All	73	93.4	3.7	2.2	0.7	0.38 ^Z	0.54
Strains	77	94.7	3.0	2.1	0.2	0.41 ^Y	0.54

¹All strains were housed such that each strain is equally represented in each density.

A,B - Different letters denote significant differences (P<.01), comparisons made among strain average values.

Y,Z - Different letters denote significant differences (P<.01), comparisons made among density average values.

TABLE 35. EFFECT OF BROWN EGG STRAIN AND SYNCHRONIZED MOLT ON BODY WEIGHT OF HENS IN THE 38th NCLP&MT (483-511 DAYS) NON-ANOREXIC MOLT PROGRAM

Breeder	Molt Density ¹	17 Wk Body Wt	69 Wk Body Wt	1st Cycle Wt Gain	Lowest Body Wt	Molt Wt Loss	73 Wk Body Wt	Days to 0% Production
(Strain)	(in ² /hen)	(kg)	(kg)	(%)	(kg)	(%)	(kg)	
Hy-Line	73	1.47	2.12	43.9	1.59	24.7	1.60	9.4
Brown	77	1.51	2.10	39.3	1.53	27.1	1.53	10.1
	Average	1.49 ^C	2.11 ^{BC}	41.6 ^A	1.56 ^{BC}	25.9	1.56 ^{BC}	9.8 ^{ABC}
Hy-Line	73	1.60	2.20	38.2	1.67	22.4	1.71	10.1
Silver Brown	77	1.56	2.23	42.5	1.72	19.7	1.79	10.8
	Average	1.58 ^{AB}	2.22 ^A	40.4 ^A	1.70 ^A	21.0	1.75 ^A	10.4 ^{AB}
TETRA	73	1.50	2.06	37.5	1.56	19.4	1.66	9.0
Brown	77	1.46	2.00	37.2	1.56	17.2	1.65	9.1
	Average	1.48 ^C	2.03 ^{CD}	37.4 ^{AB}	1.56 ^{BC}	18.3	1.66 ^{AB}	9.1 ^{BC}
TETRA	73	1.54	2.04	33.0	1.53	25.0	1.53	9.9
Amber	77	1.52	2.12	39.1	1.58	25.2	1.59	11.6
	Average	1.53 ^{BC}	2.08 ^{BC}	36.1 ^{ABC}	1.56 ^{BC}	25.1	1.56 ^{BC}	10.7 ^A
ISA	73	1.52	2.05	36.9	1.53	25.3	1.53	8.2
Brown	77	1.55	2.06	32.7	1.49	26.3	1.51	9.6
	Average	1.54 ^{ABC}	2.05 ^{BCD}	34.8 ^{ABC}	1.51 ^{BC}	25.8	1.52 ^C	8.9 ^C
Bovans	73	1.53	1.96	28.6	1.48	22.3	1.52	9.2
Brown	77	1.53	1.99	29.9	1.50	18.6	1.62	9.4
	Average	1.53 ^{BC}	1.98 ^D	29.2 ^C	1.49 ^C	20.4	1.57 ^{BC}	9.3 ^{ABC}
Novogen	73	1.59	2.11	32.6	1.58	24.8	1.58	9.1
Brown	77	1.61	2.13	32.1	1.60	23.9	1.62	8.3
	Average	1.60 ^A	2.12 ^B	32.3 ^{BC}	1.59 ^B	24.4	1.60 ^{BC}	8.7 ^C
All	73	1.54	2.08	35.8	1.56	23.4	1.59	9.3
Strains	77	1.54	2.09	36.1	1.57	22.6	1.62	9.8

¹All strains were housed such that each strain is equally represented in each density.

A,B,C - Different letters denote significant differences (P<.01), comparisons made among molt program average values.

TABLE 36. EFFECT OF WHITE EGG STRAIN AND DENSITY ON PERFORMANCE OF HENS IN THE 38th NCLP&MT (512-763 DAYS) NON-MOLTED

Breeder	Density ¹	Feed Consumption	Feed Conversion	Eggs Per Bird Housed	Egg Production	Egg Mass	Mortality
(Strain)	(in ² /hen)	(kg/100/hen/d)	(g egg/g feed)		(HD%)	(g/HD)	(%)
Hy-Line	73	10.6	0.40	148.1	62.0	41.8	7.2
W-36	77	10.7	0.43	158.0	66.4	45.4	7.5
	Average	10.6 ^D	0.41	153.1	64.2	43.6	7.3
Hy-Line	73	13.0	0.37	147.4	66.1	47.7	4.5
W-98	77	12.9	0.38	159.8	67.8	48.1	4.2
	Average	12.9 ^{AB}	0.37	153.6	67.0	47.9	4.4
H&N	73	12.2	0.38	148.2	65.8	45.0	6.0
Nick Chick	77	11.9	0.40	164.2	68.8	47.4	2.5
	Average	12.0 ^{ABC}	0.39	156.2	67.3	46.2	4.2
Lohmann	73	11.8	0.42	152.7	73.2	49.2	4.8
LSL-Lite	77	12.4	0.39	161.3	69.7	46.7	8.8
	Average	12.1 ^{ABC}	0.40	157.0	71.4	48.0	6.8
Bovans	73	12.0	0.38	152.0	68.8	45.4	10.7
White	77	11.8	0.43	156.5	74.6	49.5	18.8
	Average	11.9 ^{ABCD}	0.40	154.2	71.7	47.4	14.7
Shaver	73	11.2	0.41	165.0	70.3	45.6	7.2
White	77	11.1	0.41	153.3	68.6	44.7	13.3
	Average	11.1 ^{CD}	0.41	159.2	69.4	45.1	10.2
DeKalb	73	13.2	0.39	170.9	75.5	50.3	12.1
White	77	13.2	0.38	160.4	72.8	49.9	4.2
	Average	13.2 ^A	0.38	165.6	74.1	50.1	8.2
ISA Babcock	73	12.0	0.42	180.8	73.1	49.7	1.6
White	77	10.9	0.42	160.2	66.9	45.4	7.5
	Average	11.4 ^{CD}	0.42	170.5	70.0	47.5	4.6
ISA	73	11.2	0.42	153.8	69.1	46.7	13.1
Exp. White	77	13.0	0.39	159.7	73.3	50.2	8.3
	Average	12.1 ^{ABC}	0.40	156.7	71.2	48.4	10.7
Novogen	73	11.8	0.38	148.7	65.4	44.7	13.1
White	77	11.5	0.39	152.7	65.1	43.7	7.5
	Average	11.6 ^{BCD}	0.38	150.7	65.3	44.2	10.3
Bovans	73	12.4	0.39	153.4	69.8	48.0	16.7
Robust	77	12.0	0.41	157.1	71.5	48.6	7.7
	Average	12.2 ^{ABC}	0.40	155.2	70.6	48.3	12.2
All	73	11.9	0.40	156.4	69.0	46.7	8.8
Strains	77	11.9	0.40	158.5	69.6	47.2	8.2

¹All strains were housed such that each strain is equally represented in each density.

A,B,C,D - Different letters denote significant differences (P<.01), comparisons made among strain average values.

TABLE 37. EFFECT OF WHITE EGG STRAIN AND DENSITY ON EGG WEIGHT AND EGG SIZE DISTRIBUTION OF HENS IN THE 38th NCLP&MT (512-763 DAYS) NON-MOLTED

Breeder	Density ¹	Egg Weight	Pee Wee	Small	Medium	Large	Extra Large
(Strain)	(in ² /hen)	(g/egg)	(%)	(%)	(%)	(%)	(%)
Hy-Line	73	67.8	0.0	0.0	0.0	8.9	89.8
W-36	77	68.5	0.0	0.0	0.3	6.6	92.5
	Average	68.1 ^{BC}	0.0	0.0	0.1 ^B	7.8 ^C	91.1 ^{AB}
Hy-Line	73	72.4	0.0	0.0	0.0	2.3	96.4
W-98	77	71.3	0.0	0.0	0.0	5.4	93.7
	Average	71.8 ^A	0.0	0.0	0.0 ^B	3.8 ^C	95.0 ^A
H&N	73	68.5	0.0	0.0	0.0	7.2	92.0
Nick Chick	77	69.1	0.0	0.0	0.0	5.6	92.5
	Average	68.8 ^B	0.0	0.0	0.0 ^B	6.4 ^C	92.3 ^A
Lohmann	73	67.3	0.0	0.0	0.0	7.3	92.4
LSL-Lite	77	67.4	0.0	0.0	0.2	11.6	87.9
	Average	67.3 ^{BCD}	0.0	0.0	0.1 ^B	9.4 ^{BC}	90.2 ^{AB}
Bovans	73	66.2	0.0	0.0	0.2	13.7	85.3
White	77	66.4	0.0	0.2	0.4	14.0	84.7
	Average	66.3 ^{CD}	0.0	0.1	0.3 ^{AB}	13.9 ^{AB}	85.0 ^{BC}
Shaver	73	65.2	0.0	0.2	0.5	17.8	80.7
White	77	65.4	0.0	0.0	1.6	18.6	79.0
	Average	65.3 ^D	0.0	0.1	1.0 ^A	18.2 ^A	79.8 ^C
DeKalb	73	66.6	0.0	0.0	0.0	9.0	90.2
White	77	68.6	0.0	0.0	0.0	7.3	91.2
	Average	67.6 ^{BC}	0.0	0.0	0.0 ^B	8.1 ^{BC}	90.7 ^{AB}
ISA Babcock	73	68.1	0.0	0.0	0.9	6.4	91.8
White	77	67.8	0.0	0.0	0.4	6.2	91.8
	Average	67.9 ^{BC}	0.0	0.0	0.6 ^{AB}	6.3 ^C	91.8 ^A
ISA	73	67.6	0.0	0.0	0.0	8.7	89.8
Exp. White	77	68.6	0.0	0.0	0.0	5.9	93.3
	Average	68.1 ^{BC}	0.0	0.0	0.0 ^B	7.3 ^C	91.5 ^A
Novogen	73	68.6	0.4	0.0	0.0	8.8	89.7
White	77	67.2	0.0	0.0	0.2	9.4	88.1
	Average	67.9 ^{BC}	0.2	0.0	0.1 ^B	9.1 ^{BC}	88.9 ^{AB}
Bovans	73	68.9	0.0	0.0	0.6	7.1	90.9
Robust	77	68.3	0.0	0.0	0.5	6.8	92.0
	Average	68.6 ^B	0.0	0.0	0.6 ^{AB}	6.9 ^C	91.4 ^A
All	73	67.9	0.0	0.0	0.2	8.8	89.9
Strains	77	68.0	0.0	0.0	0.3	8.9	89.7

¹All strains were housed such that each strain is equally represented in each density.

A,B,C,D - Different letters denote significant differences (P<.01), comparisons made among strain average values.

TABLE 38. EFFECT OF WHITE EGG STRAIN AND DENSITY ON EGG QUALITY, INCOME AND FEED COSTS OF HENS IN THE 38th NCLP&MT (512-763 DAYS) NON-MOLTED

Breeder	Density ¹	Grade A	Grade B	Cracks	Loss	Egg Income	Feed Costs
(Strain)	(in ² /hen)	(%)	(%)	(%)	(%)	(\$/hen)	(\$/hen)
Hy-Line	73	92.8	1.1	4.9	1.3	15.51	10.38
W-36	77	94.2	0.9	4.2	0.7	16.81	10.47
	Average	93.5	1.0	4.5	1.0	16.16	10.42
Hy-Line	73	85.2	6.8	6.6	1.3	14.83	12.00
W-98	77	93.4	2.9	2.8	0.9	16.88	12.31
	Average	89.3	4.8	4.7	1.1	15.85	12.15
H&N	73	89.9	6.1	3.1	0.8	15.39	11.42
Nick Chick	77	90.3	4.5	3.4	1.9	16.90	11.73
	Average	90.1	5.3	3.3	1.4	16.14	11.57
Lohmann	73	93.5	2.1	4.1	0.3	16.30	9.98
LSL-Lite	77	92.1	4.2	3.3	0.4	17.01	11.78
	Average	92.8	3.2	3.7	0.3	16.65	10.88
Bovans	73	90.9	4.6	3.6	0.9	15.83	10.89
White	77	91.2	5.7	2.3	0.8	16.35	10.07
	Average	91.1	5.2	2.9	0.8	16.09	10.48
Shaver	73	90.2	3.3	5.6	0.9	17.08	10.77
White	77	89.5	4.1	5.5	0.8	15.82	10.05
	Average	89.9	3.7	5.5	0.8	16.45	10.41
DeKalb	73	95.2	2.5	1.6	0.8	18.22	12.22
White	77	94.2	2.3	2.0	1.6	16.81	11.81
	Average	94.7	2.4	1.8	1.2	17.51	12.01
ISA Babcock	73	93.0	3.6	2.5	0.9	19.02	12.26
White	77	90.2	3.6	4.5	1.7	16.43	10.82
	Average	91.6	3.6	3.5	1.3	17.73	11.54
ISA	73	91.2	3.5	3.8	1.5	15.87	10.21
Exp. White	77	92.7	2.8	3.6	0.9	16.80	11.74
	Average	91.9	3.1	3.7	1.2	16.34	10.97
Novogen	73	90.3	5.7	2.9	1.2	15.35	10.98
White	77	89.2	3.8	4.8	2.3	15.46	11.04
	Average	89.7	4.7	3.8	1.8	15.40	11.01
Bovans	73	87.8	4.5	6.3	1.5	15.73	11.09
Robust	77	94.5	2.7	2.2	0.7	16.73	10.91
	Average	91.2	3.6	4.2	1.1	16.23	11.00
All	73	90.9	4.0	4.1	1.0	16.28	11.11
Strains	77	91.9	3.4	3.5	1.1	16.54	11.15

¹All strains were housed such that each strain is equally represented in each density.
There are no significant differences among these means.

TABLE 39. EFFECT OF WHITE EGG STRAIN AND DENSITY ON PERFORMANCE OF HENS IN THE 38th NCLP&MT (512-763 DAYS) NON-ANOREXIC MOLT PROGRAM

Breeder	Density ¹	Feed Consumption	Feed Conversion	Eggs Per Bird Housed	Egg Production	Egg Mass	Mortality
(Strain)	(in ² /hen)	(kg/100/hen/d)	(g egg/g feed)		(HD%)	(g/HD)	(%)
Hy-Line	73	10.6	0.47	178.2	74.2	50.1	3.2
W-36	77	11.1	0.46	179.7	74.2	50.8	2.8
	Average	10.8 ^C	0.47	179.0 ^{ABC}	74.2E	50.5 ^D	3.0 ^{CD}
Hy-Line	73	12.9	0.42	174.2	76.1	53.9	3.9
W-98	77	12.7	0.44	171.2	77.7	55.8	0.7
	Average	12.8 ^A	0.43	172.7 ^{ABCD}	76.9 ^{DE}	54.9 ^{AB}	2.3 ^D
H&N	73	12.0	0.45	174.2	78.4	53.9	6.4
Nick Chick	77	11.9	0.46	186.0	81.3	55.3	7.3
	Average	12.0 ^{AB}	0.46	180.1 ^{ABC}	79.9 ^{BCD}	54.6 ^{AB}	6.8 ^{ABC}
Lohmann	73	12.0	0.47	177.5	82.4	55.7	5.8
LSL-Lite	77	11.7	0.48	184.4	82.2	56.0	9.4
	Average	11.9 ^B	0.47	180.9 ^{ABC}	82.3 ^{AB}	55.8 ^A	7.6 ^{AB}
Bovans	73	11.7	0.47	161.1	80.6	54.3	12.7
White	77	12.1	0.46	173.3	81.3	54.7	8.4
	Average	11.9 ^B	0.46	167.2 ^{CD}	81.0 ^{ABC}	54.5 ^{ABC}	10.6 ^A
Shaver	73	10.7	0.46	171.7	75.5	49.3	2.1
White	77	10.9	0.47	189.3	79.6	51.5	2.8
	Average	10.8 ^C	0.47	180.5 ^{ABC}	77.6 ^D	50.4 ^D	2.5 ^D
DeKalb	73	12.4	0.45	177.7	82.7	56.0	4.0
White	77	12.5	0.46	187.4	84.2	57.1	5.8
	Average	12.5 ^{AB}	0.45	182.5 ^{AB}	83.5 ^A	56.5 ^A	4.9 ^{BCD}
ISA Babcock	73	11.8	0.46	190.6	80.5	54.1	3.7
White	77	11.8	0.46	183.0	79.7	54.3	4.4
	Average	11.8 ^B	0.46	186.8 ^A	80.1 ^{BCD}	54.2 ^{ABC}	4.1 ^{BCD}
ISA	73	11.4	0.46	161.2	77.7	52.5	6.4
Exp. White	77	12.0	0.44	177.2	78.0	52.7	6.1
	Average	11.7 ^B	0.45	169.2 ^{BCD}	77.8 ^{CD}	52.6 ^{BCD}	6.2 ^{BCD}
Novogen	73	11.6	0.45	169.5	77.0	52.3	4.8
White	77	11.8	0.44	180.2	76.6	51.9	5.6
	Average	11.7 ^B	0.45	174.8 ^{ABCD}	76.8 ^{DE}	52.1 ^{CD}	5.2 ^{BCD}
Bovans	73	12.4	0.43	159.7	78.2	53.2	7.9
Robust	77	11.9	0.45	168.4	79.2	53.4	7.8
	Average	12.2 ^{AB}	0.44	164.0 ^D	78.7 ^{CD}	53.3 ^{BC}	7.9 ^{AB}
All	73	11.8	0.45	172.3 ^Z	78.5	53.2	5.5
Strains	77	11.9	0.46	180.0 ^Y	79.5	54.0	5.5

¹All strains were housed such that each strain is equally represented in each density.

A,B,C,D,E - Different letters denote significant differences (P<.01), comparisons made among strain average values.

Y,Z- Different letters denote significant differences (P<.01), comparisons made between density average values.

TABLE 40. EFFECT OF WHITE EGG STRAIN AND DENSITY ON EGG WEIGHT AND EGG SIZE DISTRIBUTION OF HENS IN THE 38th NCLP&MT (512-763 DAYS) NON-ANOREXIC MOLT PROGRAM

Breeder	Density ¹	Egg Weight	Pee Wee	Small	Medium	Large	Extra Large
(Strain)	(in ² /hen)	(g/egg)	(%)	(%)	(%)	(%)	(%)
Hy-Line	73	67.4	0.0	0.0	0.0	7.3	92.3
W-36	77	68.4	0.0	0.0	0.1	5.8	93.7
	Average	67.9 ^B	0.0	0.0	0.0	6.6 ^B	93.0 ^B
Hy-Line	73	70.9	0.0	0.0	0.0	3.0	96.4
W-98	77	71.8	0.0	0.0	0.0	1.4	98.1
	Average	71.4 ^A	0.0	0.0	0.0	2.2 ^C	97.2 ^A
H&N	73	68.7	0.0	0.0	0.0	4.6	95.0
Nick Chick	77	68.0	0.0	0.0	0.1	5.7	93.6
	Average	68.3 ^B	0.0	0.0	0.1	5.1 ^{BC}	94.3 ^{AB}
Lohmann	73	67.5	0.0	0.0	0.3	7.2	92.4
LSL-Lite	77	68.0	0.0	0.0	0.0	5.4	94.2
	Average	67.7 ^B	0.0	0.0	0.1	6.3 ^B	93.3 ^B
Bovans	73	67.3	0.0	0.1	0.2	5.4	94.0
White	77	67.2	0.0	0.0	0.1	8.5	90.0
	Average	67.3 ^B	0.0	0.1	0.1	6.9 ^B	92.0 ^B
Shaver	73	65.2	0.0	0.0	0.3	13.1	86.1
White	77	64.6	0.1	0.1	0.2	15.2	83.8
	Average	64.9 ^C	0.0	0.1	0.2	14.2 ^A	85.0 ^C
DeKalb	73	67.6	0.0	0.1	0.6	5.7	93.5
White	77	67.7	0.0	0.1	0.0	7.2	92.0
	Average	67.7 ^B	0.0	0.1	0.3	6.5 ^B	92.7 ^B
ISA Babcock	73	67.2	0.0	0.1	0.0	7.8	91.7
White	77	68.0	0.0	0.2	0.0	5.7	93.3
	Average	67.6 ^B	0.0	0.2	0.0	6.7 ^B	92.5 ^B
ISA	73	67.4	0.0	0.0	0.3	6.2	93.2
Exp. White	77	67.4	0.0	0.1	0.0	6.7	92.8
	Average	67.4 ^B	0.0	0.1	0.2	6.4 ^B	93.0 ^B
Novogen	73	67.8	0.0	0.0	0.0	6.1	93.5
White	77	67.7	0.0	0.0	0.0	7.7	91.7
	Average	67.8 ^B	0.0	0.0	0.0	6.9 ^B	92.6 ^B
Bovans	73	67.9	0.0	0.0	0.2	7.1	92.2
Robust	77	67.4	0.0	0.0	0.1	6.7	92.3
	Average	67.7 ^B	0.0	0.0	0.1	6.9 ^B	92.2 ^B
All	73	67.7	0.0	0.0	0.2	6.7	92.7
Strains	77	67.8	0.0	0.1	0.0	6.9	92.3

¹All strains were housed such that each strain is equally represented in each density.

A,B,C - Different letters denote significant differences (P<.01), comparisons made among strain average values.

TABLE 41. EFFECT OF WHITE EGG STRAIN AND DENSITY ON EGG QUALITY, INCOME AND FEED COSTS OF HENS IN THE 38th NCLP&MT (512-763 DAYS) NON-ANOREXIC MOLT PROGRAM

Breeder	Density ¹	Grade A	Grade B	Cracks	Loss	Egg Income	Feed Costs
(Strain)	(in ² /hen)	(%)	(%)	(%)	(%)	(\$/hen)	(\$/hen)
Hy-Line	73	95.8	0.9	2.9	0.4	19.19	9.73
W-36	77	95.1	0.9	3.6	0.4	19.28	10.52
	Average	95.4 ^{AB}	0.9 ^D	3.2	0.4	19.24 ^{AB}	10.12
Hy-Line	73	93.7	3.1	2.6	0.7	18.51	11.55
W-98	77	93.0	3.3	3.1	0.5	18.17	10.72
	Average	93.4 ^{BC}	3.2 ^A	2.8	0.6	18.34 ^{ABC}	11.13
H&N	73	94.7	2.4	2.4	0.5	18.64	10.10
Nick Chick	77	95.5	1.6	2.3	0.6	19.94	10.90
	Average	95.1 ^{AB}	2.0 ^{ABCD}	2.4	0.5	19.29 ^{AB}	10.50
Lohmann	73	95.5	1.8	2.5	0.1	19.14	10.16
LSL-Lite	77	96.2	1.4	2.0	0.5	19.87	10.08
	Average	95.9 ^A	1.6 ^{BCD}	2.2	0.3	19.51 ^{AB}	10.12
Bovans	73	92.8	3.3	3.6	0.3	17.10	8.79
White	77	92.1	2.4	4.1	1.5	18.09	10.11
	Average	92.4 ^C	2.9 ^{AB}	3.8	0.9	17.60 ^C	9.45
Shaver	73	96.0	1.0	2.5	0.5	18.46	9.49
White	77	95.4	1.8	2.2	0.6	20.23	9.93
	Average	95.7 ^{AB}	1.4 ^{CD}	2.3	0.5	19.34 ^{AB}	9.71
DeKalb	73	94.0	3.1	2.7	0.1	19.03	10.15
White	77	93.5	2.8	3.0	0.7	19.85	10.94
	Average	93.8 ^{ABC}	3.0 ^{AB}	2.9	0.4	19.44 ^{AB}	10.55
ISA Babcock	73	94.1	2.7	2.8	0.4	20.35	10.67
White	77	94.6	2.1	2.6	0.8	19.45	10.48
	Average	94.3 ^{ABC}	2.4 ^{ABC}	2.7	0.6	19.90 ^A	10.58
ISA	73	95.7	1.7	2.3	0.2	17.40	9.27
Exp. White	77	94.1	2.7	2.9	0.4	18.91	10.44
	Average	94.9 ^{AB}	2.2 ^{ABCD}	2.6	0.3	18.15 ^{BC}	9.86
Novogen	73	95.1	1.8	2.8	0.4	18.20	9.89
White	77	94.0	2.3	3.1	0.6	19.18	10.87
	Average	94.6 ^{ABC}	2.0 ^{ABCD}	2.9	0.5	18.69 ^{ABC}	10.38
Bovans	73	93.8	2.9	2.8	0.5	16.99	9.96
Robust	77	95.0	1.9	2.2	0.8	17.97	9.55
	Average	94.4 ^{ABC}	2.4 ^{ABC}	2.5	0.7	17.48 ^C	9.75
All	73	94.7	2.3	2.7	0.4	18.46 ^Z	9.98
Strains	77	94.4	2.1	2.8	0.7	19.18 ^Y	10.41

¹All strains were housed such that each strain is equally represented in each density.

A,B,C,D - Different letters denote significant differences (P<.01), comparisons made among strain average values.

Y,Z- Different letters denote significant differences (P<.01), comparisons made between density average values.

TABLE 42. EFFECT OF BROWN EGG STRAIN AND DENSITY ON PERFORMANCE OF HENS IN THE 38th NCLP&MT (512-763 DAYS) NON-MOLTED

Breeder	Density ¹	Feed Consumption	Feed Conversion	Eggs Per Bird Housed	Egg Production	Egg Mass	Mortality
(Strain)	(in ² /hen)	(kg/100/hen/d)	(g egg/g feed)		(HD%)	(g/HD)	(%)
Hy-Line	73	10.9	0.41	147.6	63.2	44.5	1.2
Brown	77	11.8	0.41	168.9	69.5	48.6	0.0
	Average	11.3	0.41 ^A	158.2 ^A	66.3 ^A	46.6 ^{AB}	0.6 ^C
Hy-Line	73	12.2	0.36	157.2	67.1	43.8	5.0
Silver Brown	77	11.7	0.37	157.2	65.2	42.0	4.5
	Average	11.9	0.36 ^{AB}	157.2 ^{AB}	66.1 ^A	42.9 ^{BC}	4.8 ^{BC}
TETRA	73	11.2	0.33	118.3	52.7	36.7	10.7
Brown	77	12.1	0.35	118.0	58.4	41.1	15.0
	Average	11.6	0.34 ^B	118.2 ^D	55.6 ^B	38.9 ^{CD}	12.9 ^A
TETRA	73	10.4	0.36	130.0	57.3	37.3	11.9
Amber	77	12.2	0.32	128.5	57.6	38.3	5.0
	Average	11.3	0.34 ^B	129.2 ^{CD}	57.4 ^B	37.8 ^D	8.5 ^{AB}
ISA	73	11.5	0.39	149.1	65.0	44.7	6.0
Brown	77	11.9	0.40	159.1	69.9	47.0	11.3
	Average	11.7	0.39 ^A	154.1 ^{AB}	67.5 ^A	45.8 ^{AB}	8.6 ^{AB}
Bovans	73	12.4	0.40	158.8	72.8	49.2	12.9
Brown	77	12.0	0.40	158.5	68.3	47.4	10.0
	Average	12.2	0.40 ^A	158.6 ^A	70.6 ^A	48.3 ^A	11.5 ^{AB}
Novogen	73	11.1	0.39	135.5	65.6	43.6	10.7
Brown	77	11.7	0.38	143.3	64.5	43.4	8.8
	Average	11.4	0.38 ^{AB}	139.4 ^{BC}	65.0 ^A	43.5 ^B	9.8 ^{AB}
All	73	11.4	0.38	142.3	63.4	42.8	8.3
Strains	77	11.9	0.37	147.6	64.7	44.0	7.8
NCSU Barred	73	9.7	0.18	67.2	28.0	16.9	3.0
Plym. Rock	77	10.6	0.17	63.4	29.0	18.0	3.9

¹All strains were housed such that each strain is equally represented in each density.

A,B,C,D - Different letters denote significant differences (P<.01), comparisons made among strain average values.

TABLE 43. EFFECT OF BROWN EGG STRAIN AND DENSITY ON EGG WEIGHT AND EGG SIZE DISTRIBUTION OF HENS IN THE 38th NCLP&MT (512-763 DAYS) NON-MOLTED

Breeder	Density ¹	Egg Weight	Pee Wee	Small	Medium	Large	Extra Large
(Strain)	(in ² /hen)	(g/egg)	(%)	(%)	(%)	(%)	(%)
Hy-Line	73	70.7	0.0	0.0	0.0	4.9	94.1
Brown	77	70.2	0.0	0.0	0.0	7.2	92.2
	Average	70.5 ^A	0.0	0.0	0.0	6.1 ^D	93.1 ^A
Hy-Line	73	65.5	0.0	0.0	0.4	19.7	79.7
Silver Brown	77	64.8	0.0	0.0	0.2	21.3	77.8
	Average	65.2 ^E	0.0	0.0	0.3	20.5 ^A	78.7 ^C
TETRA	73	70.0	0.0	0.0	0.2	7.3	90.7
Brown	77	70.6	0.0	0.0	0.0	4.3	93.4
	Average	70.3 ^{AB}	0.0	0.0	0.1	5.8 ^D	92.0 ^A
TETRA	73	65.4	0.3	0.0	1.4	20.7	77.5
Amber	77	66.8	0.0	0.0	0.7	14.5	83.4
	Average	66.1 ^{DE}	0.1	0.0	1.0	17.6 ^{AB}	80.5 ^C
ISA	73	69.0	0.0	0.0	0.2	9.0	90.7
Brown	77	67.2	0.0	0.2	0.0	12.6	86.3
	Average	68.1 ^C	0.0	0.1	0.1	10.8 ^{CD}	88.5 ^{AB}
Bovans	73	67.8	0.0	0.0	0.2	13.4	85.8
Brown	77	69.5	0.0	0.0	0.4	7.6	91.9
	Average	68.7 ^{BC}	0.0	0.0	0.3	10.5 ^{CD}	88.8 ^{AB}
Novogen	73	66.5	0.0	0.0	0.2	14.3	84.6
Brown	77	67.4	0.0	0.0	0.4	14.9	84.3
	Average	67.0 ^{CD}	0.0	0.0	0.3	14.6 ^{BC}	84.4 ^{BC}
All	73	67.8	0.0	0.0	0.4	12.8	86.1
Strains	77	68.1	0.0	0.0	0.2	11.8	87.0
NCSU Barred	73	60.9	0.0	0.0	1.0	33.67	62.97
Plym. Rock	77	62.7	0.0	0.0	1.4	35.10	62.90

¹All strains were housed such that each strain is equally represented in each density.

A,B,C,D,E - Different letters denote significant differences (P<.01), comparisons made among strain average values.

TABLE 44. EFFECT OF BROWN EGG STRAIN AND DENSITY ON EGG QUALITY, INCOME AND FEED COSTS OF HENS IN THE 38th NCLP&MT (512-763 DAYS) NON-MOLTED

Breeder	Density ¹	Grade A	Grade B	Cracks	Loss	Egg Income	Feed Costs
(Strain)	(in ² /hen)	(%)	(%)	(%)	(%)	(\$/hen)	(\$/hen)
Hy-Line	73	90.7	2.5	5.7	1.1	15.35	9.56
Brown	77	91.4	2.7	5.4	0.6	17.71	11.01
	Average	91.0 ^{BC}	2.6	5.6 ^A	0.8	16.53 ^A	10.28
Hy-Line	73	95.0	2.1	2.7	0.2	16.84	10.89
Silver Brown	77	95.7	2.2	1.5	0.8	16.75	10.62
	Average	95.3 ^{AB}	2.1	2.1 ^B	0.5	16.80 ^A	10.75
TETRA	73	90.4	4.8	3.0	1.8	12.12	10.40
Brown	77	89.3	4.4	4.0	2.3	11.94	10.03
	Average	89.8 ^C	4.6	3.5 ^{AB}	2.1	12.03 ^D	10.21
TETRA	73	90.9	5.8	3.1	0.2	13.57	9.73
Amber	77	92.8	4.3	1.6	1.4	13.39	11.40
	Average	91.8 ^{ABC}	5.1	2.4 ^B	0.8	13.48 ^{CD}	10.56
ISA	73	93.1	5.0	1.7	0.2	15.88	11.05
Brown	77	91.1	5.4	2.6	0.9	16.55	11.24
	Average	92.1 ^{ABC}	5.2	2.1 ^B	0.5	16.21 ^{AB}	11.15
Bovans	73	96.2	1.1	2.2	0.5	17.05	11.36
Brown	77	95.1	2.5	2.2	0.2	17.05	11.53
	Average	95.6 ^A	1.8	2.2 ^B	0.3	17.05 ^A	11.45
Novogen	73	92.0	4.4	2.7	1.0	14.12	9.43
Brown	77	91.9	4.9	2.8	0.5	15.04	10.71
	Average	91.9 ^{ABC}	4.7	2.7 ^B	0.7	14.58 ^{BC}	10.07
All	73	92.6	3.7	3.0	0.7	14.99	10.34
Strains	77	92.4	3.8	2.9	0.9	15.49	10.93
NCSU Barred	73	87.7	5.0	5.0	2.4	6.71	8.05
Plym. Rock	77	96.7	2.7	0.0	0.6	6.76	8.17

¹All strains were housed such that each strain is equally represented in each density.

A,B,C - Different letters denote significant differences (P<.01), comparisons made among strain average values.

TABLE 45. EFFECT OF BROWN EGG STRAIN AND DENSITY ON PERFORMANCE OF HENS IN THE 38th NCLP&MT (512-763 DAYS) NON-ANOREXIC MOLT PROGRAM

Breeder	Density ¹	Feed Consumption	Feed Conversion	Eggs Per Bird Housed	Egg Production	Egg Mass	Mortality
(Strain)	(in ² /hen)	(kg/100/hen/d)	(g egg/g feed)		(HD%)	(g/HD)	(%)
Hy-Line	73	11.3	0.43	167.0	70.1	48.8	4.3
Brown	77	11.4	0.43	171.3	70.5	49.4	2.8
	Average	11.4	0.43 ^{AB}	169.1 ^A	70.3 ^C	49.1 ^{BC}	3.5
Hy-Line	73	11.6	0.42	178.8	74.7	49.0	2.1
Silver Brown	77	11.7	0.41	163.4	72.8	48.0	4.4
	Average	11.6	0.42 ^{BC}	171.1 ^A	73.8 ^B	48.5 ^C	3.3
TETRA	73	11.4	0.42	145.6	67.7	47.4	6.4
Brown	77	11.0	0.42	153.6	66.8	46.6	2.2
	Average	11.2	0.42 ^{BC}	149.6 ^C	67.2 ^C	47.0 ^{CD}	4.3
TETRA	73	11.5	0.39	152.1	68.5	44.8	3.2
Amber	77	11.0	0.41	152.9	69.8	44.6	4.4
	Average	11.2	0.40 ^C	152.5 ^{BC}	69.2 ^C	44.7 ^D	3.8
ISA	73	11.7	0.44	167.0	74.5	51.5	4.8
Brown	77	12.0	0.45	167.9	78.0	53.3	4.5
	Average	11.8	0.44 ^{AB}	167.5 ^A	76.2 ^{AB}	52.4 ^A	4.6
Bovans	73	11.4	0.47	168.8	77.1	53.1	5.8
Brown	77	12.2	0.44	176.2	77.5	53.8	6.1
	Average	11.8	0.45 ^A	172.5 ^A	77.3 ^A	53.4 ^A	6.0
Novogen	73	11.6	0.44	158.7	76.4	50.9	5.8
Brown	77	11.6	0.45	171.4	76.9	51.9	2.3
	Average	11.6	0.44 ^{AB}	165.0 ^{AB}	76.6 ^{AB}	51.4 ^{AB}	4.0
All	73	11.5	0.43	162.6	72.7	49.4	4.6
Strains	77	11.6	0.43	165.3	73.2	49.6	3.8

¹All strains were housed such that each strain is equally represented in each density.

A,B,C,D - Different letters denote significant differences (P<.01), comparisons made among strain average values.

TABLE 46. EFFECT OF BROWN EGG STRAIN AND DENSITY ON EGG WEIGHT AND EGG SIZE DISTRIBUTION OF HENS IN THE 38th NCLP&MT (512-763 DAYS) NON-ANOREXIC MOLT PROGRAM

Breeder	Density ¹	Egg Weight	Pee Wee	Small	Medium	Large	Extra Large
(Strain)	(in ² /hen)	(g/egg)	(%)	(%)	(%)	(%)	(%)
Hy-Line	73	69.7	0.0	0.0	0.1	5.5	93.6
Brown	77	70.2	0.0	0.0	0.2	4.7	94.8
	Average	69.9 ^A	0.0	0.0	0.2	5.1 ^D	94.2 ^A
Hy-Line	73	65.7	0.0	0.0	0.2	12.5	87.3
Silver Brown	77	65.9	0.0	0.0	0.0	14.2	85.4
	Average	65.8 ^{CD}	0.0	0.0	0.1	13.4 ^B	86.4 ^C
TETRA	73	69.9	0.0	0.0	0.1	5.0	94.3
Brown	77	69.8	0.0	0.0	0.2	4.8	94.7
	Average	69.8 ^{AB}	0.0	0.0	0.1	4.9 ^D	94.5 ^A
TETRA	73	65.3	0.0	0.0	0.0	17.7	82.0
Amber	77	63.8	0.0	0.0	0.6	22.7	76.6
	Average	64.6 ^D	0.0	0.0	0.3	20.2 ^A	79.3 ^D
ISA	73	69.0	0.0	0.0	0.1	6.8	92.9
Brown	77	68.1	0.0	0.0	0.1	7.8	91.7
	Average	68.5 ^B	0.0	0.0	0.1	7.3 ^{CD}	92.3 ^{AB}
Bovans	73	68.8	0.0	0.0	0.0	7.2	92.8
Brown	77	69.2	0.0	0.0	0.2	5.2	94.0
	Average	69.0 ^{AB}	0.0	0.0	0.1	6.2 ^{CD}	93.4 ^{AB}
Novogen	73	66.5	0.0	0.0	0.2	9.0	90.5
Brown	77	67.3	0.0	0.0	0.6	10.2	89.0
	Average	66.9 ^C	0.0	0.0	0.4	9.6 ^{BC}	89.7 ^{BC}
All	73	67.8	0.0	0.0	0.1	9.1	90.5
Strains	77	67.7	0.0	0.0	0.3	9.9	89.4

¹All strains were housed such that each strain is equally represented in each density.

A,B,C,D - Different letters denote significant differences (P<.01), comparisons made among strain average values.

TABLE 47. EFFECT OF BROWN EGG STRAIN AND DENSITY ON EGG QUALITY, INCOME AND FEED COSTS OF HENS IN THE 38th NCLP&MT (512-763 DAYS) NON-ANOREXIC MOLT PROGRAM

Breeder	Density ¹	Grade A	Grade B	Cracks	Loss	Egg Income	Feed Costs
(Strain)	(in ² /hen)	(%)	(%)	(%)	(%)	(\$/hen)	(\$/hen)
Hy-Line Brown	73	94.2	2.2	2.7	0.8	17.76	10.80
	77	97.0	1.6	1.1	0.3	18.58	10.83
	Average	95.6 ^A	1.9 ^{BC}	1.9	0.5	18.17 ^A	10.82
Hy-Line Silver Brown	73	96.3	1.5	2.1	0.1	19.36	10.70
	77	96.9	0.9	1.8	0.3	17.65	10.55
	Average	96.6 ^A	1.2 ^C	2.0	0.2	18.51 ^A	10.62
TETRA Brown	73	93.5	2.8	3.1	0.6	15.48	9.50
	77	91.8	4.7	3.2	0.3	16.24	10.17
	Average	92.7 ^B	3.7 ^A	3.2	0.4	15.86 ^C	9.84
TETRA Amber	73	95.6	1.8	2.3	0.3	16.36	9.78
	77	96.2	1.2	2.5	0.2	16.45	9.76
	Average	95.9 ^A	1.5 ^{BC}	2.4	0.2	16.41 ^{BC}	9.77
ISA Brown	73	93.9	3.1	2.8	0.2	17.86	10.53
	77	94.7	3.2	1.8	0.4	17.98	10.04
	Average	94.3 ^{AB}	3.1 ^{AB}	2.3	0.3	17.92 ^{AB}	10.29
Bovans Brown	73	95.1	2.0	2.9	0.1	18.20	9.88
	77	95.9	1.6	1.9	0.6	18.93	11.08
	Average	95.5 ^A	1.8 ^{BC}	2.4	0.4	18.56 ^A	10.48
Novogen Brown	73	94.2	3.5	1.9	0.3	16.98	9.66
	77	95.5	2.5	1.7	0.3	18.42	10.13
	Average	94.9 ^{AB}	3.0 ^{ABC}	1.8	0.3	17.70 ^{AB}	9.89
All Strains	73	94.7	2.4	2.5	0.3	17.43	10.12
	77	95.4	2.2	2.0	0.3	17.75	10.37

¹All strains were housed such that each strain is equally represented in each density.

A,B - Different letters denote significant differences (P<.01), comparisons made among strain average values.

TABLE 48. EFFECT OF WHITE EGG STRAIN AND DENSITY ON PERFORMANCE OF HENS IN THE 38th NCLP&MT (119-763 DAYS) NON-MOLTED

Breeder	Density ¹	Feed Consumption	Feed Conversion	Eggs Per Bird Housed	Egg Production	Egg Mass	Mortality
(Strain)	(in ² /hen)	(kg/100/hen/d)	(g egg/g feed)		(HD%)	(g/HD)	(%)
Hy-Line	73	10.0	0.46	464.4	74.3	46.5	9.6
W-36	77	10.3	0.47	477.5	76.1	48.4	10.0
	Average	10.1 ^D	0.47	470.9	75.2 ^C	47.5 ^C	9.8 ^{BC}
Hy-Line	73	11.9	0.43	458.1	76.3	51.0	11.7
W-98	77	11.6	0.44	479.5	77.2	51.0	7.5
	Average	11.7 ^{AB}	0.44	468.8	76.7 ^{BC}	51.0 ^{AB}	9.6 ^{BC}
H&N	73	11.3	0.44	467.4	77.8	50.1	15.5
Nick Chick	77	11.3	0.45	489.7	79.2	51.4	7.5
	Average	11.3 ^{AB}	0.45	478.5	78.5 ^{ABC}	50.8 ^{AB}	11.5 ^{BC}
Lohmann	73	11.4	0.46	469.0	82.0	52.1	20.7
LSL-Lite	77	11.4	0.45	492.5	79.9	50.7	13.8
	Average	11.4 ^{AB}	0.45	480.7	80.9 ^A	51.4 ^A	17.2 ^{ABC}
Bovans	73	11.1	0.44	476.2	79.6	49.2	20.3
White	77	11.1	0.46	483.4	82.1	51.5	27.5
	Average	11.1 ^{ABC}	0.45	479.8	80.9 ^A	50.4 ^{AB}	23.9 ^A
Shaver	73	10.3	0.48	492.6	79.4	48.7	9.5
White	77	10.3	0.47	475.3	78.1	48.2	18.3
	Average	10.3 ^{CD}	0.47	484.0	78.7 ^{ABC}	48.4 ^{BC}	13.9 ^{ABC}
DeKalb	73	11.8	0.44	504.8	81.2	51.7	16.1
White	77	11.9	0.44	481.7	80.4	52.3	13.9
	Average	11.9 ^A	0.44	493.3	80.8 ^A	52.0 ^A	15.0 ^{ABC}
ISA Babcock	73	11.4	0.46	517.4	81.1	52.7	3.2
White	77	10.7	0.47	496.7	78.7	50.3	8.8
	Average	11.0 ^{ABCD}	0.46	507.0	79.9 ^{AB}	51.5 ^A	6.0 ^C
ISA	73	10.7	0.47	482.5	80.3	50.8	20.2
Exp. White	77	11.6	0.45	488.2	81.5	52.4	18.3
	Average	11.2 ^{ABC}	0.46	485.4	80.9 ^A	51.6 ^A	19.3 ^{AB}
Novogen	73	11.1	0.45	472.0	76.8	50.4	17.9
White	77	10.9	0.45	476.8	77.0	49.1	13.8
	Average	11.0 ^{BCD}	0.45	474.4	76.9 ^{BC}	49.7 ^{ABC}	15.8 ^{ABC}
Bovans	73	11.1	0.46	480.6	79.4	51.2	23.8
Robust	77	11.3	0.46	484.2	80.9	52.5	16.7
	Average	11.2 ^{AB}	0.46	482.4	80.2 ^{AB}	51.9 ^A	20.3 ^{AB}
All	73	11.1	0.45	480.4	78.9	50.4	15.3
Strains	77	11.1	0.46	484.1	79.2	50.7	14.2

¹All strains were housed such that each strain is equally represented in each density.

A,B,C,D - Different letters denote significant differences (P<.01), comparisons made among strain average values.

TABLE 49. EFFECT OF WHITE EGG STRAIN AND DENSITY ON EGG WEIGHT AND EGG SIZE DISTRIBUTION OF HENS IN THE 38th NCLP&MT (119-763 DAYS) NON-MOLTED

Breeder	Density ¹	Egg Weight	Pee Wee	Small	Medium	Large	Extra Large
(Strain)	(in ² /hen)	(g/egg)	(%)	(%)	(%)	(%)	(%)
Hy-Line	73	62.9	0.2	3.9	7.1	21.2	66.8
W-36	77	63.5	0.6	2.1	7.9	16.6	72.5
	Average	63.2 ^{BCD}	0.4	3.0	7.5 ^A	18.9 ^{BC}	69.6 ^{BC}
Hy-Line	73	66.9	0.0	2.6	5.3	9.5	81.7
W-98	77	66.1	0.4	2.7	4.9	12.6	78.8
	Average	66.5 ^A	0.2	2.7	5.1 ^{AB}	11.1 ^D	80.2 ^A
H&N	73	64.2	0.2	3.3	5.2	15.7	74.9
Nick Chick	77	64.7	0.3	2.3	5.5	14.3	76.7
	Average	64.5 ^B	0.3	2.8	5.3 ^{AB}	15.0 ^{CD}	75.8 ^{AB}
Lohmann	73	63.2	0.0	2.4	5.9	18.5	72.5
LSL-Lite	77	63.4	0.0	4.0	5.3	19.8	70.7
	Average	63.3 ^{BC}	0.0	3.2	5.6 ^{AB}	19.1 ^{BC}	71.6 ^{ABC}
Bovans	73	61.8	0.0	4.1	6.9	24.4	63.6
White	77	62.3	0.4	3.4	7.3	24.2	64.3
	Average	62.0 ^{CD}	0.2	3.8	7.1 ^A	24.3 ^{AB}	64.0 ^{CD}
Shaver	73	61.3	0.4	4.1	6.0	30.2	58.9
White	77	61.5	0.7	3.4	7.8	29.9	57.8
	Average	61.4 ^D	0.5	3.8	6.9 ^A	30.0 ^A	58.3 ^D
DeKalb	73	63.1	0.1	4.2	3.6	20.0	71.7
White	77	64.6	0.0	4.0	4.2	13.2	77.9
	Average	63.9 ^B	0.0	4.1	3.9 ^B	16.6 ^{CD}	74.8 ^{AB}
ISA Babcock	73	64.6	0.3	0.8	5.7	14.1	78.4
White	77	63.8	0.4	2.9	4.9	16.4	74.3
	Average	64.2 ^B	0.3	1.9	5.3 ^{AB}	15.3 ^{CD}	76.3 ^{AB}
ISA	73	63.2	0.2	2.6	6.6	19.3	70.6
Exp. White	77	64.2	0.0	2.4	5.4	15.5	76.0
	Average	63.7 ^{BC}	0.1	2.5	6.0 ^{AB}	17.4 ^{BCD}	73.3 ^{AB}
Novogen	73	64.9	0.3	2.2	3.7	16.9	76.1
White	77	63.5	0.2	3.2	5.1	20.0	70.4
	Average	64.2 ^B	0.2	2.7	4.4 ^B	18.5 ^{BC}	73.2 ^{AB}
Bovans	73	64.2	0.3	3.2	5.8	16.3	73.5
Robust	77	64.6	0.0	2.0	5.5	15.5	76.4
	Average	64.4 ^B	0.2	2.6	5.7 ^{AB}	15.9 ^{CD}	75.0 ^{AB}
All	73	63.7	0.2	3.1	5.6	18.7	71.7
Strains	77	63.8	0.3	2.9	5.8	18.0	72.3

¹All strains were housed such that each strain is equally represented in each density.

A,B,C,D - Different letters denote significant differences (P<.01), comparisons made among strain average values.

TABLE 50. EFFECT OF WHITE EGG STRAIN AND DENSITY ON EGG QUALITY, INCOME AND FEED COSTS OF HENS IN THE 38th NCLP&MT (119-763 DAYS) NON-MOLTED

Breeder	Density ¹	Grade A	Grade B	Cracks	Loss	Egg Income	Feed Costs
(Strain)	(in ² /hen)	(%)	(%)	(%)	(%)	(\$/hen)	(\$/hen)
Hy-Line	73	94.3	2.3	2.6	0.9	44.17	23.88
W-36	77	95.4	1.1	3.3	0.3	46.24	24.65
	Average	94.8	1.7	2.9	0.6	45.21	24.26
Hy-Line	73	90.7	4.5	3.9	0.9	43.43	27.34
W-98	77	95.0	2.4	2.1	0.5	46.57	27.35
	Average	92.9	3.4	3.0	0.7	45.00	27.35
H&N	73	93.6	3.5	2.2	0.6	44.85	26.16
Nick Chick	77	93.7	3.4	2.0	0.9	47.12	27.00
	Average	93.7	3.5	2.1	0.8	45.99	26.58
Lohmann	73	94.9	2.4	2.0	0.7	45.33	24.62
LSL-Lite	77	93.3	3.9	2.4	0.3	47.31	27.26
	Average	94.1	3.2	2.2	0.5	46.32	25.94
Bovans	73	94.0	3.2	1.9	0.9	45.20	25.34
White	77	93.4	4.4	1.8	0.4	46.12	24.84
	Average	93.7	3.8	1.9	0.7	45.66	25.09
Shaver	73	93.0	2.6	3.8	0.6	46.85	24.60
White	77	93.2	3.4	3.0	0.4	45.10	23.55
	Average	93.1	3.0	3.4	0.5	45.97	24.07
DeKalb	73	95.6	2.4	1.7	0.4	49.20	28.10
White	77	95.2	2.4	1.6	0.7	46.68	27.20
	Average	95.4	2.4	1.7	0.6	47.94	27.65
ISA Babcock	73	93.2	3.8	2.4	0.7	50.08	27.75
White	77	93.6	2.9	2.4	1.1	47.36	26.12
	Average	93.4	3.3	2.4	0.9	48.72	26.93
ISA	73	94.8	2.2	2.3	0.7	46.44	24.46
Exp. White	77	93.8	2.8	2.8	0.7	47.03	26.38
	Average	94.3	2.5	2.5	0.7	46.74	25.42
Novogen	73	93.3	3.8	2.1	0.8	45.38	25.90
White	77	92.3	3.2	3.5	1.0	45.24	25.75
	Average	92.8	3.5	2.8	0.9	45.31	25.82
Bovans	73	91.8	3.8	3.6	0.8	45.68	25.58
Robust	77	95.6	2.4	1.3	0.6	47.21	25.64
	Average	93.7	3.1	2.5	0.7	46.45	25.61
All	73	93.6	3.1	2.6	0.7	46.06	25.79
Strains	77	94.0	2.9	2.4	0.6	46.54	25.98

¹All strains were housed such that each strain is equally represented in each density.
There are no significant differences among these means.

TABLE 51. EFFECT OF WHITE EGG STRAIN AND DENSITY ON PERFORMANCE OF HENS IN THE 38th NCLP&MT (119-763 DAYS) NON-ANOREXIC MOLT PROGRAM

Breeder	Density ¹	Feed Consumption	Feed Conversion	Eggs Per Bird Housed	Egg Production	Egg Mass	Mortality
(Strain)	(in ² /hen)	(kg/100/hen/d)	(g egg/g feed)		(HD%)	(g/HD)	(%)
Hy-Line	73	9.9	0.47	476.5	76.0	48.0	5.8
W-36	77	10.3	0.46	483.6	76.6	48.8	5.6
	Average	10.1 ^C	0.47	480.1 ^{BCD}	76.3 ^F	48.4 ^D	5.7 ^F
Hy-Line	73	11.4	0.44	474.7	77.1	51.0	9.1
W-98	77	11.3	0.46	466.9	78.8	52.8	11.6
	Average	11.4 ^A	0.45	470.8 ^{CD}	77.9 ^{EF}	51.9 ^{ABC}	10.3 ^{CDEF}
H&N	73	11.0	0.46	482.4	79.7	51.3	15.4
Nick Chick	77	11.2	0.46	499.8	82.1	52.7	13.4
	Average	11.1 ^{AB}	0.46	491.1 ^{ABC}	80.9 ^{BC}	52.0 ^{ABC}	14.4 ^{BCDE}
Lohmann	73	11.2	0.46	483.6	81.4	52.1	17.0
LSL-Lite	77	11.1	0.46	500.8	82.5	52.9	16.1
	Average	11.2 ^{AB}	0.46	492.2 ^{ABC}	82.0 ^{AB}	52.5 ^{AB}	16.6 ^{ABC}
Bovans	73	10.8	0.46	462.9	81.2	51.7	25.9
White	77	11.1	0.46	483.1	81.7	51.6	20.8
	Average	10.9 ^{AB}	0.46	473.0 ^{CD}	81.5 ^{AB}	51.6 ^{BC}	23.4 ^A
Shaver	73	10.0	0.47	470.9	77.4	48.3	10.6
White	77	10.2	0.48	500.6	80.3	49.6	6.1
	Average	10.1 ^C	0.47	485.8 ^{ABCD}	78.8 ^{DE}	49.0 ^D	8.4 ^{EF}
DeKalb	73	11.3	0.46	493.1	82.3	52.7	15.5
White	77	11.4	0.46	509.3	83.6	53.6	14.3
	Average	11.4 ^A	0.46	501.2 ^{AB}	83.0 ^A	53.2 ^A	14.9 ^{BCDE}
ISA Babcock	73	11.1	0.46	506.0	81.1	52.2	8.0
White	77	11.2	0.46	501.1	81.5	52.9	10.6
	Average	11.2 ^{AB}	0.46	503.6 ^A	81.3 ^{ABC}	52.5 ^{AB}	9.3 ^{DEF}
ISA	73	10.6	0.47	463.8	79.5	50.7	19.6
Exp. White	77	11.1	0.46	497.9	80.7	51.4	12.8
	Average	10.8 ^B	0.47	480.8 ^{BCD}	80.1 ^{BCD}	51.1 ^C	16.2 ^{ABCD}
Novogen	73	11.0	0.45	471.3	78.5	50.9	15.5
White	77	11.0	0.45	490.7	78.6	50.8	10.0
	Average	11.0 ^{AB}	0.45	481.0 ^{BCD}	78.6 ^{DE}	50.9 ^C	12.7 ^{CDEF}
Bovans	73	11.2	0.45	461.3	79.5	51.0	22.8
Robust	77	10.9	0.46	471.8	79.5	50.6	18.9
	Average	11.0 ^{AB}	0.45	466.6 ^D	79.5 ^{CDE}	50.8 ^C	20.8 ^{AB}
All	73	10.9	0.46	476.9 ^Z	79.4 ^Z	50.9 ^Z	15.0
Strains	77	11.0	0.46	491.4 ^Y	80.5 ^Y	51.6 ^Y	12.7

¹All strains were housed such that each strain is equally represented in each density.

A,B,C,D,E,F - Different letters denote significant differences (P<.01), comparisons made among strain average values.

Y,Z- Different letters denote significant differences (P<.01), comparisons made between density average values.

TABLE 52. EFFECT OF WHITE EGG STRAIN AND DENSITY ON EGG WEIGHT AND EGG SIZE DISTRIBUTION OF HENS IN THE 38th NCLP&MT (119-763 DAYS) NON-ANOREXIC MOLT PROGRAM

Breeder	Density ¹	Egg Weight	Pee Wee	Small	Medium	Large	Extra Large
(Strain)	(in ² /hen)	(g/egg)	(%)	(%)	(%)	(%)	(%)
Hy-Line	73	62.8	0.1	3.8	5.8	18.9	70.9
W-36	77	63.4	0.0	2.5	7.0	18.5	71.7
	Average	63.1 ^{CD}	0.1	3.2 ^{BCD}	6.4	18.7 ^{BC}	71.3 ^{CD}
Hy-Line	73	66.1	0.1	2.1	5.6	10.0	81.8
W-98	77	66.9	0.1	2.0	5.2	8.1	84.2
	Average	66.5 ^A	0.1	2.0 ^D	5.4	9.0 ^E	83.0 ^A
H&N	73	64.0	0.0	2.4	5.6	16.7	75.0
Nick Chick	77	63.7	0.0	3.2	5.7	15.4	75.1
	Average	63.9 ^{BC}	0.0	2.8 ^{BCD}	5.6	16.1 ^{BCD}	75.0 ^{BC}
Lohmann	73	63.5	0.0	4.3	4.2	17.9	73.4
LSL-Lite	77	63.5	0.1	2.7	6.0	15.6	75.4
	Average	63.5 ^{BCD}	0.1	3.5 ^{ABC}	5.1	16.8 ^{BCD}	74.4 ^{BCD}
Bovans	73	62.9	0.2	2.6	7.1	18.7	71.2
White	77	62.5	0.1	3.9	6.0	20.7	68.6
	Average	62.7 ^D	0.2	3.3 ^{BCD}	6.5	19.7 ^B	69.9 ^D
Shaver	73	61.5	0.0	4.1	5.9	25.5	64.2
White	77	61.1	0.2	5.1	4.4	26.5	63.4
	Average	61.3 ^E	0.1	4.6 ^A	5.1	26.0 ^A	63.8 ^E
DeKalb	73	63.6	0.1	3.1	5.8	15.1	75.8
White	77	63.4	0.2	3.3	4.8	16.1	75.1
	Average	63.5 ^{BCD}	0.2	3.2 ^{BCD}	5.3	15.6 ^{CD}	75.4 ^{BC}
ISA Babcock	73	63.9	0.0	2.5	4.8	15.0	77.3
White	77	64.5	0.1	2.6	5.1	13.2	78.5
	Average	64.2 ^B	0.0	2.5 ^{CD}	5.0	14.1 ^D	77.9 ^B
ISA	73	63.5	0.1	2.8	5.4	16.8	74.6
Exp. White	77	63.4	0.1	2.9	5.3	18.0	73.4
	Average	63.5 ^{BCD}	0.1	2.8 ^{BCD}	5.3	17.4 ^{BCD}	74.0 ^{BCD}
Novogen	73	64.4	0.0	2.7	4.7	14.1	78.1
White	77	64.0	0.0	3.2	5.0	16.4	74.9
	Average	64.2 ^B	0.0	3.0 ^{BCD}	4.9	15.2 ^{CD}	76.5 ^B
Bovans	73	63.6	0.0	3.9	5.2	15.3	75.2
Robust	77	63.1	0.3	3.8	5.7	17.9	71.7
	Average	63.4 ^{BCD}	0.1	3.8 ^{AB}	5.5	16.6 ^{BCD}	73.5 ^{BCD}
All	73	63.6	0.1	3.1	5.5	16.7	74.3
Strains	77	63.6	0.1	3.2	5.5	17.0	73.8

¹All strains were housed such that each strain is equally represented in each density.

A,B,C,D - Different letters denote significant differences (P<.01), comparisons made among strain average values.

TABLE 53. EFFECT OF WHITE EGG STRAIN AND DENSITY ON EGG QUALITY, INCOME AND FEED COSTS OF HENS IN THE 38th NCLP&MT (119-763 DAYS) NON-ANOREXIC MOLT PROGRAM

Breeder	Density ¹	Grade A	Grade B	Cracks	Loss	Egg Income	Feed Costs
(Strain)	(in ² /hen)	(%)	(%)	(%)	(%)	(\$/hen)	(\$/hen)
Hy-Line	73	96.1	1.1	2.4	0.3	46.61	22.98
W-36	77	95.8	0.9	3.0	0.3	47.38	24.36
	Average	96.0 ^A	1.0 ^D	2.7	0.3	46.99 ^{ABC}	23.67 ^{AB}
Hy-Line	73	94.1	3.0	2.4	0.5	46.31	26.18
W-98	77	93.4	4.0	2.3	0.3	45.51	24.77
	Average	93.7 ^C	3.5 ^A	2.4	0.4	45.91 ^{BC}	25.47 ^A
H&N	73	95.2	2.6	1.9	0.3	47.26	24.55
Nick Chick	77	96.2	1.5	1.8	0.5	49.00	25.08
	Average	95.7 ^A	2.0 ^{BC}	1.8	0.4	48.13 ^{AB}	24.81 ^{AB}
Lohmann	73	96.2	2.1	1.6	0.2	47.56	24.59
LSL-Lite	77	96.6	1.6	1.5	0.2	49.34	25.14
	Average	96.4 ^A	1.9 ^{CD}	1.5	0.2	48.45 ^A	24.87 ^{AB}
Bovans	73	94.3	2.7	2.8	0.2	44.82	22.56
White	77	94.1	2.6	2.7	0.7	46.46	24.42
	Average	94.2 ^{BC}	2.7 ^{ABC}	2.7	0.4	45.64 ^C	23.49 ^B
Shaver	73	95.4	1.9	2.4	0.4	45.77	22.70
White	77	95.7	1.8	2.1	0.4	48.72	23.47
	Average	95.5 ^{AB}	1.8 ^{CD}	2.3	0.4	47.25 ^{ABC}	23.09 ^B
DeKalb	73	95.6	2.4	1.9	0.1	48.36	25.01
White	77	95.6	2.1	1.9	0.4	49.78	26.01
	Average	95.6 ^{AB}	2.3 ^{BC}	1.9	0.2	49.07 ^A	25.51 ^A
ISA Babcock	73	95.1	2.5	2.0	0.4	49.69	25.78
White	77	95.3	2.0	2.1	0.6	48.94	25.41
	Average	95.2 ^{AB}	2.2 ^{BC}	2.0	0.5	49.32 ^A	25.60 ^A
ISA	73	95.7	2.2	1.9	0.2	45.41	22.92
Exp. White	77	95.8	2.2	1.7	0.3	48.70	25.23
	Average	95.7 ^A	2.2 ^{BC}	1.8	0.3	47.06 ^{ABC}	24.07 ^{AB}
Novogen	73	94.9	2.2	2.4	0.5	46.04	24.57
White	77	95.1	2.2	2.3	0.4	47.97	25.45
	Average	95.0 ^{ABC}	2.2 ^{BC}	2.3	0.4	47.01 ^{ABC}	25.01 ^{AB}
Bovans	73	94.6	3.3	1.8	0.4	44.68	24.21
Robust	77	94.7	2.6	2.0	0.6	45.52	23.62
	Average	94.6 ^{ABC}	3.0 ^{AB}	1.9	0.5	45.10 ^C	23.91 ^{AB}
All	73	95.2	2.4	2.1	0.3	46.59 ^Z	24.19
Strains	77	95.3	2.2	2.1	0.4	47.94 ^Y	24.81

¹All strains were housed such that each strain is equally represented in each density.

A,B,C,D - Different letters denote significant differences (P<.01), comparisons made among strain average values.

Y,Z- Different letters denote significant differences (P<.01), comparisons made between density average values.

TABLE 54. EFFECT OF BROWN EGG STRAIN AND DENSITY ON PERFORMANCE OF HENS IN THE 38th NCLP&MT (119-763 DAYS) NON-MOLTED

Breeder	Density ¹	Feed Consumption	Feed Conversion	Eggs Per Bird Housed	Egg Production	Egg Mass	Mortality
(Strain)	(in ² /hen)	(kg/100/hen/d)	(g egg/g feed)		(HD%)	(g/HD)	(%)
Hy-Line	73	10.5	0.46	455.4	74.1	48.7	7.2
Brown	77	11.2	0.46	492.7	78.4	51.8	3.8
	Average	10.8	0.46 ^A	474.1 ^{ABC}	76.2 ^{AB}	50.2 ^A	5.5 ^C
Hy-Line	73	11.2	0.42	475.5	77.2	47.2	9.8
Silver Brown	77	11.1	0.43	494.0	77.8	47.6	7.0
	Average	11.2	0.43 ^{BC}	484.7 ^A	77.5 ^A	47.4 ^{BC}	8.4 ^{BC}
TETRA	73	10.7	0.41	411.8	67.3	43.8	15.5
Brown	77	11.5	0.42	411.8	72.8	47.9	28.8
	Average	11.1	0.41 ^C	411.8 ^D	70.1 ^C	45.8 ^{BC}	22.1 ^A
TETRA	73	10.3	0.43	450.0	73.2	44.7	16.7
Amber	77	11.7	0.39	439.7	73.3	45.6	13.8
	Average	11.0	0.41 ^C	444.8 ^C	73.2 ^{BC}	45.2 ^C	15.2 ^{AB}
ISA	73	11.2	0.45	467.9	76.6	50.2	11.9
Brown	77	11.6	0.44	488.0	79.6	51.3	15.0
	Average	11.4	0.45 ^{ABC}	477.9 ^{AB}	78.1 ^A	50.8 ^A	13.5 ^{ABC}
Bovans	73	11.4	0.45	489.4	80.1	51.1	17.7
Brown	77	11.3	0.45	481.3	78.2	51.4	15.0
	Average	11.3	0.45 ^{AB}	485.3 ^A	79.1 ^A	51.3 ^A	16.4 ^{AB}
Novogen	73	10.8	0.44	443.0	76.4	48.4	22.6
Brown	77	11.2	0.44	455.4	76.5	48.7	17.7
	Average	11.0	0.44 ^{ABC}	449.2 ^{BC}	76.5 ^{AB}	48.5 ^{AB}	20.2 ^A
All	73	10.9	0.44	456.1	75.0	47.7	14.5
Strains	77	11.4	0.43	466.1	76.7	49.2	14.4
NCSU Barred	73	9.3 ^Z	0.26	270.3	43.9	24.7 ^Z	7.8
Plym. Rock	77	10.2 ^Y	0.25	257.8	44.4	25.7 ^Y	13.4

¹All strains were housed such that each strain is equally represented in each density.

A,B,C,D - Different letters denote significant differences (P<.01), comparisons made among strain average values.

Y,Z - Different letters denote significant differences (P<.01), comparisons made among density average values.

TABLE 55. EFFECT OF BROWN EGG STRAIN AND DENSITY ON EGG WEIGHT AND EGG SIZE DISTRIBUTION OF HENS IN THE 38th NCLP&MT (119-763 DAYS) NON-MOLTED

Breeder	Density ¹	Egg Weight	Pee Wee	Small	Medium	Large	Extra Large
(Strain)	(in ² /hen)	(g/egg)	(%)	(%)	(%)	(%)	(%)
Hy-Line	73	65.7	0.0	1.2	5.6	15.4	77.2
Brown	77	66.0	0.1	0.5	4.5	16.2	78.4
	Average	65.8 ^A	0.0	0.9 ^B	5.0 ^B	15.8 ^{CD}	77.8 ^A
Hy-Line	73	61.1	0.4	2.4	8.6	32.7	55.6
Silver Brown	77	61.1	0.0	2.2	8.7	29.7	58.8
	Average	61.1 ^C	0.2	2.3 ^{AB}	8.7 ^A	31.2 ^A	57.2 ^C
TETRA	73	65.2	0.0	1.6	6.5	14.5	76.6
Brown	77	65.9	0.3	1.1	5.5	13.5	78.7
	Average	65.5 ^A	0.1	1.3 ^B	6.0 ^{AB}	14.0 ^D	77.7 ^A
TETRA	73	61.2	0.2	3.4	8.2	29.3	58.5
Amber	77	62.1	0.1	3.8	8.0	28.7	58.7
	Average	61.7 ^C	0.1	3.6 ^A	8.1 ^A	29.0 ^A	58.6 ^C
ISA	73	65.3	0.0	1.0	5.3	14.8	78.6
Brown	77	64.2	0.3	2.0	5.0	17.9	74.3
	Average	64.8 ^A	0.1	1.5 ^B	5.2 ^B	16.4 ^{CD}	76.5 ^A
Bovans	73	63.6	0.0	2.6	3.8	23.2	70.1
Brown	77	65.5	0.0	0.5	5.6	18.2	75.3
	Average	64.6 ^{AB}	0.0	1.6 ^B	4.7 ^B	20.7 ^{BC}	72.7 ^{AB}
Novogen	73	63.1	0.5	1.7	7.0	22.7	67.5
Brown	77	63.5	0.1	2.0	6.8	23.2	67.9
	Average	63.3 ^B	0.3	1.8 ^B	6.9 ^{AB}	23.0 ^B	67.7 ^B
All	73	63.6	0.2	2.0	6.4	21.8	69.2
Strains	77	64.0	0.1	1.7	6.3	21.1	70.3
NCSU Barred	73	56.1	0.7	10.7	15.3	36.52	35.23
Plym. Rock	77	56.9	1.1	9.7	15.8	36.32	36.10

¹All strains were housed such that each strain is equally represented in each density.

A,B,C,D - Different letters denote significant differences (P<.01), comparisons made among strain average values.

TABLE 56. EFFECT OF BROWN EGG STRAIN AND DENSITY ON EGG QUALITY, INCOME AND FEED COSTS OF HENS IN THE 38th NCLP&MT (119-763 DAYS) NON-MOLTED

Breeder	Density ¹	Grade A	Grade B	Cracks	Loss	Egg Income	Feed Costs
(Strain)	(in ² /hen)	(%)	(%)	(%)	(%)	(\$/hen)	(\$/hen)
Hy-Line	73	94.0	2.0	3.4	0.6	44.24	24.20
Brown	77	93.8	2.2	3.6	0.4	48.23	26.68
	Average	93.9	2.1 ^{BC}	3.5	0.5	46.23 ^{AB}	25.44
Hy-Line	73	96.5	1.9	1.4	0.2	46.07	26.20
Silver Brown	77	95.9	1.6	1.9	0.6	47.61	26.66
	Average	96.2	1.8 ^C	1.7	0.4	46.84 ^A	26.43
TETRA	73	93.3	3.6	2.4	0.8	39.50	25.41
Brown	77	93.0	3.4	2.6	0.9	39.46	25.10
	Average	93.2	3.5 ^{ABC}	2.5	0.9	39.48 ^D	25.25
TETRA	73	92.8	4.7	2.1	0.4	42.46	24.59
Amber	77	94.6	3.1	1.6	0.7	41.74	27.54
	Average	93.7	3.9 ^{ABC}	1.9	0.6	42.10 ^{CD}	26.06
ISA	73	93.1	4.6	2.0	0.3	45.37	26.84
Brown	77	93.0	4.6	1.9	0.5	46.98	27.66
	Average	93.0	4.6 ^A	2.0	0.4	46.18 ^{AB}	27.25
Bovans	73	96.3	1.6	2.0	0.2	48.13	26.72
Brown	77	94.7	2.9	2.0	0.4	47.11	27.28
	Average	95.5	2.2 ^{BC}	2.0	0.3	47.62 ^A	27.00
Novogen	73	93.9	4.0	1.6	0.5	42.39	24.27
Brown	77	93.9	4.1	1.7	0.2	44.01	25.79
	Average	93.9	4.1 ^{AB}	1.7	0.4	43.20 ^{BC}	25.03
All	73	94.3	3.2	2.1	0.4	44.02	25.46
Strains	77	94.1	3.1	2.2	0.5	45.02	26.67
NCSU Barred	73	87.9	7.0	3.6	1.5	23.12	21.26
Plym. Rock	77	95.1	3.2	0.9	0.9	22.84	22.03

¹All strains were housed such that each strain is equally represented in each density.

A,B,C,D - Different letters denote significant differences (P<.01), comparisons made among strain average values.

TABLE 57. EFFECT OF BROWN EGG STRAIN AND DENSITY ON PERFORMANCE OF HENS IN THE 38th NCLP&MT (119-763 DAYS) NON-ANOREXIC MOLT PROGRAM

Breeder	Density ¹	Feed Consumption	Feed Conversion	Eggs Per Bird Housed	Egg Production	Egg Mass	Mortality
(Strain)	(in ² /hen)	(kg/100/hen/d)	(g egg/g feed)		(HD%)	(g/HD)	(%)
Hy-Line	73	10.7	0.45	467.0	74.8	49.4	8.0
Brown	77	10.7	0.46	480.1	75.5	49.9	5.0
	Average	10.7	0.46 ^{AB}	473.6 ^A	75.1 ^B	49.6 ^{CD}	6.5
Hy-Line	73	10.9	0.44	489.5	78.2	48.4	5.8
Silver Brown	77	11.0	0.43	467.0	77.8	48.0	13.4
	Average	10.9	0.44 ^C	478.2 ^A	78.0 ^A	48.2 ^{DE}	9.6
TETRA	73	10.9	0.43	437.4	73.4	48.3	17.5
Brown	77	10.6	0.44	443.8	73.1	47.8	10.6
	Average	10.7	0.44 ^C	440.6 ^C	73.3 ^B	48.0 ^E	14.0
TETRA	73	10.8	0.41	449.7	74.1	45.7	12.8
Amber	77	10.6	0.42	450.3	75.4	45.4	14.5
	Average	10.7	0.42 ^D	450.0 ^{BC}	74.7 ^B	45.5 ^F	13.6
ISA	73	11.0	0.45	469.2	76.9	50.7	13.2
Brown	77	11.2	0.45	472.6	79.4	51.8	15.7
	Average	11.1	0.45 ^{ABC}	470.9 ^{AB}	78.1 ^A	51.2 ^{AB}	14.4
Bovans	73	10.7	0.47	476.0	78.8	51.2	15.9
Brown	77	11.2	0.46	489.2	79.5	51.9	13.3
	Average	10.9	0.46 ^A	482.6 ^A	79.1 ^A	51.5 ^A	14.6
Novogen	73	11.0	0.44	453.3	77.7	49.3	19.1
Brown	77	11.0	0.45	476.0	78.5	50.7	12.3
	Average	11.0	0.45 ^{BC}	464.7 ^{AB}	78.1 ^A	50.0 ^{BC}	15.7
All	73	10.8	0.44	463.2	76.3	49.0	13.2
Strains	77	10.9	0.44	468.4	77.0	49.3	12.1

¹All strains were housed such that each strain is equally represented in each density.

A,B,C,D,E,F - Different letters denote significant differences (P<.01), comparisons made among strain average values.

TABLE 58. EFFECT OF BROWN EGG STRAIN AND DENSITY ON EGG WEIGHT AND EGG SIZE DISTRIBUTION OF HENS IN THE 38th NCLP&MT (119-763 DAYS) NON-ANOREXIC MOLT PROGRAM

Breeder	Density ¹	Egg Weight	Pee Wee	Small	Medium	Large	Extra Large
(Strain)	(in ² /hen)	(g/egg)	(%)	(%)	(%)	(%)	(%)
Hy-Line	73	65.9	0.0	0.6	4.4	14.1	80.5
Brown	77	65.9	0.0	0.8	4.5	13.5	80.8
	Average	65.9 ^A	0.0	0.7 ^C	4.4 ^{BC}	13.8 ^C	80.6 ^A
Hy-Line	73	61.7	0.1	2.0	7.3	27.7	62.7
Silver Brown	77	61.6	0.0	1.4	8.7	27.3	62.5
	Average	61.7 ^D	0.0	1.7 ^{BC}	8.0 ^A	27.5 ^A	62.6 ^C
TETRA	73	65.5	0.0	1.9	4.4	14.1	78.9
Brown	77	65.3	0.0	1.9	4.8	15.4	77.7
	Average	65.4 ^{AB}	0.0	1.9 ^B	4.6 ^{BC}	14.8 ^C	78.3 ^{AB}
TETRA	73	61.6	0.1	2.8	7.8	27.2	61.8
Amber	77	60.0	0.0	4.6	9.3	31.7	54.3
	Average	60.8 ^D	0.0	3.7 ^A	8.5 ^A	29.4 ^A	58.1 ^C
ISA	73	65.4	0.0	2.4	3.3	15.2	78.9
Brown	77	64.7	0.0	2.3	4.9	15.5	77.1
	Average	65.1 ^{AB}	0.0	2.3 ^B	4.1 ^C	15.3 ^{BC}	78.0 ^{AB}
Bovans	73	64.6	0.0	1.2	5.8	17.9	74.9
Brown	77	64.9	0.1	1.5	4.9	15.8	77.4
	Average	64.8 ^B	0.0	1.3 ^{BC}	5.3 ^{BC}	16.9 ^{BC}	76.2 ^{AB}
Novogen	73	63.1	0.0	1.9	5.3	20.0	72.5
Brown	77	64.1	0.2	1.4	6.1	17.2	74.9
	Average	63.6 ^C	0.1	1.7 ^{BC}	5.7 ^B	18.6 ^B	73.7 ^B
All	73	64.0	0.0	1.8	5.5	19.5	72.9
Strains	77	63.8	0.0	2.0	6.2	19.5	72.1

¹All strains were housed such that each strain is equally represented in each density.

A,B,C - Different letters denote significant differences (P<.01), comparisons made among strain average values.

TABLE 59. EFFECT OF BROWN EGG STRAIN AND DENSITY ON EGG QUALITY, INCOME AND FEED COSTS OF HENS IN THE 38th NCLP&MT (119-763 DAYS) NON-ANOREXIC MOLT PROGRAM

Breeder	Density ¹	Grade A	Grade B	Cracks	Loss	Egg Income	Feed Costs
(Strain)	(in ² /hen)	(%)	(%)	(%)	(%)	(\$/hen)	(\$/hen)
Hy-Line Brown	73	95.4	1.8 ^{cde}	2.4	0.5	46.13	25.50
	77	96.8	1.7 ^{de}	1.2	0.4	47.73	26.13
	Average	96.1 ^{AB}	1.7	1.8	0.4	46.93 ^A	25.81
Hy-Line Silver Brown	73	95.2	2.5 ^{bcd}	2.1	0.3	47.81	25.77
	77	97.5	1.0 ^e	1.4	0.1	45.99	25.32
	Average	96.4 ^A	1.7	1.7	0.2	46.90 ^A	25.54
TETRA Brown	73	94.1	2.5 ^{bcd}	2.8	0.7	42.47	24.34
	77	93.7	3.7 ^{ab}	2.3	0.3	43.28	24.91
	Average	93.9 ^C	3.1	2.5	0.5	42.88 ^C	24.63
TETRA Amber	73	95.4	2.3 ^{bcde}	2.0	0.3	43.54	24.80
	77	96.3	1.4 ^{de}	2.2	0.1	43.36	24.32
	Average	95.8 ^{AB}	1.8	2.1	0.2	43.45 ^{BC}	24.56
ISA Brown	73	93.7	4.3 ^a	1.8	0.2	45.89	25.65
	77	94.8	3.3 ^{ab}	1.7	0.2	46.31	25.26
	Average	94.2 ^C	3.8	1.7	0.2	46.10 ^A	25.46
Bovans Brown	73	95.9	1.7 ^{de}	2.3	0.1	47.00	24.81
	77	95.6	2.5 ^{bcd}	1.6	0.3	48.22	26.21
	Average	95.7 ^{AB}	2.1	1.9	0.2	47.61 ^A	25.51
Novogen Brown	73	94.4	3.2 ^{abc}	2.1	0.3	44.23	24.50
	77	95.5	2.5 ^{bcd}	1.7	0.3	46.71	25.27
	Average	95.0 ^{BC}	2.9	1.9	0.3	45.47 ^{AB}	24.88
All Strains	73	94.9 ^Z	2.6	2.2 ^Y	0.3	45.30	25.05
	77	95.7 ^Y	2.3	1.7 ^Z	0.3	45.94	25.34

¹All strains were housed such that each strain is equally represented in each density.

A,B,C - Different letters denote significant differences (P<.01), comparisons made among strain average values.

a,b,c,d,e - Different letters denote significant differences (P<.01), comparisons made among strain*density values.

Y,Z - Different letters denote significant differences (P<.01), comparisons made among density average values.

TABLE 60. EFFECT OF WHITE EGG STRAIN AND DENSITY ON BODY WEIGHT OF HENS IN THE 38th NCLP&MT (119-763 DAYS) NON-MOLTED

Breeder	Density ¹	110 Wk Body Wt	2 nd Cycle Wt Gain	2 nd Cycle Wt Gain	Total Wt Gain	Total Wt Gain
(Strain)	(in ² /hen)	(kg)	(g)	(%)	(g)	(%)
Hy-Line	73	1.74	-21	-1.1	507	41.2
W-36	77	1.81	46	3.2	621	52.2
	Average	1.78 ^{BCD}	12	1.0	564 ^B	46.7 ^B
Hy-Line	73	2.03	80	4.5	733	56.8
W-98	77	2.01	83	4.3	730	56.9
	Average	2.02 ^A	82	4.4	731 ^A	56.8 ^A
H&N	73	1.84	28	1.5	571	44.8
Nick Chick	77	1.81	-120	-6.0	510	39.3
	Average	1.82 ^{BC}	-46	-2.3	540 ^B	42.1 ^{BC}
Lohmann	73	1.75	-79	-4.3	521	42.6
LSL-Lite	77	1.73	-50	-2.8	455	35.9
	Average	1.74 ^{CDE}	-65	-3.5	488 ^{BC}	39.3 ^{BCD}
Bovans	73	1.68	-89	-4.9	478	39.9
White	77	1.69	-70	-3.8	537	46.7
	Average	1.68 ^{DE}	-80	-4.4	508 ^{BC}	43.3 ^{BC}
Shaver	73	1.66	-58	-3.4	460	38.4
White	77	1.67	20	2.0	480	40.4
	Average	1.66 ^E	-19	-0.7	470 ^{BC}	39.4 ^{BCD}
DeKalb	73	1.71	-5	-0.1	466	37.5
White	77	1.82	-1	0.0	542	42.5
	Average	1.77 ^{CDE}	-3	0.0	504 ^{BC}	40.0 ^{BCD}
ISA Babcock	73	1.89	-3	-0.2	563	42.6
White	77	1.88	0	0.1	560	42.6
	Average	1.88 ^B	-2	0.0	561 ^B	42.6 ^{BC}
ISA	73	1.74	-15	-0.8	431	33.1
Exp. White	77	1.72	25	1.6	438	34.2
	Average	1.73 ^{CDE}	5	0.4	434 ^C	33.6 ^D
Novogen	73	1.79	-68	-3.6	503	39.1
White	77	1.74	-117	-6.0	483	38.5
	Average	1.77 ^{CDE}	-93	-4.8	493 ^{BC}	38.8 ^{CD}
Bovans	73	1.76	8	0.5	555	46.4
Robust	77	1.80	-71	-3.7	494	38.0
	Average	1.78 ^{BCD}	-32	-1.6	524 ^{BC}	42.2 ^{BC}
All	73	1.78	-20	-1.1	526	42.0
Strains	77	1.79	-23	-1.0	532	42.5

¹All strains were housed such that each strain is equally represented in each density.

A,B,C,D,E - Different letters denote significant differences (P<.01), comparisons made among strain average values.

TABLE 61. EFFECT OF WHITE EGG STRAIN AND DENSITY ON BODY WEIGHT OF HENS IN THE 38th NCLP&MT (119-763 DAYS) NON-ANOREXIC MOLT PROGRAM

Breeder	Density ¹	110 Wk Body Wt	2 nd Cycle Wt Gain	2 nd Cycle Wt Gain	Total Wt Gain	Total Wt Gain
(Strain)	(in ² /hen)	(kg)	(g)	(%)	(g)	(%)
Hy-Line	73	1.84	377	26.0	638	53.2
W-36	77	1.84	418	29.5	624	51.5
	Average	1.84 ^{CD}	397 ^{AB}	27.8	631 ^B	52.3 ^B
Hy-Line	73	2.08	468	29.6	744	56.3
W-98	77	2.14	522	32.9	823	62.6
	Average	2.11 ^A	495 ^A	31.2	783 ^A	59.5 ^A
H&N	73	1.91	451	31.5	652	52.1
Nick Chick	77	1.89	417	28.4	604	47.1
	Average	1.90 ^{BC}	434 ^{AB}	29.9	628 ^B	49.6 ^{BCD}
Lohmann	73	1.84	396	28.1	561	44.0
LSL-Lite	77	1.84	376	26.3	549	42.5
	Average	1.84 ^{CD}	386 ^B	27.2	555 ^{BCD}	43.2 ^{DE}
Bovans	73	1.81	333	22.6	605	50.1
White	77	1.84	387	27.4	639	53.5
	Average	1.83 ^{CDE}	360 ^B	25.0	622 ^{BC}	51.8 ^{BC}
Shaver	73	1.73	362	26.7	538	45.1
White	77	1.78	356	25.9	550	44.8
	Average	1.76 ^E	359 ^B	26.3	544 ^{CD}	44.9 ^{CDE}
DeKalb	73	1.83	412	30.1	543	42.5
White	77	1.79	269	18.1	487	37.6
	Average	1.81 ^{DE}	341 ^B	24.1	515 ^D	40.0 ^E
ISA Babcock	73	1.96	461	31.0	612	45.5
White	77	1.98	428	27.7	634	47.1
	Average	1.97 ^B	444 ^{AB}	29.4	623 ^{BC}	46.3 ^{BCDE}
ISA	73	1.84	346	23.7	518	39.3
Exp. White	77	1.86	350	23.5	546	41.6
	Average	1.85 ^{CD}	348 ^B	23.6	532 ^D	40.4 ^E
Novogen	73	1.86	455	32.8	597	47.3
White	77	1.81	398	28.4	567	45.8
	Average	1.84 ^{CD}	427 ^{AB}	30.6	582 ^{BCD}	46.5 ^{BCDE}
Bovans	73	1.84	368	25.2	613	49.9
Robust	77	1.81	376	27.0	551	43.9
	Average	1.82 ^{CDE}	372 ^B	26.1	582 ^{BCD}	46.9 ^{BCDE}
All	73	1.87	403	27.9	602	47.7
Strains	77	1.87	391	26.8	598	47.1

¹All strains were housed such that each strain is equally represented in each density.

A,B,C,D,E - Different letters denote significant differences (P<.01), comparisons made among strain average values.

TABLE 62. EFFECT OF BROWN EGG STRAIN AND DENSITY ON BODY WEIGHT OF HENS IN THE 38th NCLP&MT (119-763 DAYS) NON-MOLTED

Breeder	Density ¹	110 Wk Body Wt	2 nd Cycle Wt Gain	2 nd Cycle Wt Gain	Total Wt Gain	Total Wt Gain
(Strain)	(in ² /hen)	(kg)	(g)	(%)	(g)	(%)
Hy-Line	73	2.06	-12	-0.4	592	40.3
Brown	77	2.08	-86	-3.9	549	36.2
	Average	2.07 ^B	-49	-2.1	571 ^{AB}	38.2 ^{AB}
Hy-Line	73	2.13	10	0.7	592	38.6
Silver Brown	77	2.25	-67	-2.4	677	43.2
	Average	2.19 ^A	-28	-0.9	634 ^A	40.9 ^A
TETRA	73	2.00	64	3.3	517	34.9
Brown	77	2.09	59	3.0	614	41.8
	Average	2.04 ^B	62	3.2	565 ^{AB}	38.3 ^{AB}
TETRA	73	2.11	-19	-0.8	549	35.3
Amber	77	2.13	-74	-3.2	581	37.6
	Average	2.12 ^{AB}	-46	-2.0	565 ^{AB}	36.5 ^{AB}
ISA	73	2.05	-5	-0.2	524	34.2
Brown	77	2.03	-50	-2.4	475	30.8
	Average	2.04 ^B	-27	-1.3	500 ^{BC}	32.5 ^{ABC}
Bovans	73	1.94	-75	-3.7	415	27.1
Brown	77	1.93	-104	-4.9	381	24.8
	Average	1.93 ^C	-90	-4.3	398 ^C	26.0 ^C
Novogen	73	2.05	50	2.9	483	31.1
Brown	77	2.03	1	0.1	486	31.9
	Average	2.04 ^B	26	1.5	485 ^{BC}	31.5 ^{BC}
All	73	2.05	2	0.2	525	34.5
Strains	77	2.08	-46	-2.0	538	35.2
NCSU Barred	73	2.24	118	5.7	1004	81.1
Plym. Rock	77	2.28	52	2.4	1018	80.6

¹All strains were housed such that each strain is equally represented in each density.

A,B,C - Different letters denote significant differences (P<.01), comparisons made among strain average values.

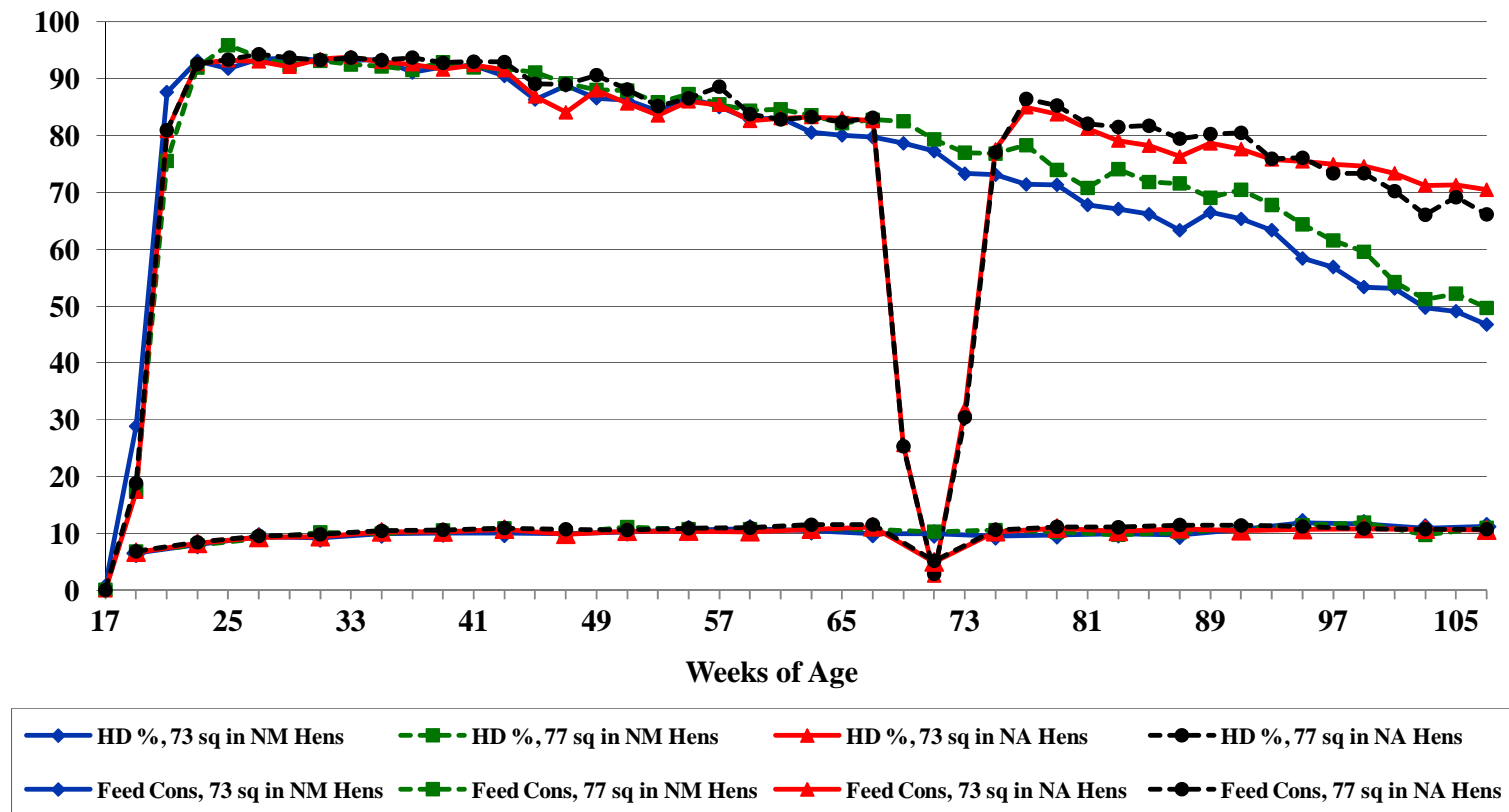
TABLE 63. EFFECT OF BROWN EGG STRAIN AND DENSITY ON BODY WEIGHT OF HENS IN THE 38th NCLP&MT (119-763 DAYS) NON-ANOREXIC MOLT PROGRAM

Breeder	Density ¹	110 Wk Body Wt	2 nd Cycle Wt Gain	2 nd Cycle Wt Gain	Total Wt Gain	Total Wt Gain
(Strain)	(in ² /hen)	(kg)	(g)	(%)	(g)	(%)
Hy-Line	73	2.12	528	33.2	648	44.1
Brown	77	2.16	630	41.5	652	43.2
	Average	2.14 ^B	579 ^{ABC}	37.3 ^{ABC}	650 ^A	43.6 ^A
Hy-Line	73	2.21	500	29.5	615	38.6
Silver Brown	77	2.27	484	27.4	708	45.3
	Average	2.24 ^A	492 ^{BC}	28.4 ^C	661 ^A	41.9 ^{AB}
TETRA	73	2.14	483	30.2	643	43.0
Brown	77	2.09	440	27.0	636	43.9
	Average	2.12 ^{BC}	462 ^C	28.6 ^C	639 ^A	43.5 ^A
TETRA	73	2.15	622	40.7	617	40.3
Amber	77	2.17	581	37.3	642	42.2
	Average	2.16 ^{AB}	601 ^{AB}	39.0 ^{AB}	630 ^A	41.3 ^{AB}
ISA	73	2.18	646	42.6	653	45.1
Brown	77	2.14	631	42.5	592	38.6
	Average	2.16 ^{AB}	638 ^A	42.6 ^A	623 ^A	41.8 ^{AB}
Bovans	73	2.05	524	35.4	521	34.1
Brown	77	2.05	432	27.4	517	33.7
	Average	2.05 ^C	478 ^{BC}	31.4 ^{BC}	519 ^B	33.9 ^B
Novogen	73	2.17	580	37.0	574	36.2
Brown	77	2.17	555	35.6	564	35.2
	Average	2.17 ^{AB}	568 ^{ABC}	36.3 ^{ABC}	569 ^{AB}	35.7 ^{AB}
All	73	2.15	555	35.5	610	40.2
Strains	77	2.15	536	34.1	616	40.3

¹All strains were housed such that each strain is equally represented in each density.

A,B,C - Different letters denote significant differences (P<.01), comparisons made among strain average values.

Figure 1. Hy-Line W-36, bi-weekly hen-day egg production¹ and period feed consumption¹ by hen population (73 or 77 in²) and molt program (NM² or NA³)

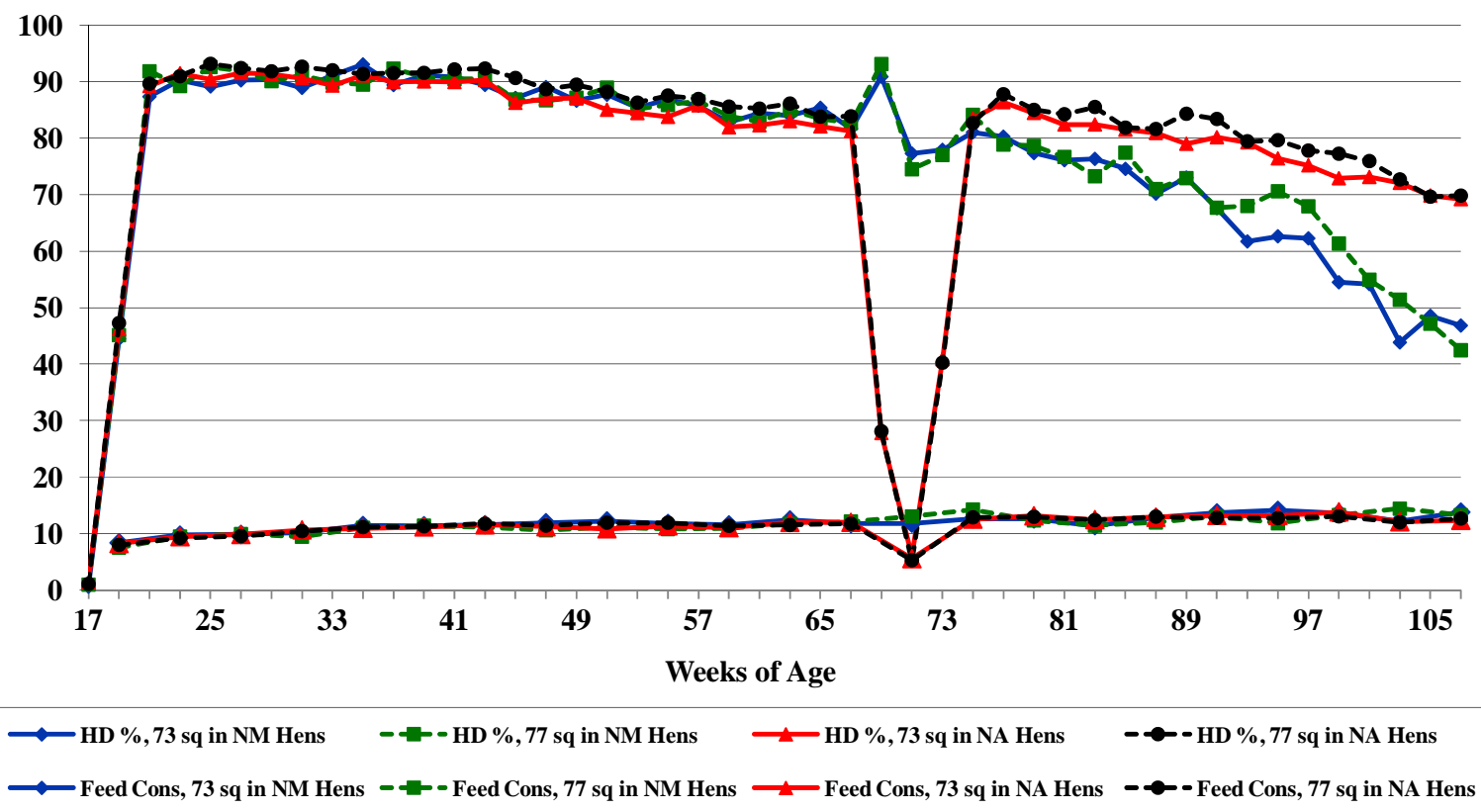


¹ Hen-day Production is % and Feed Consumption is kg/100 Hens/d

² NM = non-molted

³ NA = non-anorexic molt program

Figure 2. Hy-Line W-98, hen-day egg production¹ and period feed consumption¹ by hen population (73 or 77 in²) and molt program (NM² or NA³)

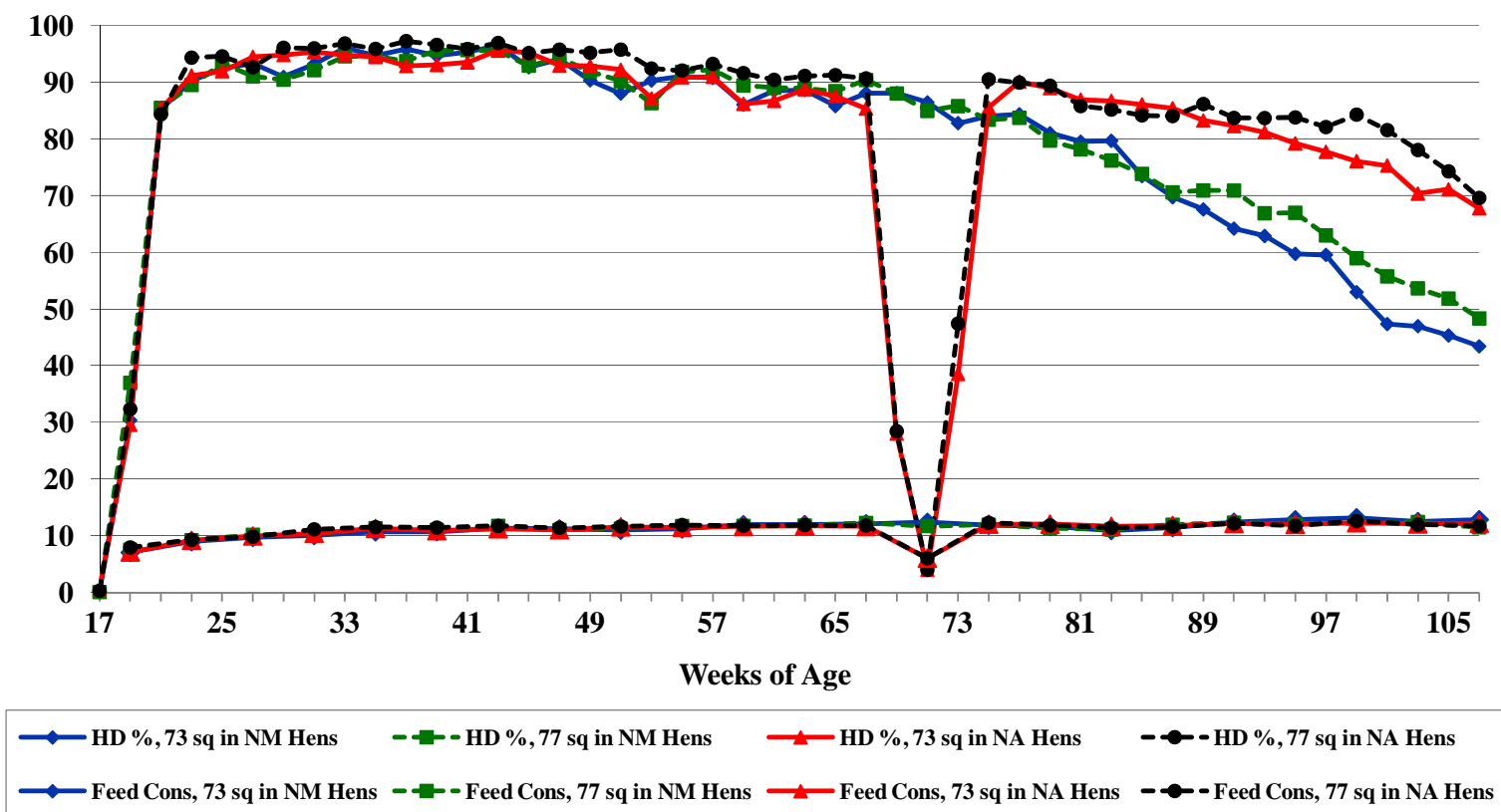


¹ Hen-day Production is % and Feed Consumption is kg/100 Hens/d

² NM = non-molted

³ NA = non-anorexic molt program

Figure 3. H & N “Nick Chick”, bi-weekly hen-day egg production¹ and period feed consumption¹ by hen population (73 or 77 in²) and molt program (NM² or NA³)

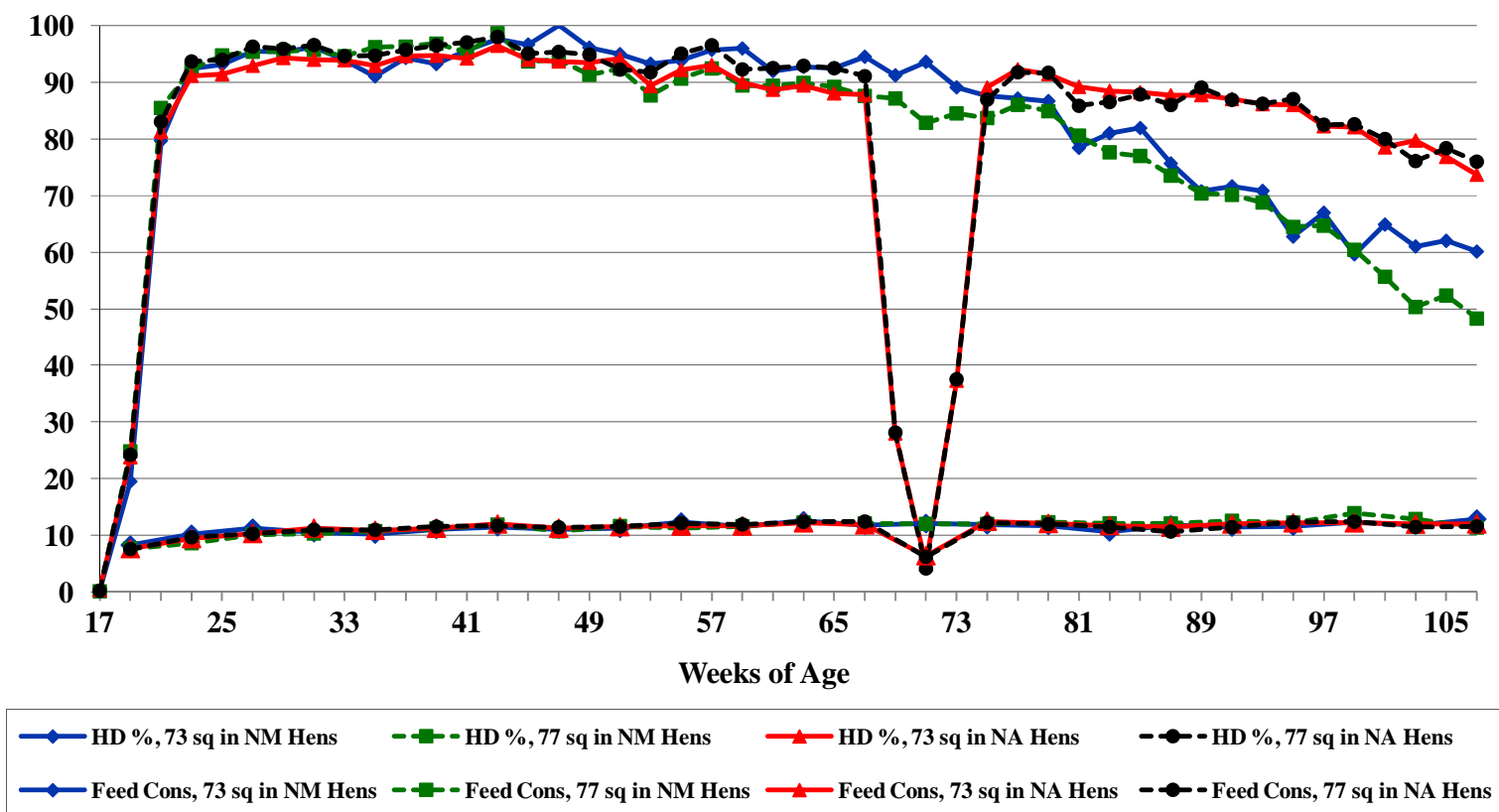


¹ Hen-day Production is % and Feed Consumption is kg/100 Hens/d

² NM = non-molted

³ NA = non-anorexic molt program

Figure 4. Lohmann LSL-Lite, bi-weekly hen-day egg production¹ and period feed consumption¹ by hen population (73 or 77 in²) and molt program (NM² or NA³)

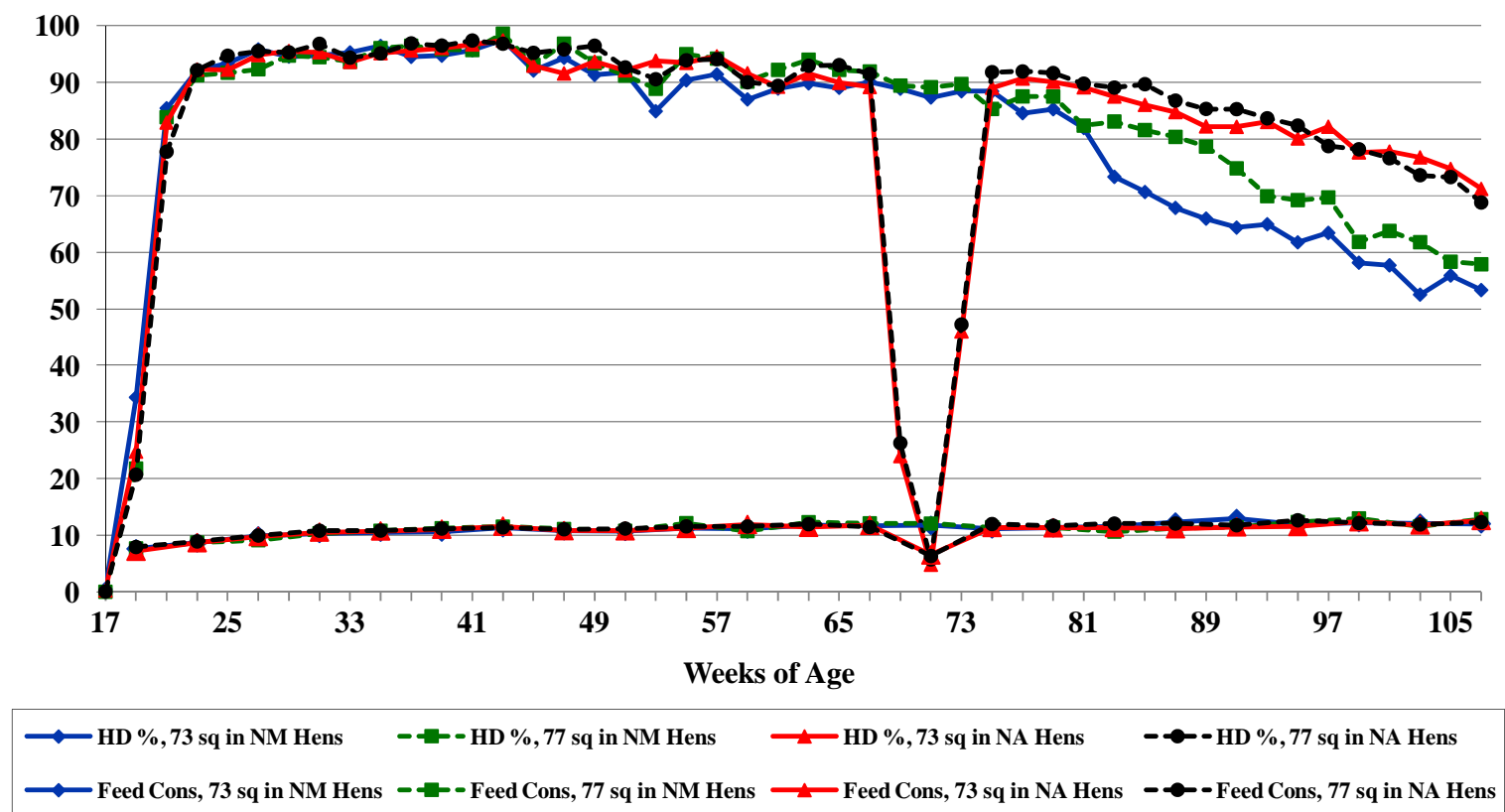


¹ Hen-day Production is % and Feed Consumption is kg/100 Hens/d

² NM = non-molted

³ NA = non-anorexic molt program

Figure 5. ISA Bovans White, bi-weekly hen-day egg production¹ and period feed consumption¹ by hen population (73 or 77 in²) and molt program (NM² or NA³)

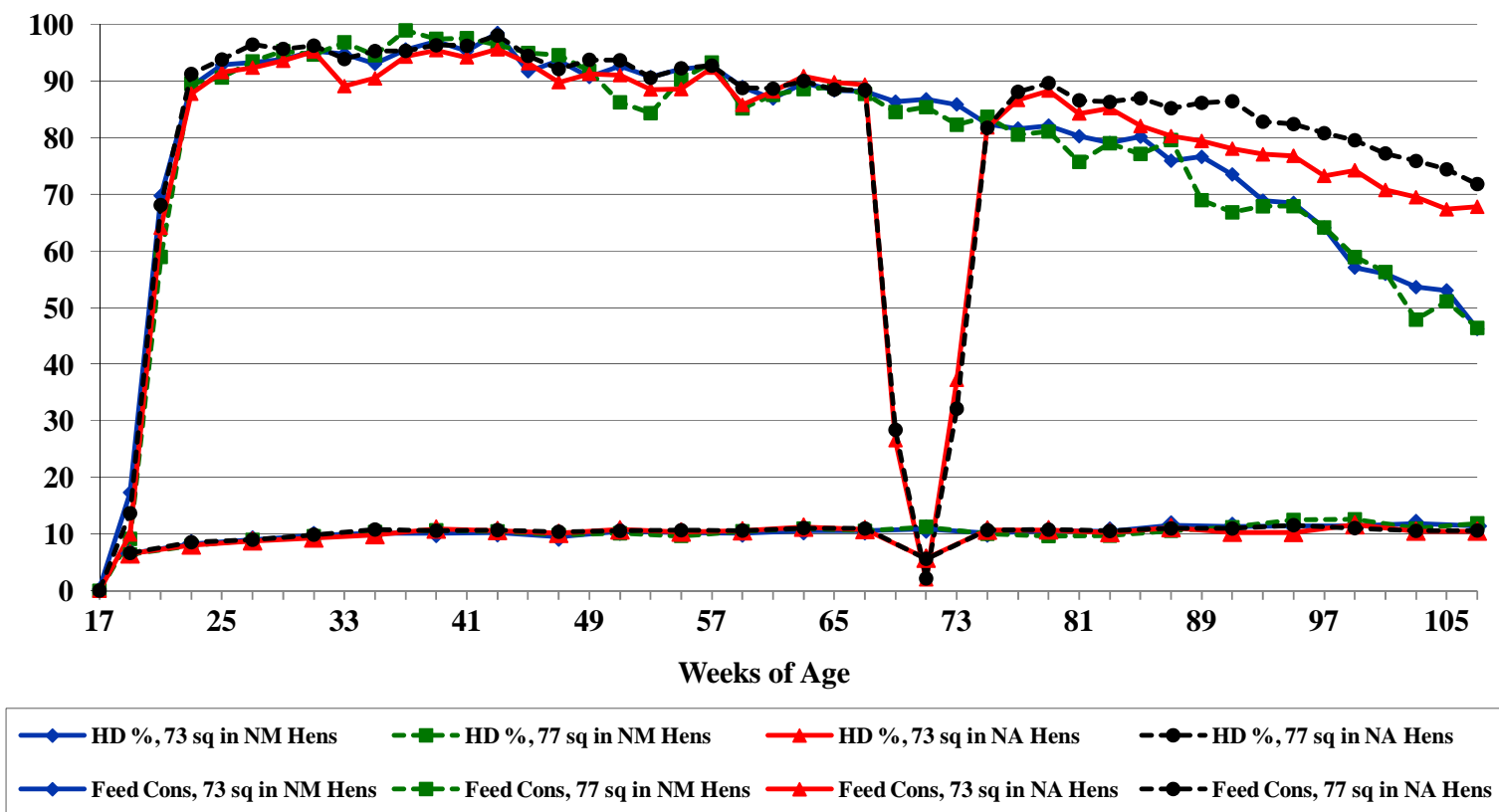


¹ Hen-day Production is % and Feed Consumption is kg/100 Hens/d

² NM = non-molted

³ NA = non-anorexic molt program

Figure 6. ISA Shaver White, bi-weekly hen-day egg production¹ and period feed consumption¹ by hen population (73 or 77 in²) and molt program (NM² or NA³)

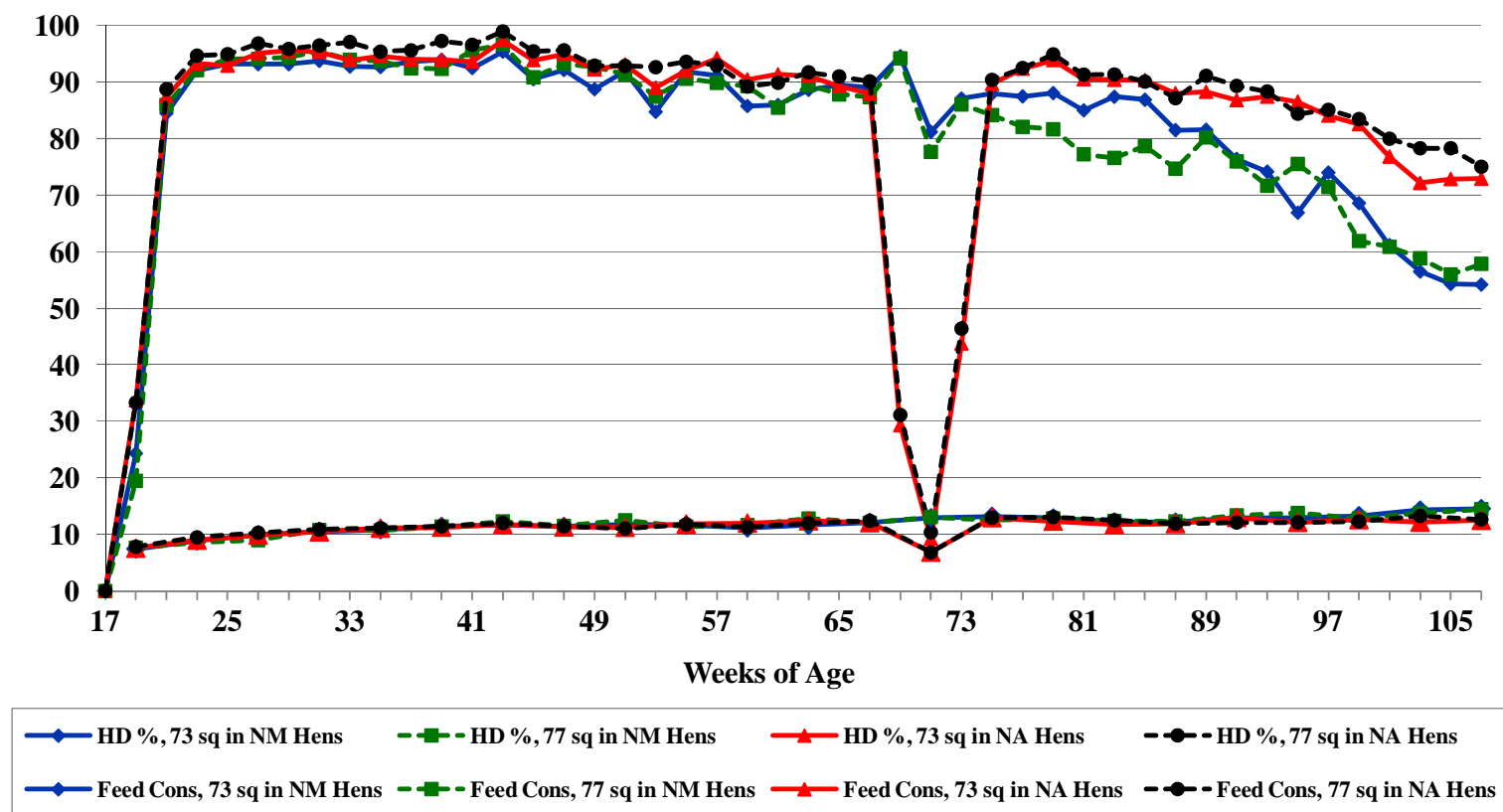


¹ Hen-day Production is % and Feed Consumption is kg/100 Hens/d

² NM = non-molted

³ NA = non-anorexic molt program

Figure 7. ISA Dekalb White, bi-weekly hen-day egg production¹ and period feed consumption¹ by hen population (73 or 77 in²) and molt program (NM² or NA³)

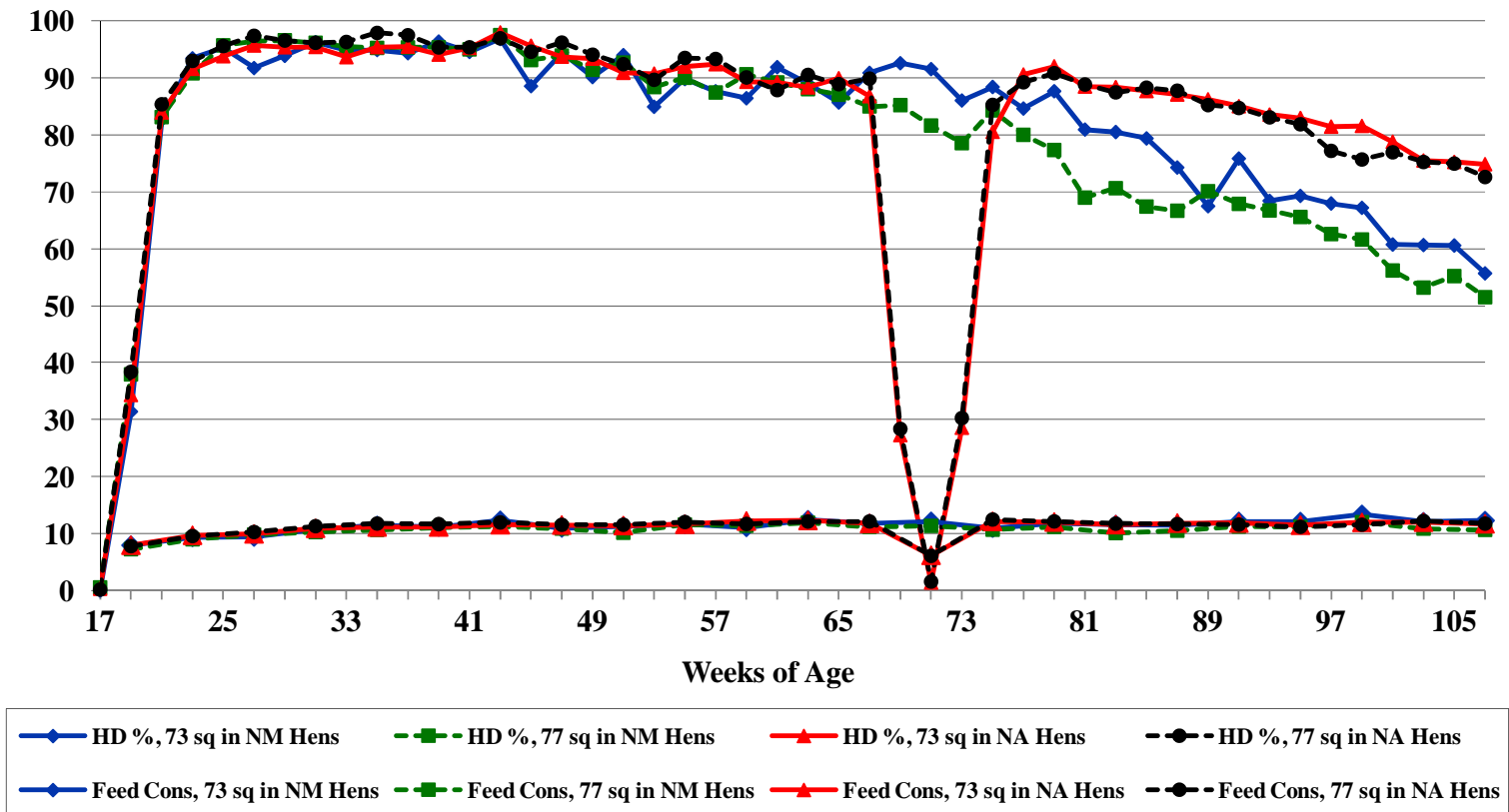


¹ Hen-day Production is % and Feed Consumption is kg/100 Hens/d

² NM = non-molted

³ NA = non-anorexic molt program

Figure 8. ISA Babcock White, bi-weekly hen-day egg production¹ and period feed consumption¹ by hen population (73 or 77 in²) and molt program (NM² or NA³)

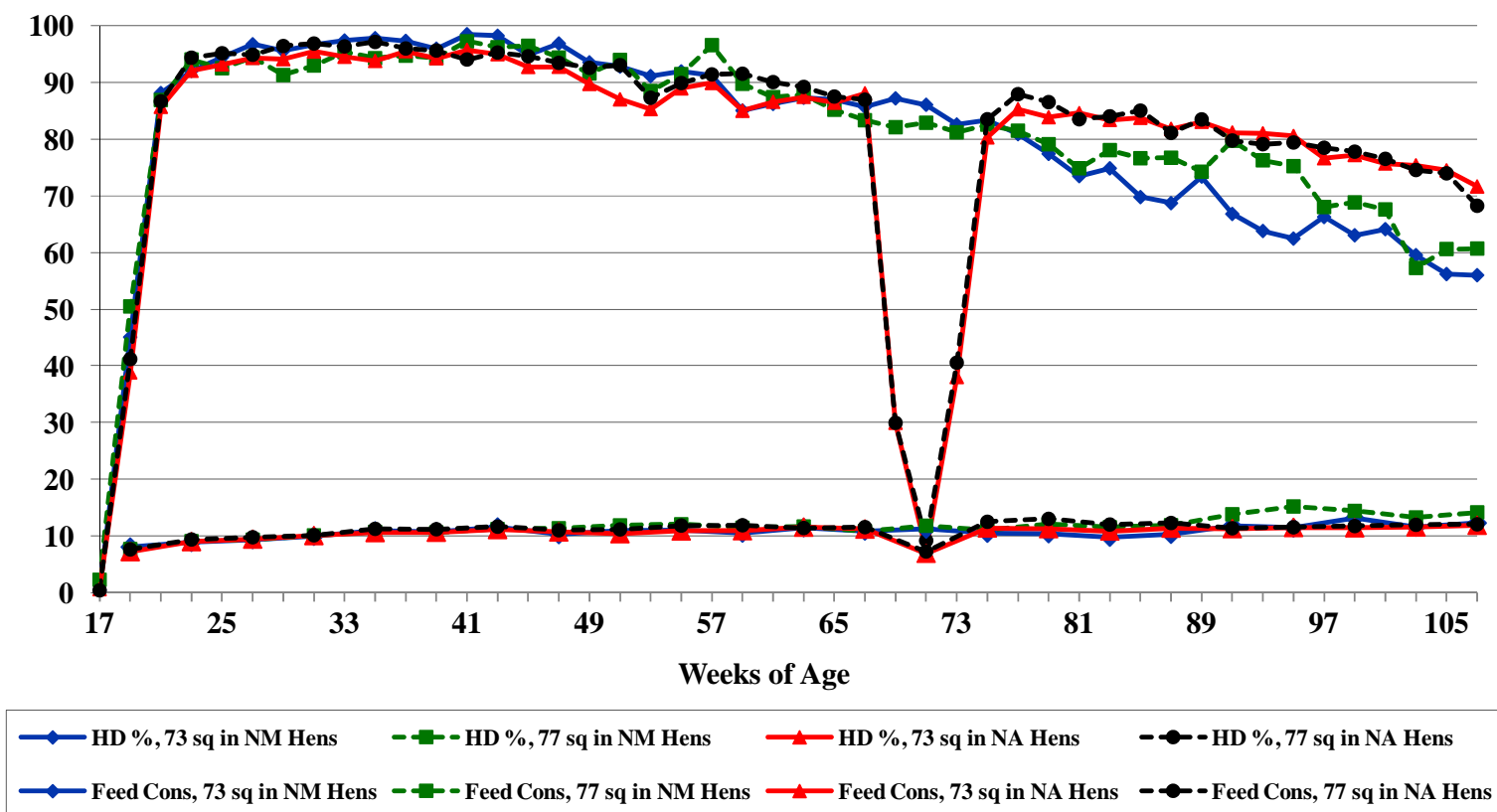


¹ Hen-day Production is % and Feed Consumption is kg/100 Hens/d

² NM = non-molted

³ NA = non-anorexic molt program

Figure 9. ISA Experimental White, bi-weekly hen-day egg production¹ and period feed consumption¹ by hen population (73 or 77 in²) and molt program (NM² or NA³)

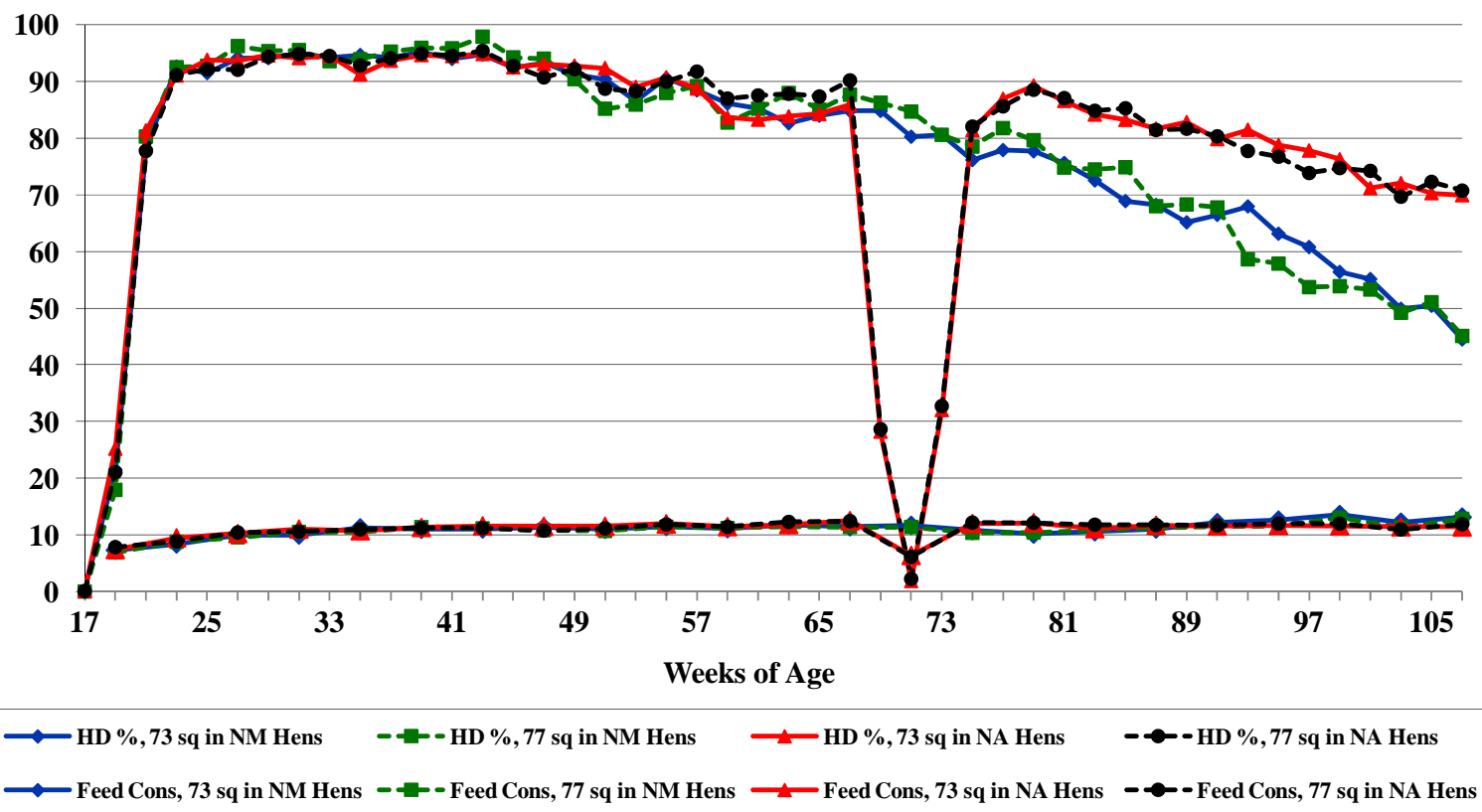


¹ Hen-day Production is % and Feed Consumption is kg/100 Hens/d

² NM = non-molted

³ NA = non-anorexic molt program

Figure 10. Novogen White, bi-weekly hen-day egg production¹ and period feed consumption¹ by hen population (73 or 77 in²) and molt program (NM² or NA³)

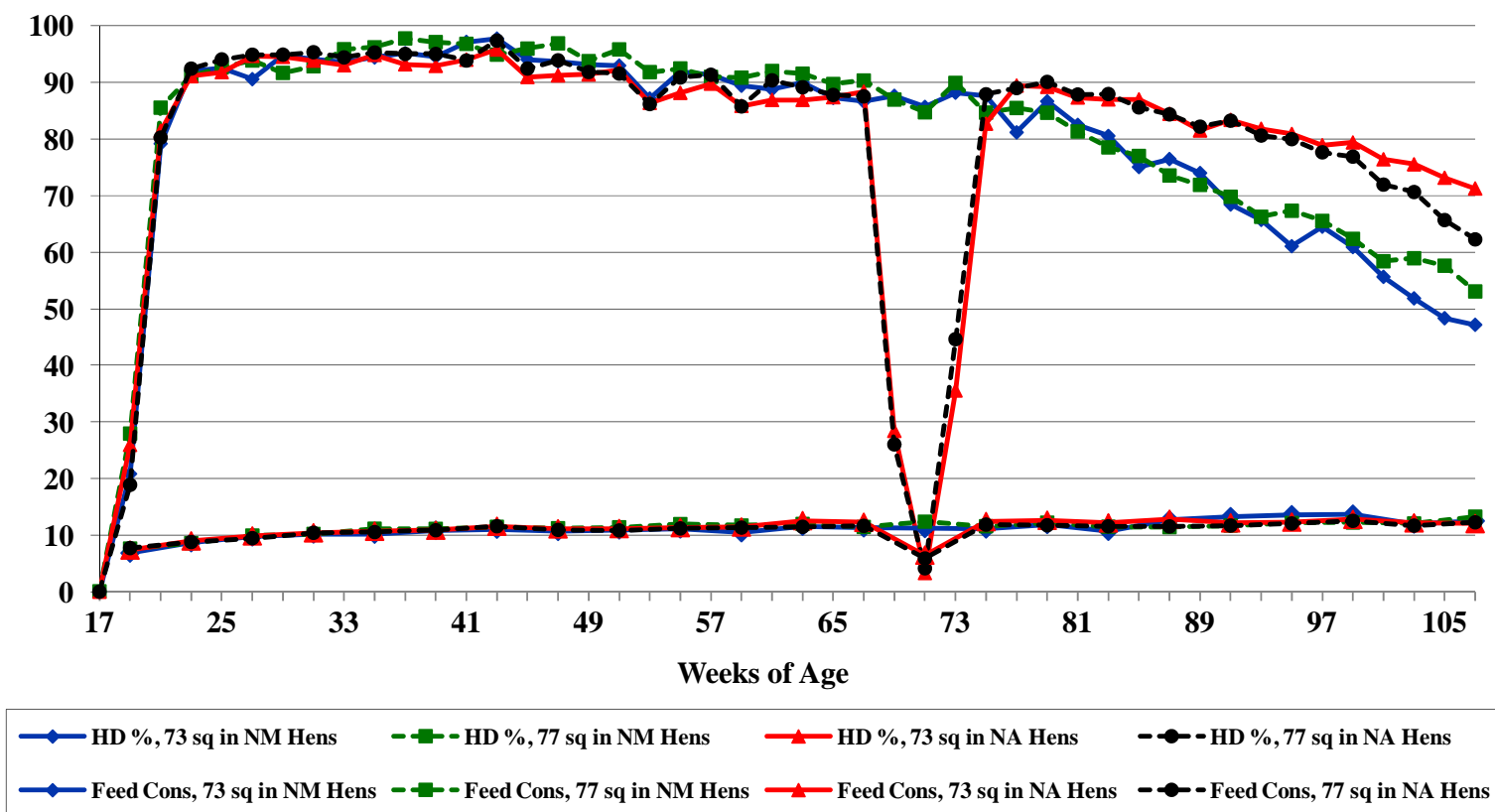


¹ Hen-day Production is % and Feed Consumption is kg/100 Hens/d

² NM = non-molted

³ NA = non-anorexic molt program

Figure 11. ISA Bovans Robust, bi-weekly hen-day egg production¹ and period feed consumption¹ by hen population (73 or 77 in²) and molt program (NM² or NA³)

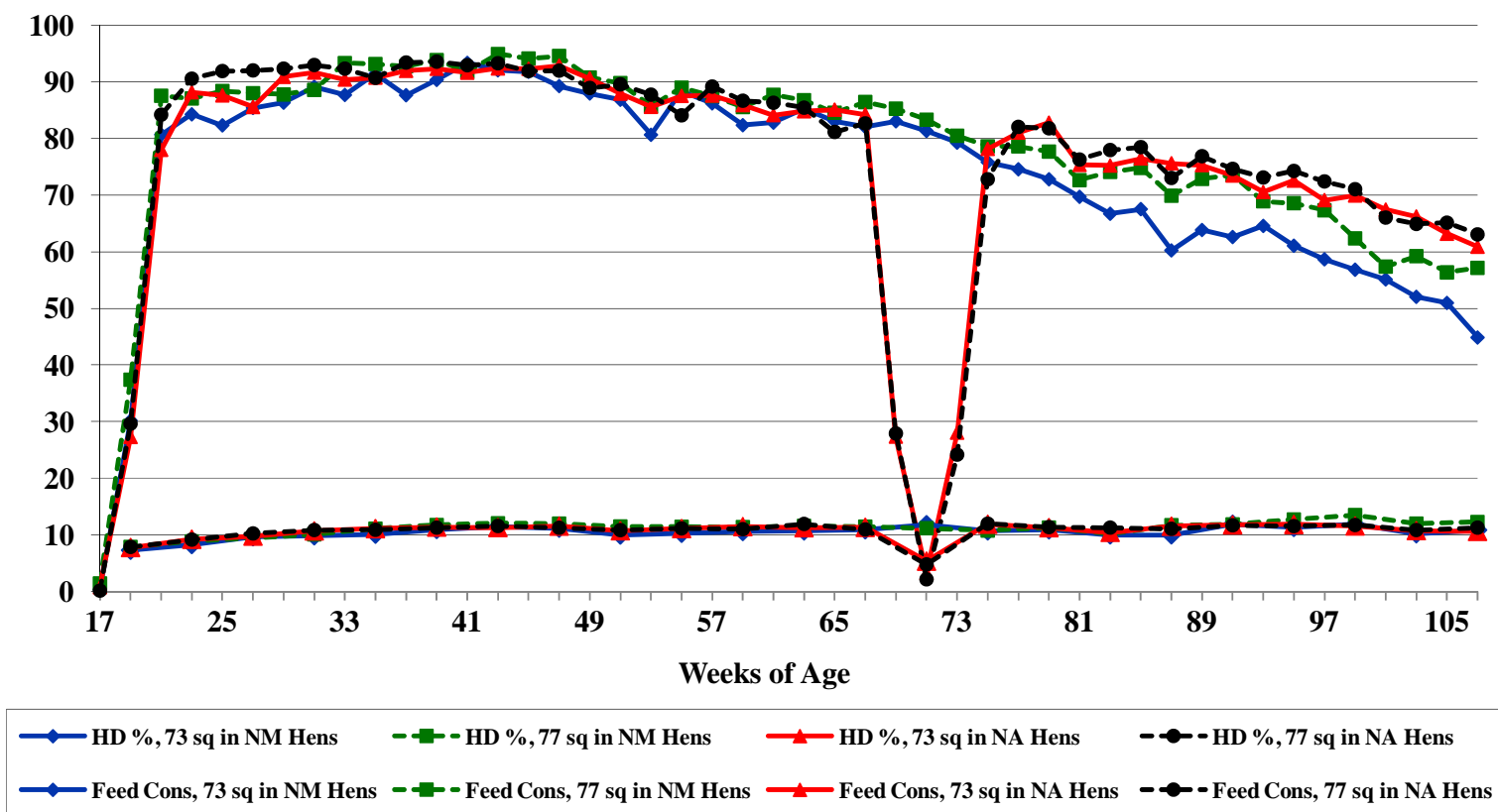


¹ Hen-day Production is % and Feed Consumption is kg/100 Hens/d

² NM = non-molted

³ NA = non-anorexic molt program

Figure 12. Hy-Line Brown, bi-weekly hen-day egg production¹ and period feed consumption¹ by hen population (73 or 77 in²) and molt program (NM² or NA³)

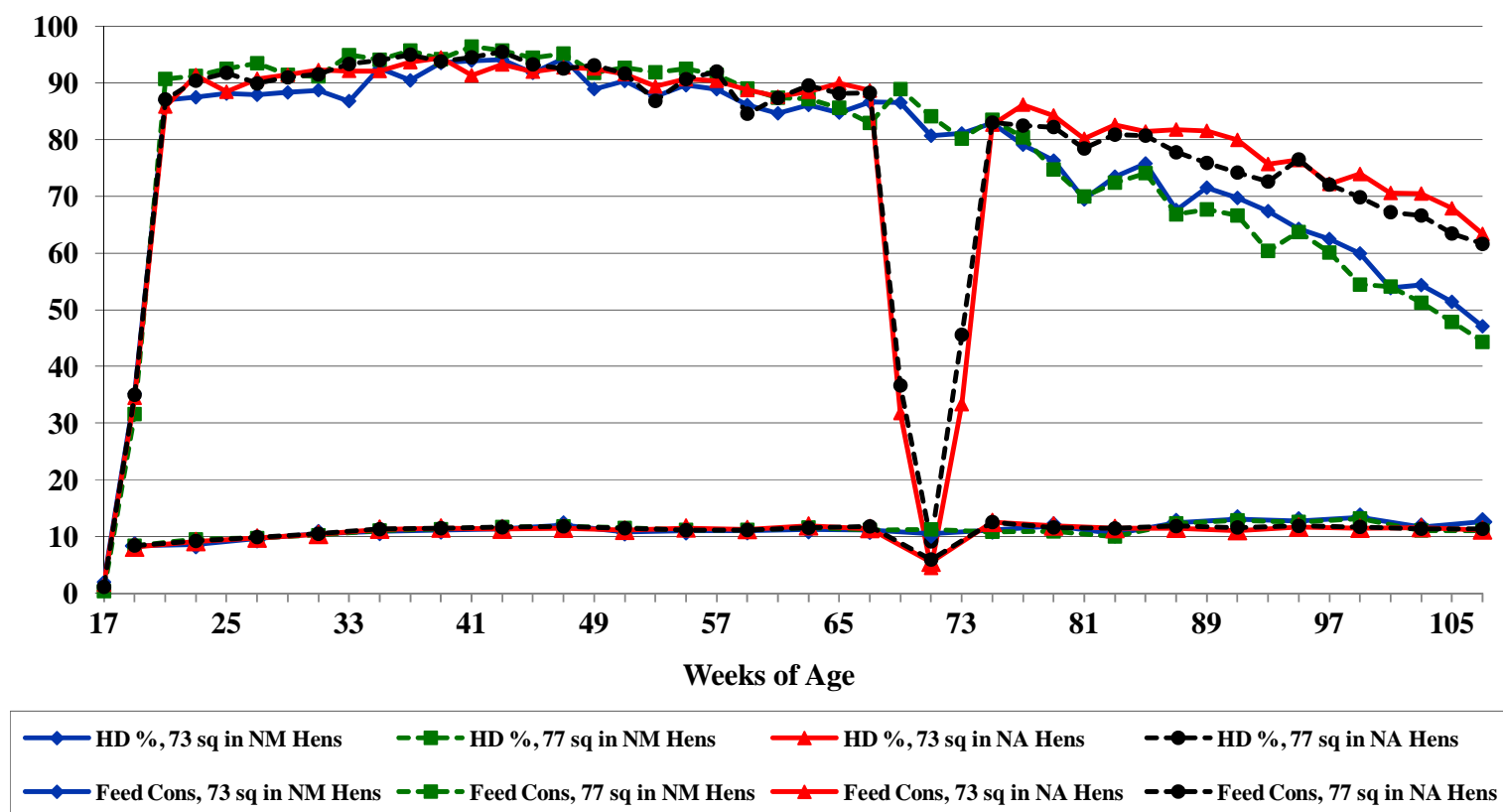


¹ Hen-day Production is % and Feed Consumption is kg/100 Hens/d

² NM = non-molted

³ NA = non-anorexic molt program

Figure 13. Hy-Line Silver Brown, bi-weekly hen-day egg production¹ and period feed consumption¹ by hen population (73 or 77 in²) and molt program (NM² or NA³)

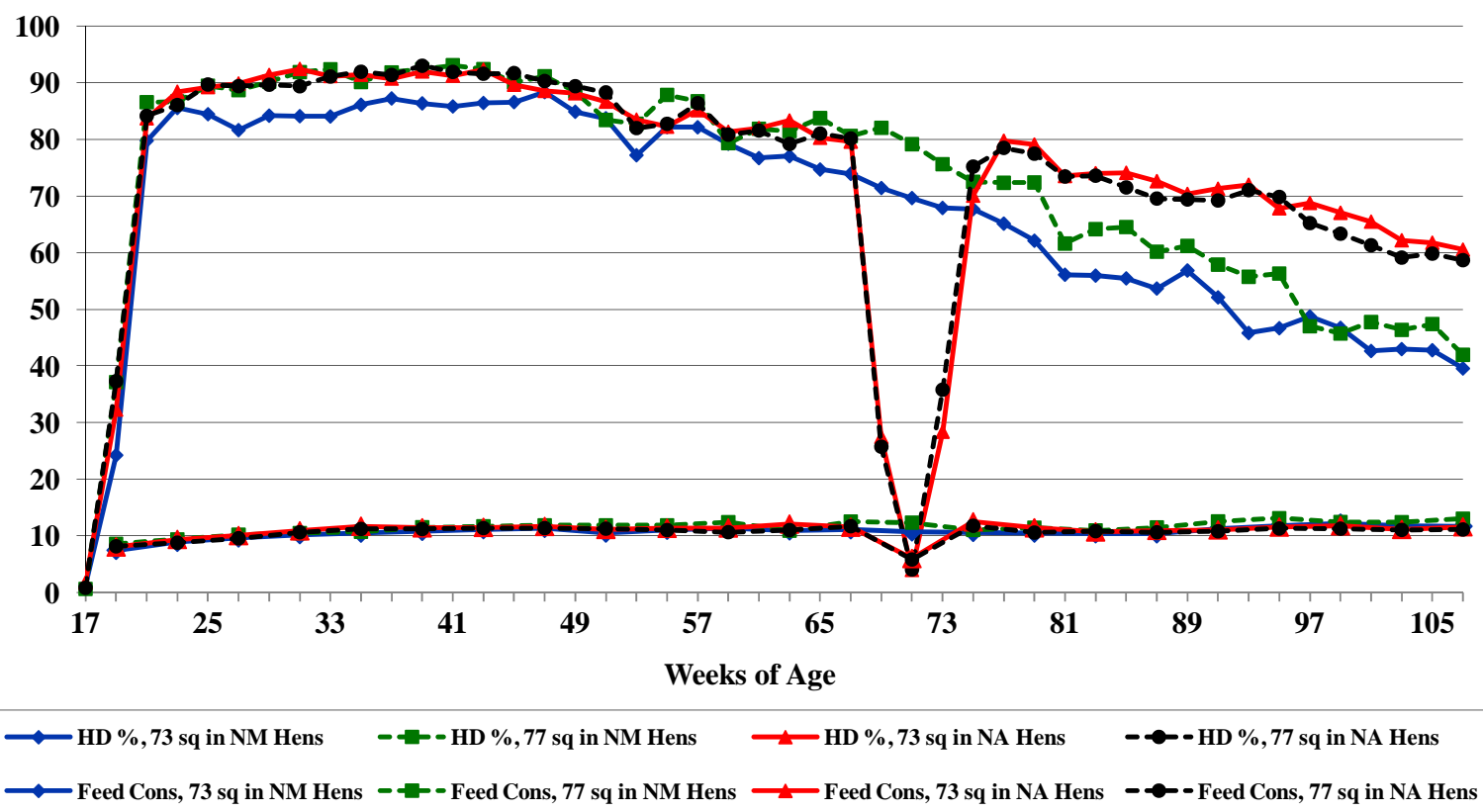


¹ Hen-day Production is % and Feed Consumption is kg/100 Hens/d

² NM = non-molted

³ NA = non-anorexic molt program

Figure 14. TETRA Brown, bi-weekly hen-day egg production¹ and period feed consumption¹ by hen population (73 or 77 in²) and molt program (NM² or NA³)

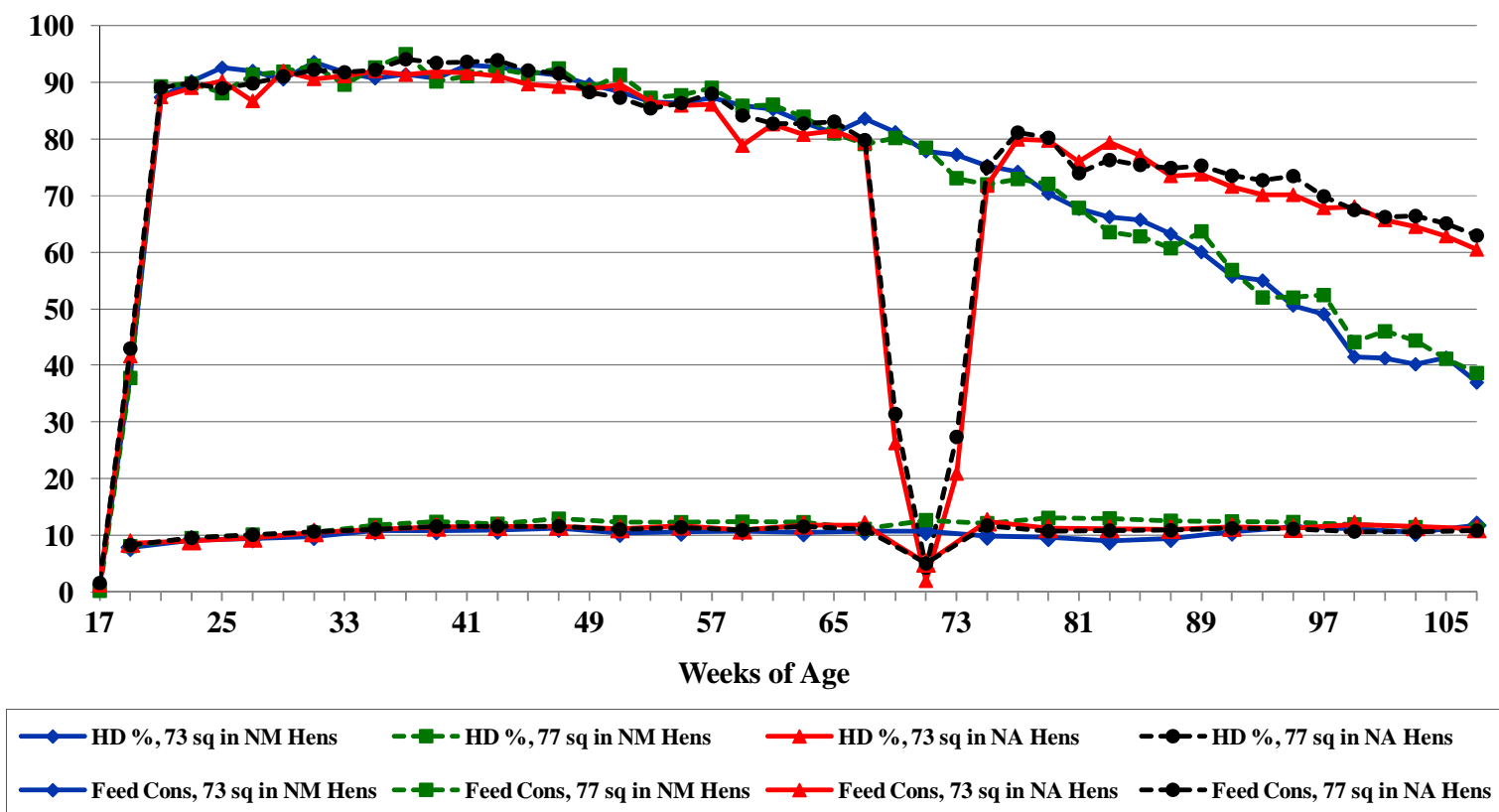


¹ Hen-day Production is % and Feed Consumption is kg/100 Hens/d

² NM = non-molted

³ NA = non-anorexic molt program

Figure 15. TETRA Amber, bi-weekly hen-day egg production¹ and period feed consumption¹ by hen population (73 or 77 in²) and molt program (NM² or NA³)

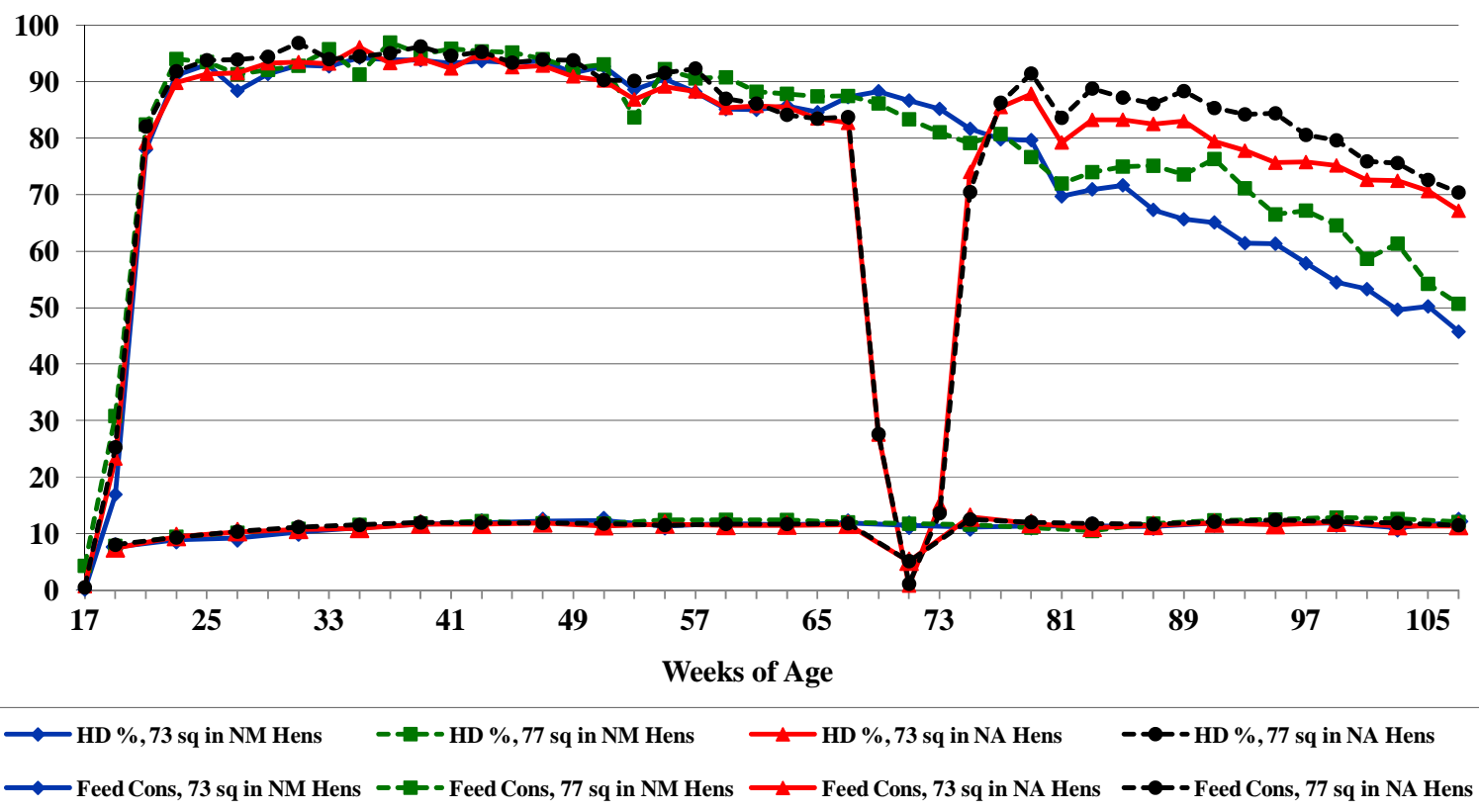


¹ Hen-day Production is % and Feed Consumption is kg/100 Hens/d

² NM = non-molted

³ NA = non-anorexic molt program

Figure 16. ISA Brown, bi-weekly hen-day egg production¹ and period feed consumption¹ by hen population (73 or 77 in²) and molt program (NM² or NA³)

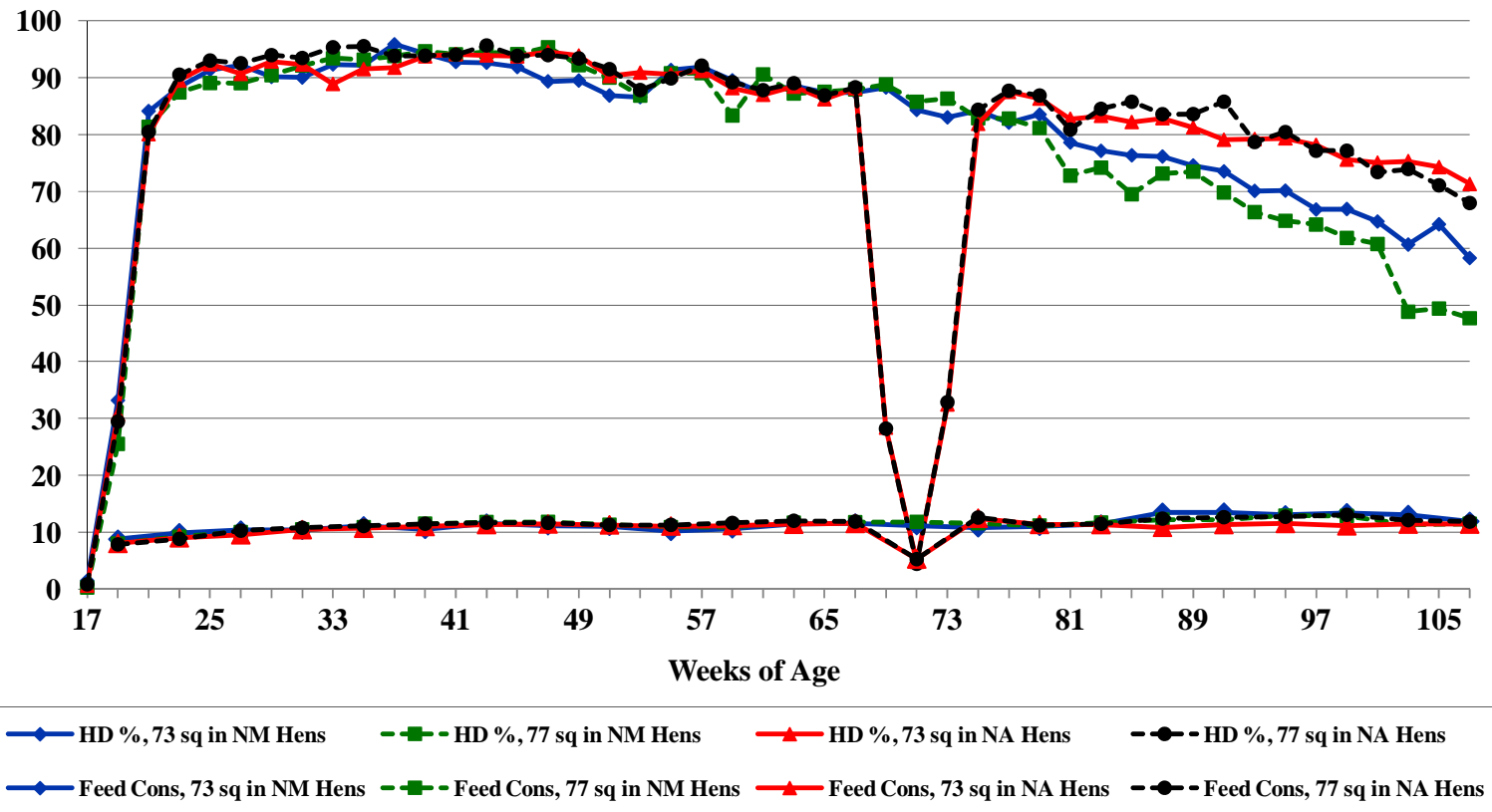


¹ Hen-day Production is % and Feed Consumption is kg/100 Hens/d

² NM = non-molted

³ NA = non-anorexic molt program

Figure 17. ISA Bovans Brown, bi-weekly hen-day egg production¹ and period feed consumption¹ by hen population (73 or 77 in²) and molt program (NM² or NA³)

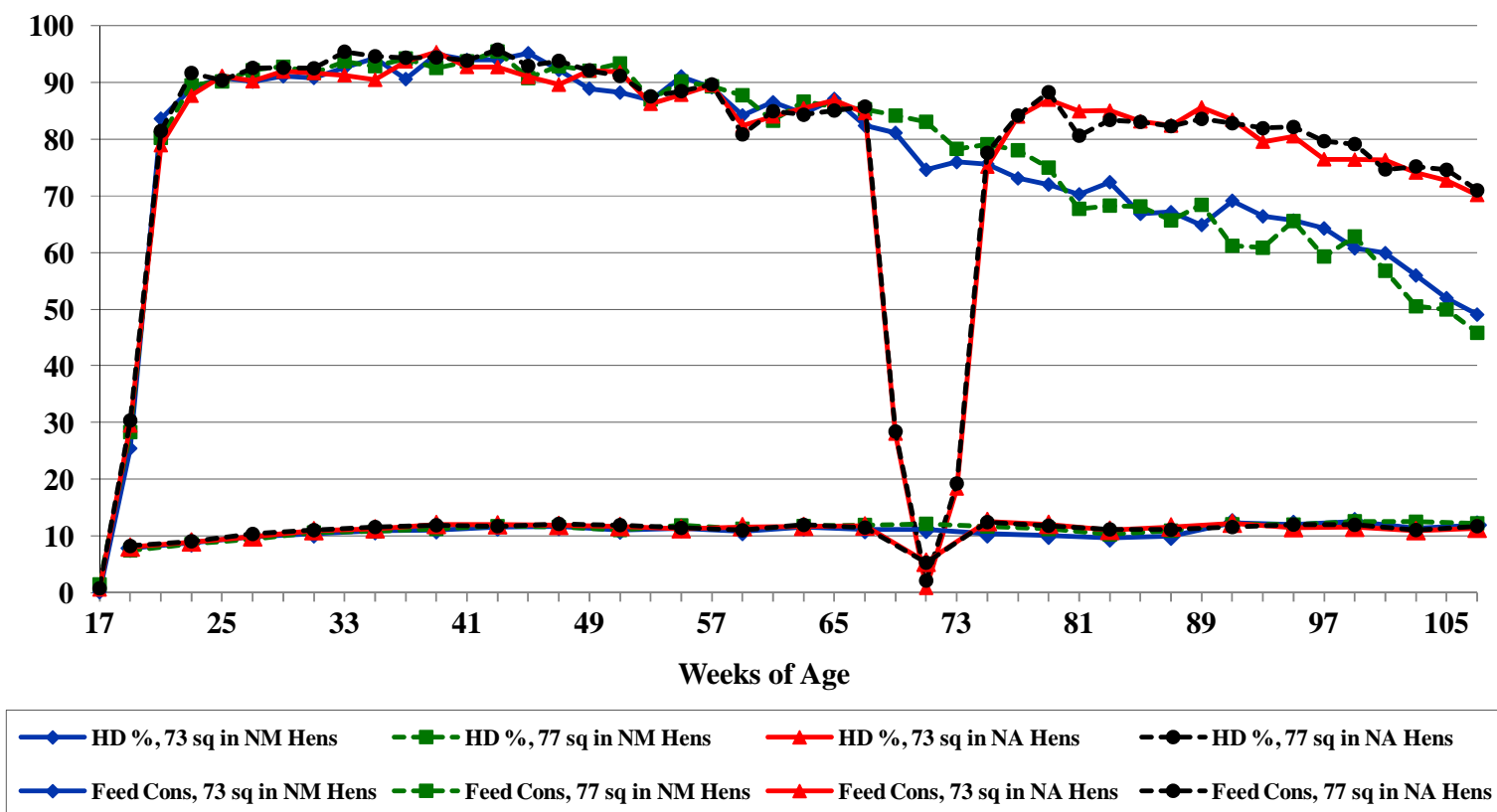


¹ Hen-day Production is % and Feed Consumption is kg/100 Hens/d

² NM = non-molted

³ NA = non-anorexic molt program

Figure 18. Novogen Brown, bi-weekly hen-day egg production¹ and period feed consumption¹ by hen population (73 or 77 in²) and molt program (NM² or NA³)

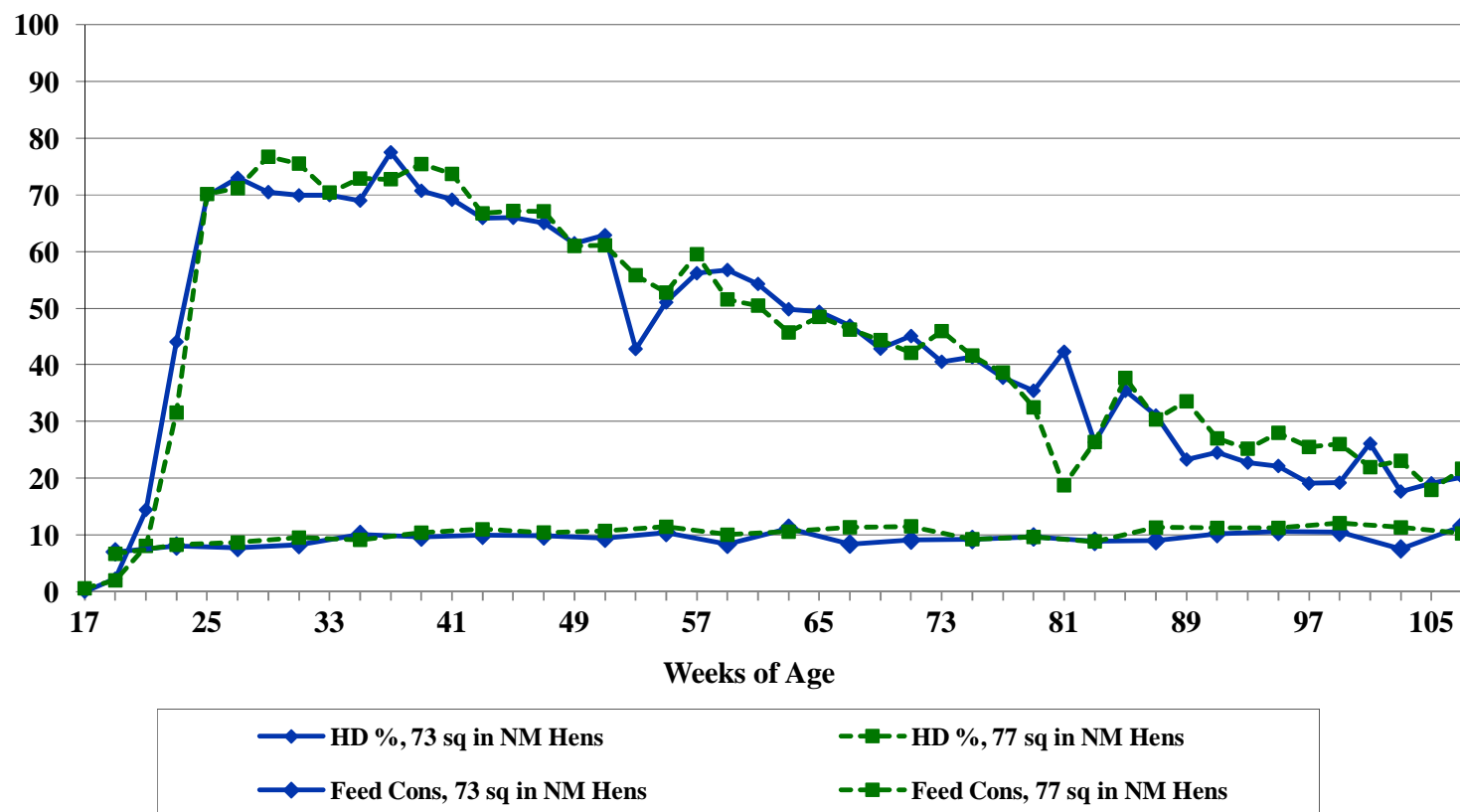


¹ Hen-day Production is % and Feed Consumption is kg/100 Hens/d

² NM = non-molted

³ NA = non-anorexic molt program

Figure 19. NCSU Barred Ply. Rock, bi-weekly hen-day egg production¹ and period feed consumption¹ by hen population (73 or 77 in²) in only non-molted



¹ Hen-day Production is % and Feed Consumption is kg/100 Hens/d

Table 64. Entries in the 38th NCLP&MT by Breeder, Stock Suppliers, and Categories

Breeder	Stock	Category ¹	Source
Hy-Line International 2583 240 th Street 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 International 17458 G. Avenue Perry, IA 50220
	Hy-Line Silver Brown	III-A	Dallas Center Research Farm 2418 N Ave. Dallas Center, IA 50063
Lohmann Tierzucht Gmbh Am Seedeich 9-11 . P.O.Box 460 D-27454 Cuxhaven, Germany	Lohmann LSL-Lite	I-A	Hy-Line North America 1755 West Lakes Parkway West Des Moines, IA 50266
H&N International 321 Burnett Ave South, Suite 300 Renton, Washington 98055	H&N “Nick Chick”	I-A	Feather Land Farms 32832 E. Peral Road Coberg, OR 97408
Instiut de Selection Animale (A Hendrix Genetic Company) ISA North America 650 Riverbend Drive, Suite C Kitchener, Ontario N2K 3S2 Canada	Bovans White	I-A	CPI-South Central Hatchery 5087 County Road 35 Bremen, AL 35033
	Bovans Robust	II-A	(Same)
	Bovans Brown	I-A	(Same)
	Babcock White	I-A	ISA North America 650 Riverbend Drive Kitchener, Ontario N2K 3S2 Canada
	Dekalb White	I-A	(Same)
	Experimental White	III-A	(Same)
	Shaver White	II-A	Brickland Hatchery Midwest Farms, LLC. 135 S. Epes St. Blackstone, VA 23824
	ISA Brown	II-A	Westwind Hatchery 8382 Lakeview St. Interlaken, NY 14847
North Carolina State University Dept of Poultry Science Box 7608 Raleigh, NC 27695	NCSU Barred Plymouth Rock	III-C	North Carolina State University Dept of Poultry Science Box 7608 Raleigh, NC 27695
Tetra Americana, LLC 1105 Washington Road Lexington, GA 30648	TETRA Brown	I-A	CPI-MidAmerica Hatchery 111 Stoddart Street Beaver Dam, WI 53916
	TETRA Amber	I-A	(Same)
NOVOGEN S.A.S. Mauguérand – Le Foeil BP 265 22 800 QUINTIN - FRANCE	NOVOgen WHITE	I-A	Kendrick Farm 25 Dr Breley Rd East Freetown, PA 02717
	NOVOgen BROWN	I-A	Highland Hills Farm 105 Hurricane Road Westmoreland, NH 03467

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