North Carolina Cooperative Extension Service

NC STATE UNIVERSITY

College of Agriculture and Life Sciences
Extension Poultry Science
Scott Hall/Campus Box 7608
Raleigh, North Carolina 27695

919-515-2621 (phone)
919-515-7070 (fax)

SINGLE PRODUCTION CYCLE REPORT OF THE THIRTY SEVENTH

NORTH CAROLINA LAYER PERFORMANCE

AND MANAGEMENT TEST

Vol. 37, No. 4
February 2009

The North Carolina Layer Performance and Management Test is conducted under the auspices of the Cooperative Extension Service at North Carolina State University and the North Carolina Department of Agriculture and Consumer Services. The flock is maintained at the Piedmont Research Station, Salisbury, North Carolina. Mr. Joe Hampton is the Superintendent of the Piedmont Research Station; Mr. Aaron Sellers is Resident Manager of the Poultry Unit and oversees the flock protocol; Pam Jenkins is the Statistical Research Assistant; and Dr. Kenneth E. Anderson is Project Leader. The purpose of this program is to assist the management within the poultry industry 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 a single production cycle of the 37th North Carolina Layer Performance and Management Test. This report summarizes the single cycle performance of commercial caged layers and flocks maintained in a free range system. Performance summary tables are available for each strain, and cage population used along with the combined results. The range comparison for this test simply presents the means for the hen performance due to the limited replicates available. You can view this report on our website at
http://www.ces.ncsu.edu/depts/poulsci/tech_manuals/layer_reports/36_first_cycle_report.pdf

For further information contact:

Dr. Kenneth E. Anderson
Poultry Science Department
North Carolina State University
Box 7608
Raleigh, NC 27695-7608
Tel: (919) 515-5527
Fax: (919) 515-7070
Email: ken_anderson@ncsu.edu

37th NORTH CAROLINA LAYER PERFORMANCE AND MANAGEMENT TEST
Protocol Procedures Used for the Single Cycle Report

Entries:

A total of ten white egg and six brown egg strains were entered for a total of sixteen 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.

Table 1. Strain name and egg color designation

Strain	Egg Color Designation
Hy-Line W-36	White
Hy-Line W-98	White
Hy-Line CV-22	White
Shaver White	White
Dekalb TX	White
Lohmann LSL-Lite	White
H&N Nick Chick	White
Bovans White	White
Hisex White	White
Bovans Robust	White
ISA Brown	Brown
Hy-Line Brown*	Brown
Hy-Line S. Brown	Brown
Bovans Brown	Brown
Hisex Brown*	Brown
Dekalb Amber Link	Brown

*Strains used in Range Comparison

Dates of Importance:

The eggs were placed into trays and set on May 15, 2007 at the North Carolina Dept. of Agriculture and Consumer Services, Piedmont Research Station, Poultry Unit at Salisbury, NC. The cage flock was hatched on June 6, 2007 then moved to the laying facilities on September 26-28, 2007 during their 17th week of age. The pullets for the range study were moved to the range August 29, 2007 during their 12th week of age.

Single cycle production records commenced on October 3, 2007 (17 weeks of age), through the end of a single cycle of production at 82 weeks of age on December 30, 2008 (574 days). This report includes production data summarized from 17 to 82 wks, for both commercially caged laying hens and free range hens. The changes in body weights from 17 to 82 wk of age are included in Tables 14, 18, and 22. Production curves are shown in Figures 1 through 18.

Cage 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 59 % 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.

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 in^2, 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.

Range Pullet Housing:

The pullets for the range facilities were reared on litter at a density of 929 cm^2/pullet. They had access to feed, nipple waterers, and roosts (See House 6) in order to make them familiar with that behavior and facilitate nest box usage. All other rearing procedures and vaccinations were the same as their cage reared flock mates

Layer Housing:

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 in house 4 which can support 5,184 hens. The replicate blocks contain cages that are either 61 or 81 cm wide.

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 cages and two banks with quad-deck (4 levels) of cages. There are a total of 252 replicates in house 5 which can support 6,048 hens.

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 cage density in both was dictated by the cage size in each replicate that contain cages that were either 61 or 81.2 cm wide and 40.6 cm deep, which allowed for a constant density of 64 in^2 (413 cm^2), at 6 or 8 hens/cage, respectively. 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.

Range pullets were housed at 12 weeks of age in the range facility. They were provided a range hut that provided a minimum of 929 cm^2/pullet, 13 cm of roosting space/pullet, and 1 nest/8 hens. The range hut had a timer and light powered via battery and solar cell, supplemental propane heater for winter conditions to maintain a interior temperature above 7.2° C (45 F) which is the lower level of the chickens Effective Thermal Neutral Zone (eTNZ) where body temperature will be maintained via a feed intake increase. The hens had free access to the outdoors throughout the day and night but, appeared to return to the range hut during the dark for roosting and protection. Husbandry, lighting and supplemental feed were allocated on the same basis as flock mates in cages in order to minimize the variables between flock mates as much as possible. Range density was based upon a 500 hen/acre static equivalency 8.04 m^2/hen (86 ft^2/hen). The range pens were 21.3 m x 21.3 m (70' x 70') and were enclosed by a fence 1.8 m (6 ft) with the lower chain link section being 1.2 m (4 ft) high.

Table 2. Laying House and Range Hut Lighting Schedules:

Age	Date	House 5	House 7
		(Light Hours)	(Light Hours)
Housing Pullets	Sept. 26-Oct 3, 2007	10.0	10.0
17 Weeks[1]	Oct. 3, 2007	11.0	11.0
18 Weeks	Oct. 10, 2007	11.5	11.5
19 Weeks	Oct. 17, 2007	12.0	12.0
20 Weeks	Oct. 24, 2007	12.5	12.5
21 Weeks	Oct. 30, 2007	13.0	13.0
22 Weeks	Nov. 7, 2007	13.5	13.5
23 Weeks	Nov. 14, 2007	14.0	14.0
24 Weeks	Nov. 21, 2007	14.25	14.25
25 Weeks	Nov 28, 2007	14.5	14.5
26 Weeks	Dec. 5, 2007	14.75	14.75
27 Weeks	Dec. 12, 2007	15.0	15.0
28 Weeks	Dec. 19, 2007	15.25	15.25
29 Weeks	Dec. 26, 2007	15.5	15.5
30 Weeks	Jan. 2, 2008	15.75	15.75
31 Weeks	Jan. 9, 2008	16.0	16.0
Through 82Wks	Dec. 30, 2008	16.0	16.0

Test Design:

The laying test set up as a completely randomized factorial design. The main effects within House 4 and 5 were strain, and population. Following are general descriptions of the main effects and other housing conditions.

Strain

The samples of fertile eggs were provided directly by the breeders involved. All eggs were set and hatched concurrently. A total of nine white egg strains and three brown egg strains participated in the test. See the 37th Hatch Report (Vol. 37, No. 1) for details.

Density

In House 4 and 5, all individual cages within each block contained either the brown or the white egg layers. Thus each replicate included 24 hens in 30.5 x 40.6 cm cages for 8 cages with 3 hens/cage or 40.6 x 40.6 cm cages for 6 cages with 4 hens/cage. Cage densities were held constant at 413 cm^2 (64 in^2) for the two cage dimensions to approximate the commercial animal welfare guidelines as closely as possible. The initial population sizes provided for a constant density and feeder space allocation. Therefore density and feeder space were not factors in this test.

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

White and Brown Hens/Cage or Brown Hens Range	Cage Size or Range Width x Depth	Floor Space per Bird	Feeder Space per Bird	Water Nipples per Cage or Range
6	30.5 cm x 40.7 cm	413 cm^2 (64 in^2)	10.2 cm 4.0 in	1
8	40.7 cm x 40.7 cm	413 cm^2 (64 in^2)	10.2 cm 4.0 in	1
75	Pen 21.3 m x 21.3m	929 cm^2 (144 in^2) 8.04 m^2 (86 ft^2)	3.9 cm 1.5 in	16

Layer Nutrition:

Layer diets were 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 5. The feed for the range hens was allocated based upon the combined productivity of the cage hens in order to minimize the production variables. The hens were provided the feed ad libitum and range intake was full access.

Table 4. Minimum Daily Intake of Nutrients Per Bird at Various Stages of Production in the 37th 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%

Table 5. Laying House and Range Feeding Program

Rate of Production	Consumption Per 100 Birds/Day (kg)	Diet Fed: White Egg Strains	Diet Fed: 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 6. Laying Period Diets

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 7. Laying Period Diets

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

Data Collection Schedule and Procedures:

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-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 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 single cycle (82 wks). Body weight gain for the single cycle was calculated and reported for each strain.

Mortality--All mortalities were recorded daily, and obvious accidents were not included in reported mortalities.

Statistical Analyses and Separation of Means:

Analyses of variance were performed on all data. 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. All data were subjected to ANOVA utilizing the GLM procedure of SAS, with the main effect of strain. First and second order interactions were tested for significance. Mean differences were separated via the PDIFF option of the GLM procedure.

There were no statistics run on the range test. This was a preliminary test of the range capabilities at the Piedmont Research Station with very limited replicates.

DESCRIPTION OF DATA TABLE STATISTICS

Single cycle performance of white and brown egg strains are shown on Tables 11 to 18. The single cycle range hen data for the brown egg strains are shown on Tables 19 to 23. No statistical analysis could be done on this data so only the means are reported.

Breeder (Strain):

Short identification codes of the breeder and strain of the stock were developed. See more complete information following data tables in Table 24.

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 574 days of age

Feed Consumption:

The kilograms of feed consumed daily per 100 hens per day (hen days).

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 from 10/3/2007 to 12/30/2008 (Table 8).

Table 8. Current year regional average egg prices 10/3/2007 to 12/30/2008.

Grade	Size	$/Dozen 1st Cycle
A	Extra Large	1.44
A	Large	1.40
A	Medium	1.19
A	Small	0.95
A	Pee Wee	0.47
B	All	0.74
Checks	All	0.74

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:

The following size classifications (Table 9) were used for establishing the USDA egg size grading. There has been blending of egg size in this test with the weight cutoff between medium and large being 23.5 ounces/doz. This maximizes the number of USDA large eggs just as would occur in a commercial plant.

Table 9. 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 purchased from 10/3/2007 to 12/30/2008.

Table 10. The Average Contract Feed Price For Feed Purchases during the First Cycle.

Diets	Price Per Ton
D	300.30
E	334.60
F	383.60
G	337.53
H	309.90
I	294.16
M	268.55
N	266.20

Metric Conversions:

1 lb = 453.6 g
1 lb = .4536 kg
1 oz = 28.35 g

1 g = .03527 oz
1 kg = 2.204 lb
1 g = 1000 mg
1 kg = 1000 g

TABLE 11. EFFECT OF WHITE EGG STRAIN AND POPULATION ON PERFORMANCE OF HENS IN THE 37th NCLP&MT (119-574 DAYS)

Breeder (Strain)	Population[1]	Feed Consumption (kg/100hens/d)	Feed Conversion (g egg/ g feed)	Eggs Per Bird Housed	Egg Production (HD%)	Egg Mass (g/HD)	Mortality (%)	Age at 50% Production (Days)
Hy-Line	6	9.7	0.50	356.3	80.1	48.6	4.2	140
W-36	8	9.7	0.51	351.6	80.2	49.1	8.4	140
	Average	9.7	0.50	354.0	80.1^{DE}	48.8^{D}	6.3^{C}	140^{A}
Hy-Line	6	10.3	0.49	349.0	79.4	50.3	4.4	136
W-98	8	10.7	0.48	351.7	79.9	51.6	4.7	137
	Average	10.5	0.49	350.3	79.7^{E}	50.9^{C}	4.5^{C}	137^{B}
Hy-Line	6	10.9	0.48	346.5	81.0	51.6	13.3	135
CV-22	8	10.3	0.51	350.6	80.0	51.7	9.4	135
	Average	10.6	0.49	348.6	80.5^{DE}	51.7^{BC}	11.4^{ABC}	135^{B}
Shaver	6	10.4	0.49	362.9	83.5	50.8	9.4	142
White	8	10.3	0.48	339.4	81.8	48.9	18.5	141
	Average	10.3	0.48	351.1	82.7^{CD}	49.8^{CD}	13.9^{ABC}	141^{A}
Dekalb	6	10.4	0.49	370.3	84.1	51.7	9.4	140
TX	8	10.7	0.46	350.5	80.8	49.3	14.7	139
	Average	10.5	0.48	360.4	82.4^{CD}	50.5^{CD}	12.1^{ABC}	139^{A}
Lohmann	6	10.6	0.50	365.2	85.3	53.3	8.3	140
LSL-Lite	8	11.1	0.49	365.6	87.0	54.3	19.6	140
	Average	10.8	0.50	365.4	86.2^{A}	53.8^{A}	14.0^{ABC}	140^{A}
H&N	6	10.5	0.48	369.6	85.4	50.9	13.6	139
Nick Chick	8	10.7	0.49	365.3	87.7	52.3	20.4	139
	Average	10.6	0.49	367.4	86.6^{A}	51.6^{BC}	17.0^{AB}	139^{A}
Bovans	6	10.8	0.50	361.4	85.9	53.0	16.3	139
White	8	11.2	0.48	355.7	86.2	53.5	18.5	140
	Average	11.0	0.49	358.6	86.0^{AB}	53.3^{AB}	17.4^{A}	139^{A}
Hisex	6	10.5	0.49	352.8	83.3	51.4	16.2	140
White	8	10.5	0.49	354.2	83.5	51.7	19.3	139
	Average	10.5	0.49	353.5	83.4^{BC}	51.6^{BC}	17.7^{A}	140^{A}
Bovans	6	10.0	0.51	353.7	81.2	51.3	7.7	140
Robust	8	10.3	0.50	356.6	81.1	51.0	7.7	140
	Average	10.1	0.50	355.1	81.2^{CDE}	51.1^{C}	7.7^{BC}	140^{A}
All	6	10.4	0.49	358.8	82.9	51.3	10.3	139
Strains	8	10.5	0.49	354.1	82.8	51.3	14.1	139

[1]All strains were housed at a constant density of: 413 cm^2 equals 64 in^2.

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

TABLE 12. EFFECT OF WHITE EGG STRAIN AND POPULATION ON EGG WEIGHT AND EGG SIZE DISTRIBUTION OF HENS IN THE 37th NCLP&MT (119-574 DAYS)

Breeder (Strain)	Population[1]	Egg Weight (g/egg)	Pee Wee (%)	Small (%)	Medium (%)	Large (%)	Extra Large (%)
Hy-Line W-36	6	60.5	0.0	0.8	10.7	25.2	63.2
	8	60.9	0.0	1.4	10.8	20.9	66.8
	Average	60.7^{DE}	0.0	1.1^{AB}	10.8^{AB}	23.0^{BC}	65.0^{DE}
Hy-Line W-98	6	63.3	0.0	0.3	7.7	15.8	76.2
	8	64.4	0.0	0.4	7.1	12.6	80.0
	Average	63.8^{AB}	0.0	0.4^{BC}	7.4^{CD}	14.2^{F}	78.1^{AB}
Hy-Line CV-22	6	63.7	0.0	0.0	6.4	15.5	78.0
	8	64.6	0.0	0.2	4.9	13.7	81.1
	Average	64.1^{A}	0.0	0.1^{C}	5.7^{D}	14.6^{EF}	79.5^{A}
Shaver White	6	60.3	0.0	2.0	9.7	28.4	60.0
	8	59.4	0.0	1.4	11.7	32.1	54.8
	Average	59.8^{EF}	0.0	1.7^{A}	10.7^{AB}	30.2^{A}	57.4^{EF}
Dekalb TX	6	61.1	0.0	1.0	10.6	24.1	64.4
	8	60.7	0.0	1.4	9.4	26.8	62.3
	Average	60.9^{DE}	0.0	1.2^{AB}	10.0^{ABC}	25.5^{ABC}	63.3^{DEF}
Lohmann LSL-Lite	6	62.0	0.0	0.5	7.0	22.3	70.2
	8	61.9	0.0	0.9	8.5	19.4	71.1
	Average	61.9^{CD}	0.0	0.7^{BC}	7.7^{BCD}	20.8^{CDE}	70.7^{BCD}
H&N Nick Chick	6	59.2	0.0	1.9	12.5	28.7	56.8
	8	59.2	0.0	1.6	12.8	29.8	55.5
	Average	59.2^{F}	0.0	1.8^{A}	12.7^{A}	29.2^{AB}	56.1^{F}
Bovans White	6	61.4	0.0	0.7	8.6	24.9	65.7
	8	61.8	0.0	0.9	9.1	22.0	67.9
	Average	61.6^{CD}	0.0	0.8^{BC}	8.8^{BC}	23.4^{BC}	66.8^{CD}
Hisex White	6	61.5	0.0	1.6	9.9	21.5	67.0
	8	61.5	0.0	2.0	9.7	20.7	67.3
	Average	61.5^{CD}	0.0	1.8^{A}	9.8^{ABC}	21.1^{CD}	67.1^{CD}
Bovans Robust	6	62.9	0.0	0.8	8.3	15.9	75.1
	8	62.5	0.0	0.1	8.8	16.3	74.8
	Average	62.7^{BC}	0.0	0.4^{BC}	8.6^{BCD}	16.1^{DEF}	74.9^{ABC}
All Strains	6	61.6	0.0	1.0	9.1	22.2	67.6
	8	61.7	0.0	1.0	9.3	21.4	68.1

[1]All strains were housed at a constant density of: 413 cm^2 equals 64 in^2.

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

TABLE 13. EFFECT OF WHITE EGG STRAIN AND POPULATION ON EGG QUALITY, INCOME AND FEED COSTS OF HENS IN THE 37th NCLP&MT (119-574 DAYS)

Breeder	Population[1]	Grade A	Grade B	Cracks	Loss	Egg Income	Feed Costs
(Strain)		(%)	(%)	(%)	(%)	($/hen)	($/hen)
Hy-Line	6	90.8	5.3	3.8	0.2	39.21	15.54
W-36	8	92.4	4.3	3.1	0.2	39.06	15.40
	Average	91.6^{ABC}	4.8^{B}	3.5	0.2	39.13	15.47
Hy-Line	6	86.4	9.3	4.2	0.1	37.66	16.36
W-98	8	88.8	7.3	3.9	0.1	38.65	16.98
	Average	87.6^{D}	8.3^{A}	4.1	0.1	38.16	16.67
Hy-Line	6	90.2	6.5	3.1	0.2	38.45	16.74
CV-22	8	88.4	7.3	4.3	0.1	38.57	16.20
	Average	89.3^{BCD}	6.9^{AB}	3.7	0.1	38.51	16.47
Shaver	6	89.8	7.0	3.1	0.1	39.59	16.34
White	8	89.5	7.1	3.3	0.1	36.83	15.32
	Average	89.7^{ABCD}	7.0^{AB}	3.2	0.1	38.21	15.83
Dekalb	6	90.8	6.2	3.0	0.1	40.77	16.66
TX	8	88.4	7.7	3.6	0.3	37.93	16.61
	Average	89.6^{ABCD}	7.0^{AB}	3.3	0.2	39.35	16.63
Lohmann	6	91.9	5.3	2.7	0.1	40.79	16.43
LSL-Lite	8	92.8	5.2	1.9	0.2	40.89	16.72
	Average	92.3^{A}	5.3^{B}	2.3	0.1	40.84	16.57
H&N	6	93.0	4.9	2.1	0.1	40.87	16.42
Nick Chick	8	91.4	6.4	2.3	0.0	39.89	16.03
	Average	92.2^{AB}	5.6^{B}	2.2	0.0	40.38	16.22
Bovans	6	89.5	7.6	2.4	0.4	39.44	16.30
White	8	91.3	5.6	3.0	0.2	39.40	16.67
	Average	90.4^{ABCD}	6.6^{AB}	2.7	0.3	39.42	16.48
Hisex	6	90.0	6.8	2.9	0.3	38.57	15.96
White	8	88.4	7.3	4.0	0.3	38.20	16.26
	Average	89.2^{CD}	7.0^{AB}	3.4	0.3	38.39	16.11
Bovans	6	90.7	5.7	3.2	0.5	39.15	15.86
Robust	8	90.9	6.2	2.8	0.2	39.56	16.30
	Average	90.8^{ABC}	5.9^{B}	3.0	0.3	39.35	16.08
All	6	90.3	6.5	3.0	0.2	39.45	16.26
Strains	8	90.2	6.4	3.2	0.2	38.90	16.25

[1]All strains were housed at a constant density of: 413 cm^2 equals 64 in^2.

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

TABLE 14. EFFECT OF WHITE EGG STRAIN AND POPULATION ON BODY WEIGHTS OF HENS IN THE 37th NCLP&MT (119-574 DAYS)

Breeder (Strain)	Population[1]	17 Wk Body Wt (kg)	82 Wk Body Wt (kg)	Wt Gain (kg)	Wt Gain (%)
Hy-Line W-36	6	1.17	1.72	0.55	47.6
	8	1.14	1.71	0.57	50.3
	Average	1.15	1.71^{CDE}	0.56	48.9
Hy-Line W-98	6	1.20	1.90	0.70	58.5
	8	1.25	1.87	0.62	49.8
	Average	1.23	1.89^{AB}	0.66	54.1
Hy-Line CV-22	6	1.15	1.99	0.84	73.8
	8	1.18	1.81	0.64	54.1
	Average	1.16	1.90^{A}	0.74	64.0
Shaver White	6	1.11	1.60	0.49	45.2
	8	1.11	1.64	0.53	47.5
	Average	1.11	1.62^{E}	0.51	46.4
Dekalb TX	6	1.21	1.75	0.54	45.6
	8	1.15	1.84	0.68	59.5
	Average	1.18	1.79^{ABCD}	0.61	52.6
Lohmann LSL-Lite	6	1.21	1.85	0.64	53.5
	8	1.25	1.82	0.57	45.4
	Average	1.23	1.83^{ABC}	0.61	49.4
H&N Nick Chick	6	1.19	1.67	0.48	40.5
	8	1.19	1.66	0.47	39.9
	Average	1.19	1.66^{DE}	0.47	40.2
Bovans White	6	1.14	1.79	0.65	57.8
	8	1.13	1.71	0.58	51.9
	Average	1.13	1.75^{BCDE}	0.62	54.9
Hisex White	6	1.14	1.87	0.74	65.1
	8	1.17	1.74	0.58	49.9
	Average	1.15	1.81^{ABCD}	0.66	57.5
Bovans Robust	6	1.15	1.75	0.60	52.2
	8	1.18	1.68	0.49	41.7
	Average	1.17	1.71^{CDE}	0.54	46.9
All Strains	6	1.16	1.79	0.62	54.0
	8	1.16	1.75	0.59	52.2

[1]All strains were housed at a constant density of: 413 cm^2 equals 64 in^2.

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

TABLE 15. EFFECT OF BROWN EGG STRAIN AND POPULATION ON PERFORMANCE OF HENS IN THE 37th NCLP&MT (119-574 DAYS)

Breeder (Strain)	Population[1]	Feed Consumption (kg/100hens/d)	Feed Conversion (g egg/ g feed)	Eggs Per Bird Housed	Egg Production (HD%)	Egg Mass (g/HD)	Mortality (%)	Age at 50% Production (Days)
ISA	6	10.4	0.50	364.4	84.4	52.7	8.6	142
Brown	8	10.2	0.51	355.8	82.3	52.1	13.1	141
	Average	10.3^{B}	0.51^{AB}	360.1	83.3	52.4^{AB}	10.8	142^{A}
Hy-Line	6	10.4	0.50	355.6	81.9	52.4	10.8	140
Brown	8	10.3	0.51	360.3	81.9	52.9	6.7	140
	Average	10.3^{B}	0.51^{A}	357.9	81.9	52.6^{A}	8.7	140^{B}
Hy-Line Silver	6	10.4	0.48	362.7	82.6	49.9	11.3	139
Brown	8	10.3	0.49	360.6	83.8	50.6	8.3	140
	Average	10.3^{B}	0.49^{BC}	361.7	83.2	50.3^{B}	9.8	140^{B}
Bovans	6	10.8	0.51	370.8	84.4	54.5	6.3	140
Brown	8	10.6	0.50	360.0	83.0	53.5	10.4	141
	Average	10.7^{AB}	0.50^{ABC}	365.4	83.7	54.0^{A}	8.3	140^{B}
Hisex	6	11.0	0.49	360.7	83.4	53.8	9.5	140
Brown	8	11.2	0.48	358.3	84.7	54.8	21.3	139
	Average	11.1^{A}	0.49^{BC}	359.5	84.1	54.3^{A}	15.4	140^{B}
Dekalb	6	11.2	0.48	365.6	84.1	53.1	9.4	140
Amber Link	8	10.9	0.48	363.7	85.7	53.0	13.6	140
	Average	11.0^{A}	0.48^{C}	364.7	84.9	53.0^{A}	11.5	140^{B}
All	6	10.7	0.49	363.3	83.5	52.7	9.3	140
Strains	8	10.6	0.50	359.8	83.6	52.8	12.2	140

[1]All strains were housed at a constant density of: 413 cm^2 equals 64 in^2.

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

TABLE 16. EFFECT OF BROWN EGG STRAIN AND POPULATION ON EGG WEIGHT AND EGG SIZE DISTRIBUTION OF HENS IN THE 37th NCLP&MT (119-574 DAYS)

Breeder (Strain)	Population[1]	Egg Weight (g/egg)	Pee Wee (%)	Small (%)	Medium (%)	Large (%)	Extra Large (%)
ISA Brown	6	62.0	0.0	0.8	7.9	19.1	72.2
	8	62.8	0.0	1.4	7.4	16.5	74.8
	Average	62.4^{BC}	0.0	1.1^{AB}	7.6^{B}	17.8^{B}	73.5^{B}
Hy-Line Brown	6	63.6	0.0	0.2	4.7	15.4	79.5
	8	64.1	0.0	0.4	5.3	13.0	81.2
	Average	63.9^{AB}	0.0	0.3^{B}	5.0^{C}	14.2^{B}	80.3^{AB}
Hy-Line Silver Brown	6	60.1	0.0	0.6	9.8	29.2	60.2
	8	60.1	0.0	0.7	11.5	28.5	59.3
	Average	60.1^{D}	0.0	0.7^{AB}	10.7^{A}	28.8^{A}	59.7^{C}
Bovans Brown	6	64.0	0.0	1.2	7.1	12.0	79.4
	8	63.9	0.0	0.2	5.8	14.0	80.2
	Average	63.9^{AB}	0.0	0.7^{AB}	6.4^{BC}	13.0^{B}	79.8^{AB}
Hisex Brown	6	64.1	0.0	0.2	5.0	12.7	82.0
	8	64.4	0.0	0.6	5.9	12.9	80.5
	Average	64.2^{A}	0.0	0.4^{B}	5.4^{BC}	12.8^{B}	81.3^{A}
Dekalb Amber Link	6	62.6	0.0	2.2	6.5	15.3	75.7
	8	61.3	0.0	1.5	8.8	18.5	71.1
	Average	62.0^{C}	0.0	1.9^{A}	7.7^{B}	16.9^{B}	73.4^{B}
All Strains	6	62.7	0.0	0.9	6.8	17.3	74.8
	8	62.8	0.0	0.8	7.4	17.2	74.5

[1]All strains were housed at a constant density of: 413 cm^2 equals 64 in^2.

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

TABLE 17. EFFECT OF BROWN EGG STRAIN AND POPULATION ON EGG QUALITY, INCOME AND FEED COSTS OF HENS IN THE 37th NCLP&MT (119-574 DAYS)

Breeder	Population[1]	Grade A	Grade B	Cracks	Loss	Egg Income	Feed Costs
(Strain)		(%)	(%)	(%)	(%)	($/hen)	($/hen)
ISA	6	91.1	6.7	2.2	0.1	40.43	16.49
Brown	8	89.4	7.1	3.3	0.3	39.06	16.19
	Average	90.3	6.9^{ABC}	2.7	0.2	39.74	16.34^{B}
Hy-Line	6	89.5	6.0	4.3	0.2	39.42	16.52
Brown	8	90.7	5.9	3.5	0.0	40.21	16.51
	Average	90.1	5.9^{BC}	3.9	0.1	39.81	16.51^{AB}
Hy-Line	6	93.3	4.9	1.7	0.1	40.48	16.75
Silver Brown	8	91.8	4.9	3.3	0.0	39.93	16.24
	Average	92.5	4.9^{C}	2.5	0.1	40.20	16.50^{AB}
Bovans	6	89.5	6.9	3.5	0.2	40.67	17.41
Brown	8	89.1	7.8	2.9	0.2	39.70	16.90
	Average	89.3	7.4^{AB}	3.2	0.2	40.19	17.15^{AB}
Hisex	6	89.5	7.8	2.6	0.1	39.87	17.41
Brown	8	88.2	7.9	3.9	0.0	39.24	17.41
	Average	88.8	7.9^{A}	3.3	0.1	39.55	17.41^{A}
Dekalb	6	89.7	7.3	2.7	0.3	39.95	17.77
Amber Link	8	91.0	5.3	3.6	0.2	40.22	17.02
	Average	90.3	6.3^{ABC}	3.1	0.2	40.09	17.39^{A}
All	6	90.4	6.6	2.8	0.2	40.14	17.06
Strains	8	90.0	6.5	3.4	0.1	39.73	16.71

[1]All strains were housed at a constant density of: 413 cm^2 equals 64 in^2.

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

TABLE 18. EFFECT OF BROWN EGG STRAIN AND POPULATION ON BODY WEIGHTS OF HENS IN THE 37th NCLP&MT (119-574 DAYS)

Breeder (Strain)	Population[1]	17 Wk Body Wt (kg)	82 Wk Body Wt (kg)	Wt Gain (kg)	Wt Gain (%)
ISA Brown	6	1.43	1.96	0.53	37.3
	8	1.48	2.02	0.54	36.5
	Average	1.46	1.99	0.53	36.9
Hy-Line Brown	6	1.40	2.09	0.69	49.0
	8	1.39	2.00	0.62	44.9
	Average	1.40	2.05	0.65	46.9
Hy-Line Silver Brown	6	1.39	2.11	0.72	52.4
	8	1.36	2.05	0.69	50.6
	Average	1.38	2.08	0.71	51.5
Bovans Brown	6	1.43	1.98	0.55	39.5
	8	1.44	1.97	0.53	37.3
	Average	1.43	1.98	0.54	38.4
Hisex Brown	6	1.43	2.00	0.58	40.4
	8	1.42	1.91	0.49	34.9
	Average	1.42	1.96	0.53	37.6
Dekalb Amber Link	6	1.47	2.01	0.54	37.1
	8	1.36	1.96	0.60	44.2
	Average	1.42	1.98	0.57	40.7
All Strains	6	1.42	2.03	0.60	42.6
	8	1.41	1.99	0.58	41.4

[1]All strains were housed at a constant density of: 413 cm^2 equals 64 in^2.
There are no significant differences among these means.

TABLE 19. EFFECT OF BROWN EGG STRAIN HOUSED IN A RANGE SYSTEM ON PERFORMANCE OF HENS IN THE 37th NCLP&MT (119-574 DAYS)

Breeder	Feed Consumption	Feed Conver-Conversion	Eggs Per Bird Housed	Egg Production	Egg Mass	Mortality	Age at 50% Production
(Strain)	(kg/100hens/d)	(g egg/ g feed)		(HD%)	(g/HD)	(%)	(Days)
Hy-Line	10.1	0.49	304.1	77.7	49.4	28.4	133
Hisex	10.9	0.48	358.5	83.2	52.5	12.0	124

TABLE 20. EFFECT OF BROWN EGG STRAIN HOUSED IN A RANGE SYSTEM ON EGG WEIGHT AND EGG SIZE DISTRIBUTION OF HENS IN THE 37th NCLP&MT (119-574 DAYS)

Breeder	Egg Weight	Pee Wee	Small	Medium	Large	Extra Large
(Strain)	(g/egg)	(%)	(%)	(%)	(%)	(%)
Hy-Line	63.5	0.0	0.2	6.0	16.7	77.1
Hisex	63.0	0.0	0.7	7.5	17.2	74.7

TABLE 21. EFFECT OF BROWN EGG STRAIN HOUSED IN A RANGE SYSTEM ON EGG QUALITY, INCOME AND FEED COSTS OF HENS IN THE 37th NCLP&MT (119-574 DAYS)

Breeder	Grade A	Grade B	Cracks	Loss	Egg Income	Feed Costs
(Strain)	(%)	(%)	(%)	(%)	($/hen)	($/hen)
Hy-Line	85.9	11.5	2.4	0.2	32.65	14.58
Hisex	86.3	11.3	2.2	0.2	38.47	16.79

TABLE 22. EFFECT OF BROWN EGG STRAIN HOUSED IN A RANGE SYSTEM ON BODY WEIGHTS OF HENS IN THE 37th NCLP&MT (119-574 DAYS)

Breeder (Strain)	17 Wk Body Wt (kg)	82 Wk Body Wt (kg)	Wt Gain (kg)	Wt Gain (%)
Hy-Line	1.36	1.97	0.61	45.2
Hisex	1.52	1.96	0.44	29.2

TABLE 23. MAN HOURS UTILIZED TO MAINTAIN A FLOCK OF COMMERCIALLY CAGED LAYERS AND LAYERS IN A FREE RANGE SETTING

Hen age (Weeks)	Caged (Man-hours/bird/period)	Range (Man-hours/bird/period)
17-22	0.012	0.135
23-26	0.007	0.117
27-30	0.009	0.115
31-34	0.009	0.119
35-38	0.012	0.138
39-42	0.013	0.518*
43-46	0.012	0.149
47-50	0.012	0.148
51-54	0.010	0.190
55-58	0.009	0.136
59-62	0.011	0.150
63-66	0.011	0.139
67-70	0.013	0.160
71-74	0.013	0.158
75-78	0.010	0.146
79-82	0.011	0.148
Total	0.173	2.663

*Range hut was moved to provide fresh forage on the paddocks

Figure 1. Hy-Line W-36, Bi-weekly Percent Egg Production and Period Feed Consumption in Hens kept at 6 and 8 Hens Per Cage (kg per 100 Hens)

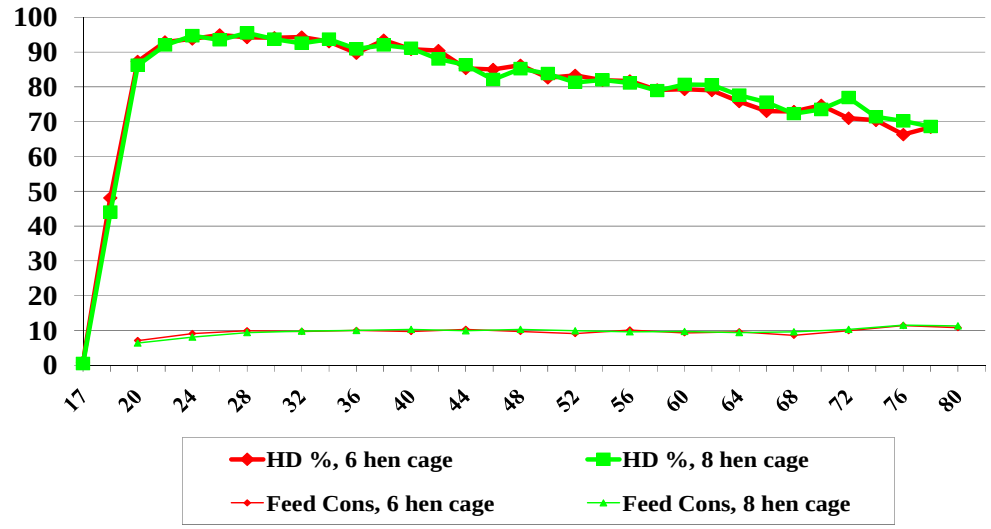

Figure 2. Hy-Line W-98, Bi-weekly Percent Egg Production and Period Feed Consumption in Hens kept at 6 and 8 Hens Per Cage (kg per 100 Hens)

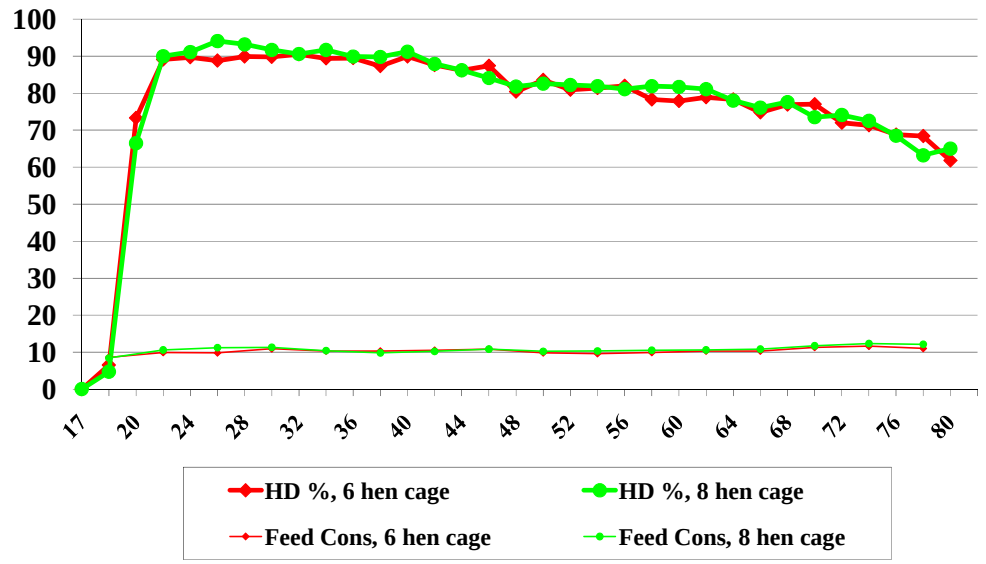

Figure 3. Hy-Line CV-22, Bi-weekly Percent Egg Production and Period Feed Consumption in Hens kept at 6 and 8 Hens Per Cage (kg per 100 Hens)

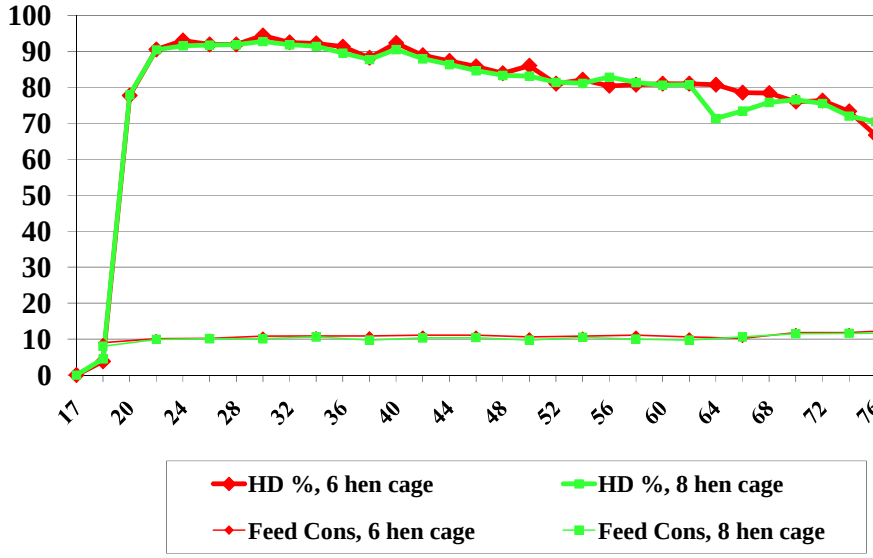

Figure 4. Shaver White, Bi-weekly Percent Egg Production and Period Feed Consumption in Hens kept at 6 and 8 Hens Per Cage (kg per 100 Hens)

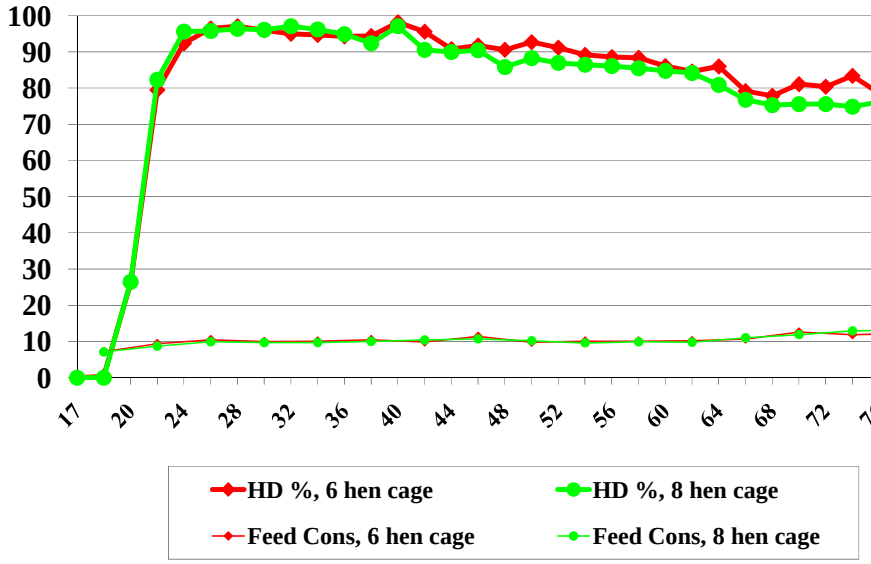

Figure 5. Dekalb TX, Bi-weekly Percent Egg Production and Period Feed Consumption in Hens kept at 6 and 8 Hens Per Cage (kg per 100 Hens)

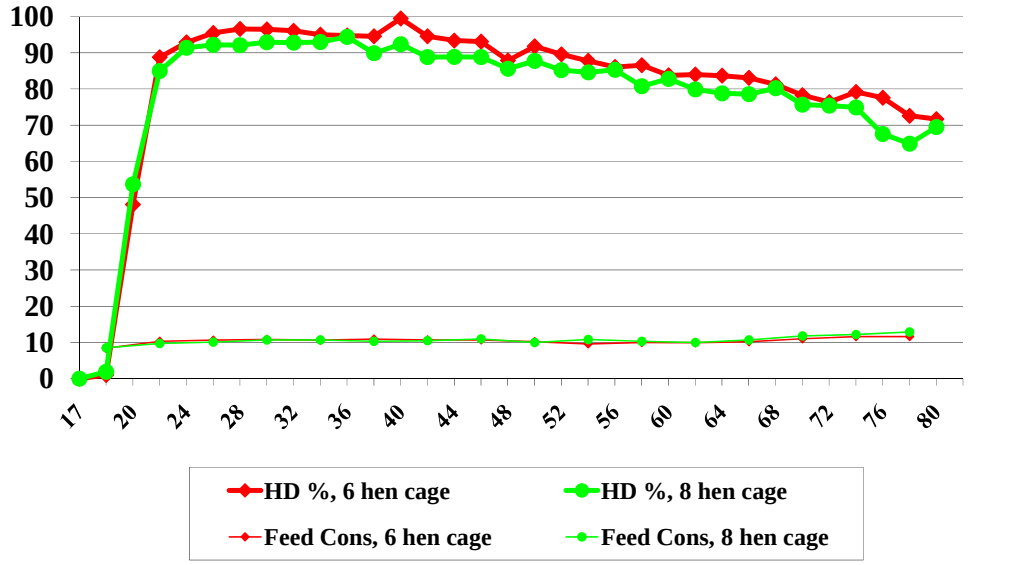

Figure 6. Lohmann LSL-Lite, Bi-weekly Percent Egg Production and Period Feed Consumption in Hens kept at 6 and 8 Hens Per Cage (kg per 100 Hens)

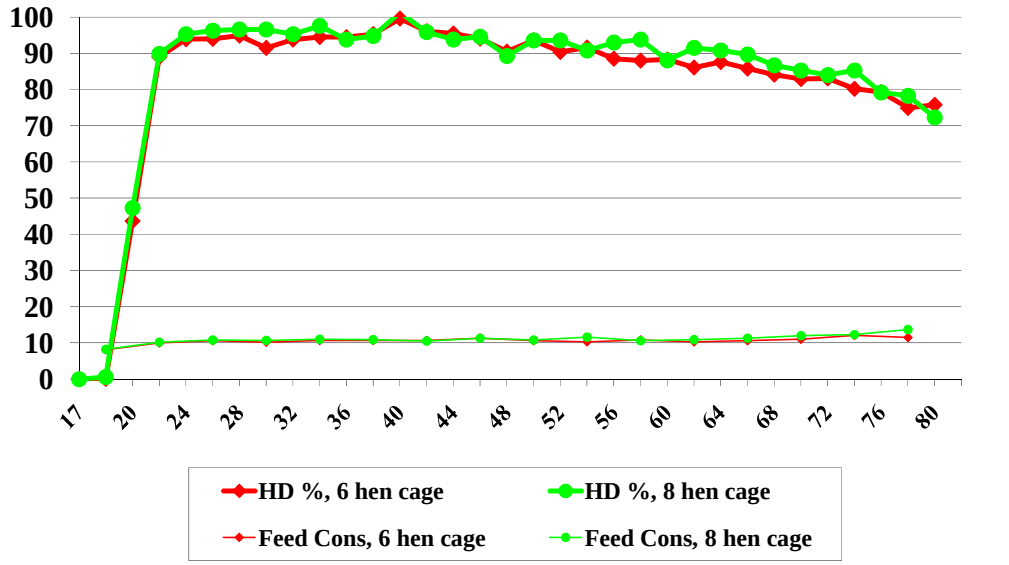

Figure 7. H & N "Nick Chick", Bi-weekly Percent Egg Production and Period Feed Consumption in Hens kept at 6 and 8 Hens Per Cage (kg per 100 Hens)

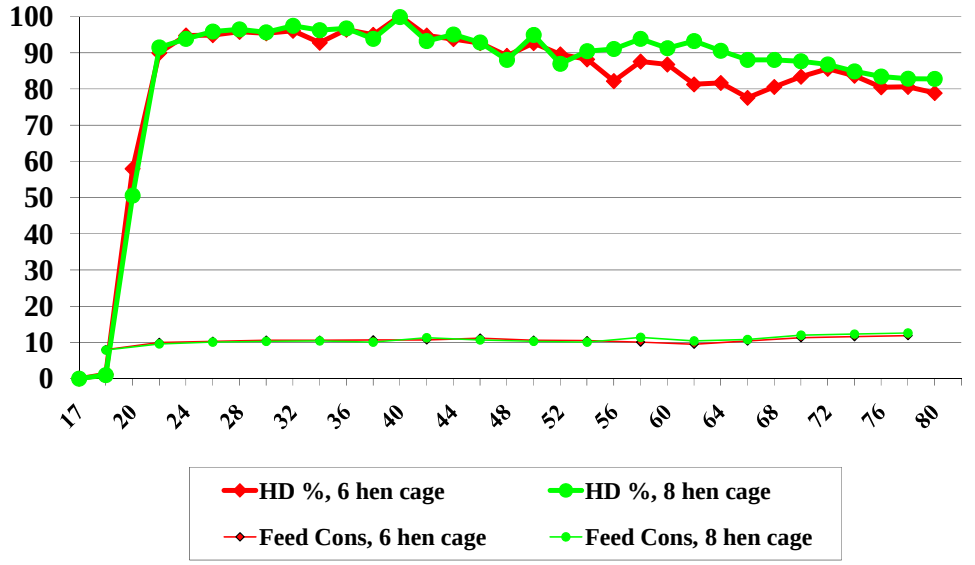

Figure 8. Bovans White, Bi-weekly Percent Egg Production and Period Feed Consumption in Hens kept at 6 and 8 Hens Per Cage (kg per 100 Hens)

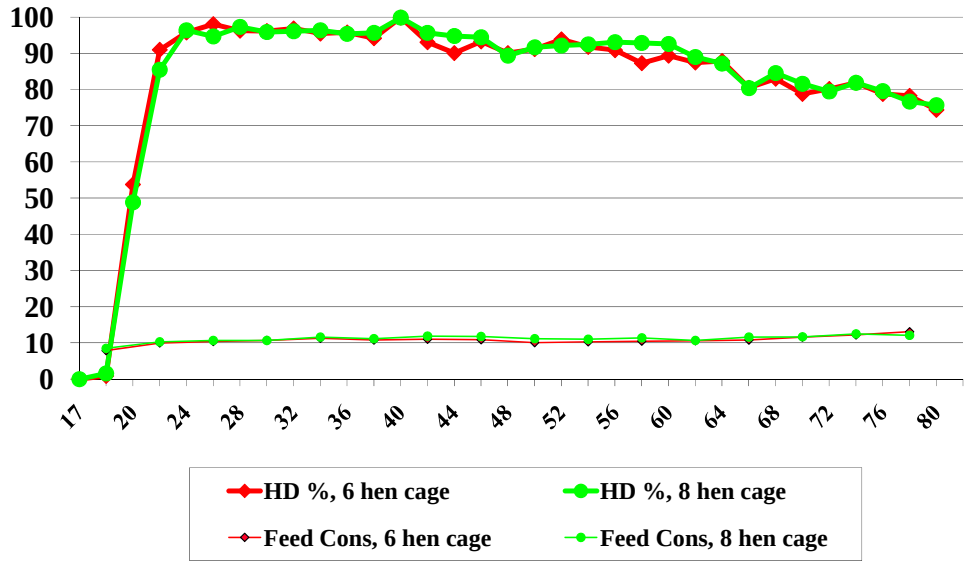

Figure 9. Hisex White, Bi-weekly Percent Egg Production and Period Feed Consumption in Hens kept at 6 and 8 Hens Per Cage (kg per 100 Hens)

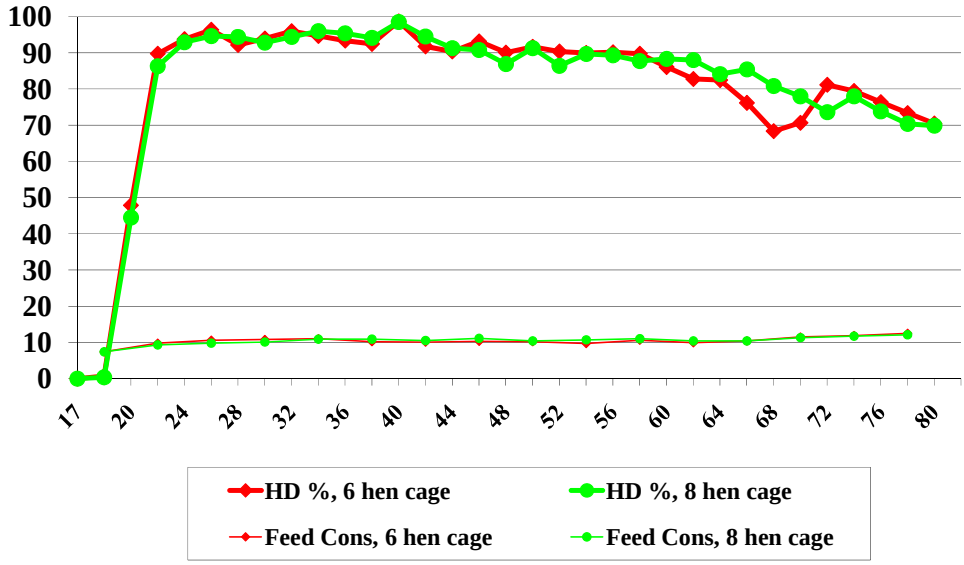

Figure 10. Bovans Robust, Bi-weekly Percent Egg Production and Period Feed Consumption in Hens kept at 6 and 8 Hens Per Cage (kg per 100 Hens)

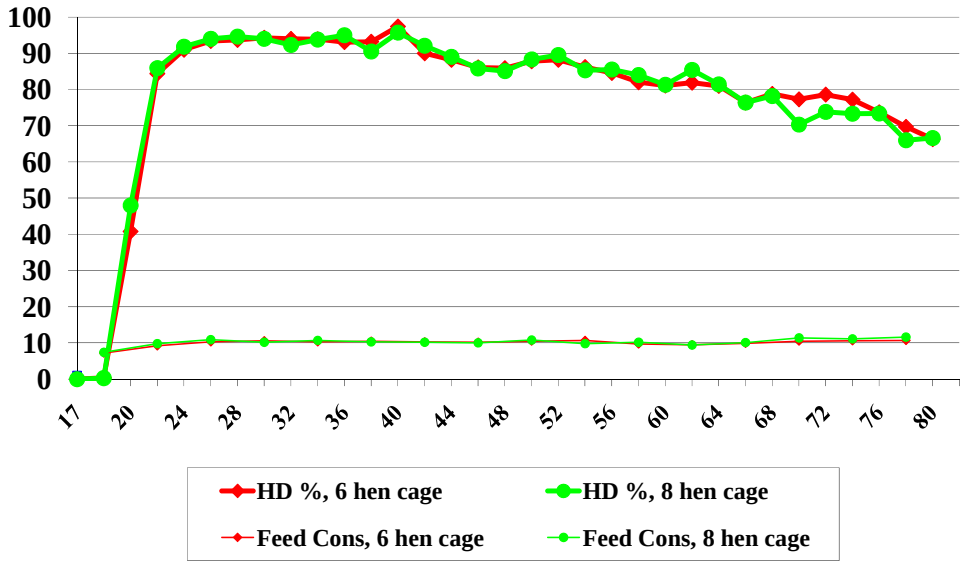

Figure 11. ISA Brown, Bi-weekly Percent Egg Production and Period Feed Consumption in Hens kept at 6 and 8 Hens Per Cage (kg per 100 Hens)

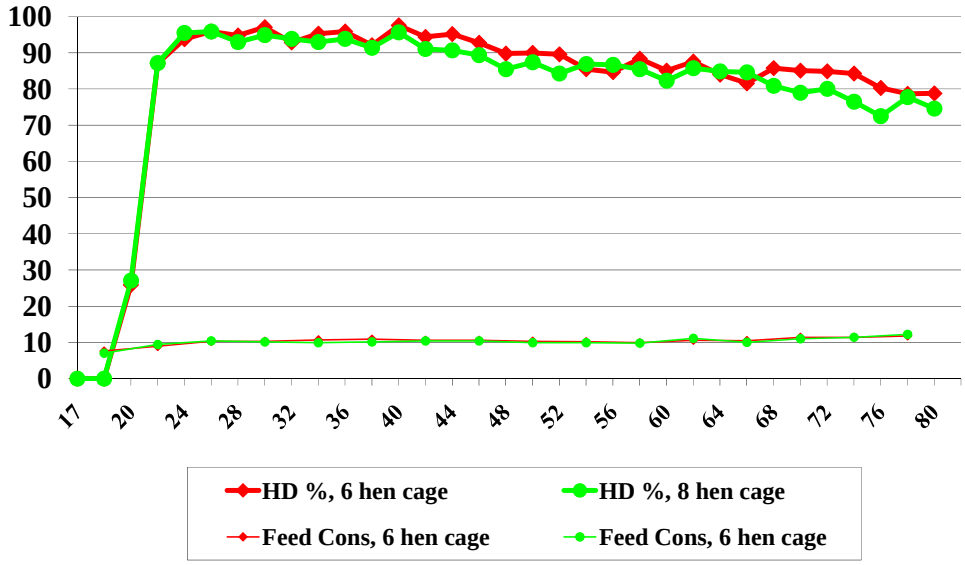

Figure 12. Hy-Line Brown, Bi-weekly Percent Egg Production and Period Feed Consumption in Hens kept at 6 and 8 Hens Per Cage (kg per 100 Hens)

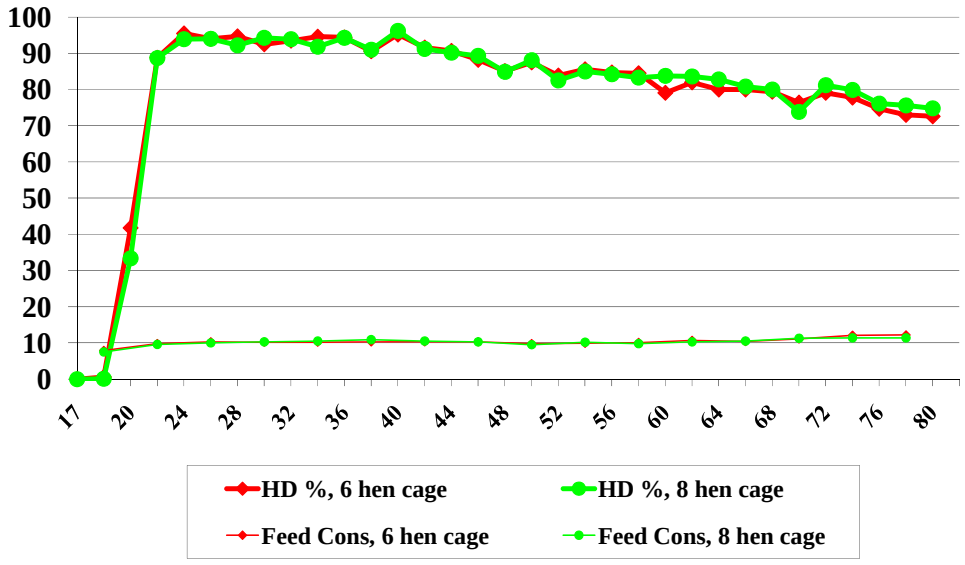

Figure 13. Hy-Line Silver Brown, Bi-weekly Percent Egg Production and Period Feed Consumption in Hens kept at 6 and 8 Hens Per Cage (kg per 100 Hens)

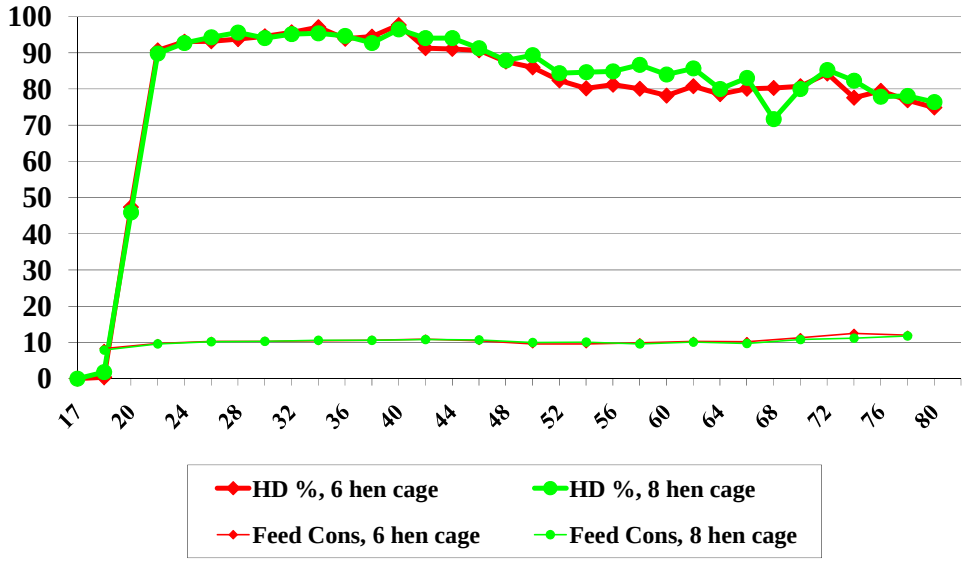

Figure 14. Bovans Brown, Bi-weekly Percent Egg Production and Period Feed Consumption in Hens kept at 6 and 8 Hens Per Cage (kg per 100 Hens)

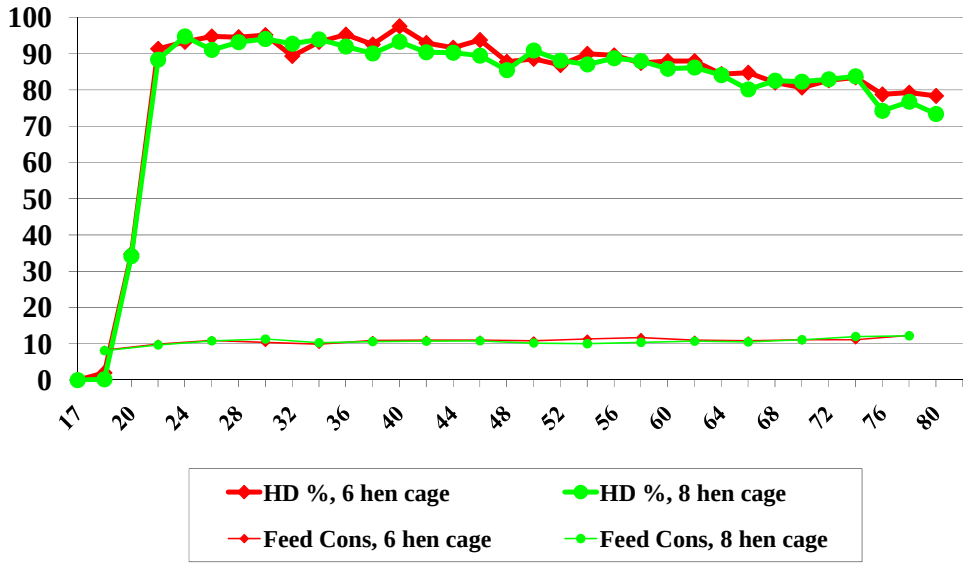

Figure 15. Hisex Brown, Bi-weekly Percent Egg Production and Period Feed Consumption in Hens kept at 6 and 8 Hens Per Cage (kg per 100 Hens)

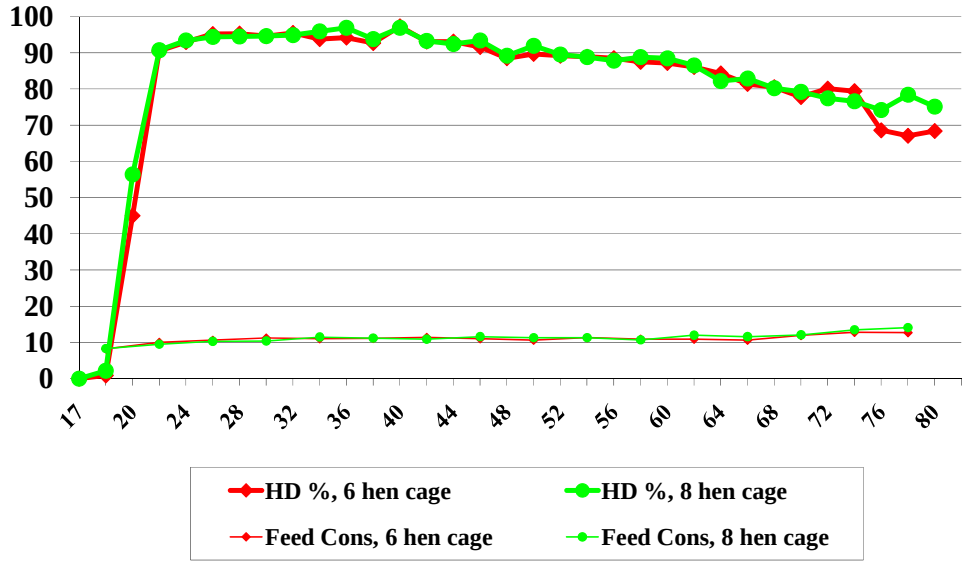

Figure 16. Dekalb Amber Link, Bi-weekly Percent Egg Production and Period Feed Consumption in Hens kept at 6 and 8 Hens Per Cage (kg per 100 Hens)

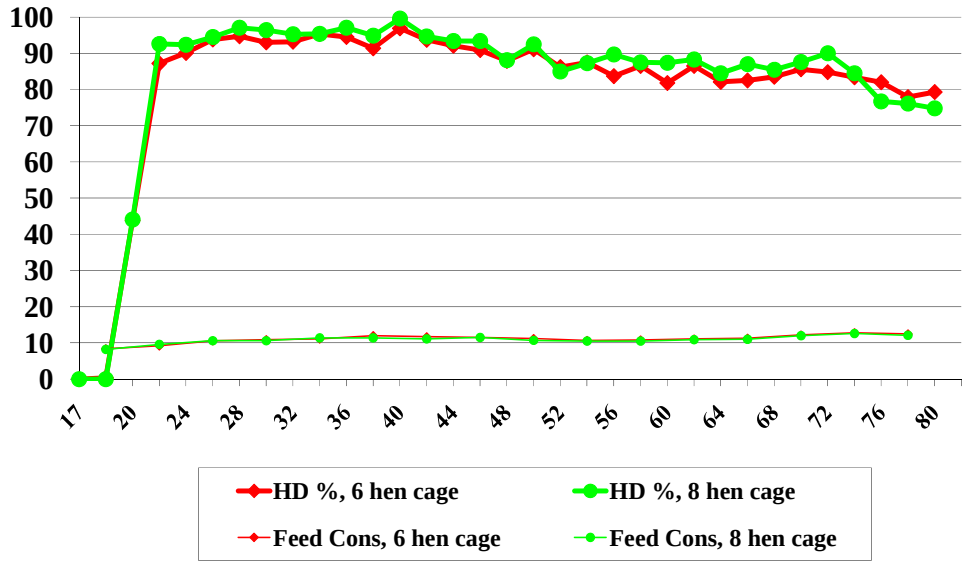

Figure 17. Hisex Brown, Bi-weekly Percent Egg Production and Period Feed Consumption in Hens kept on Range (kg per 100 Hens)

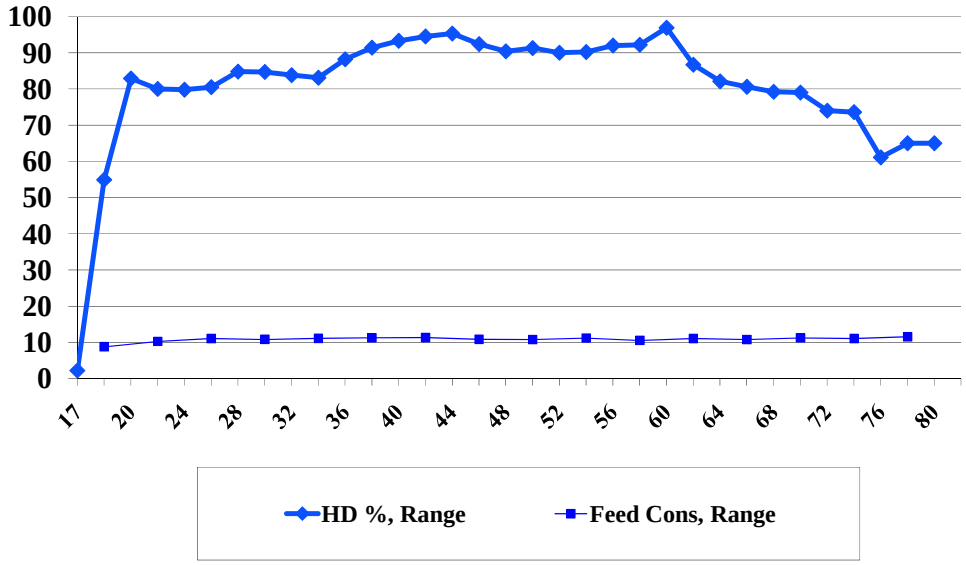

Figure 18. Hy-Line Brown, Bi-weekly Percent Egg Production and Period Feed Consumption in Hens kept on Range (kg per 100 Hens)

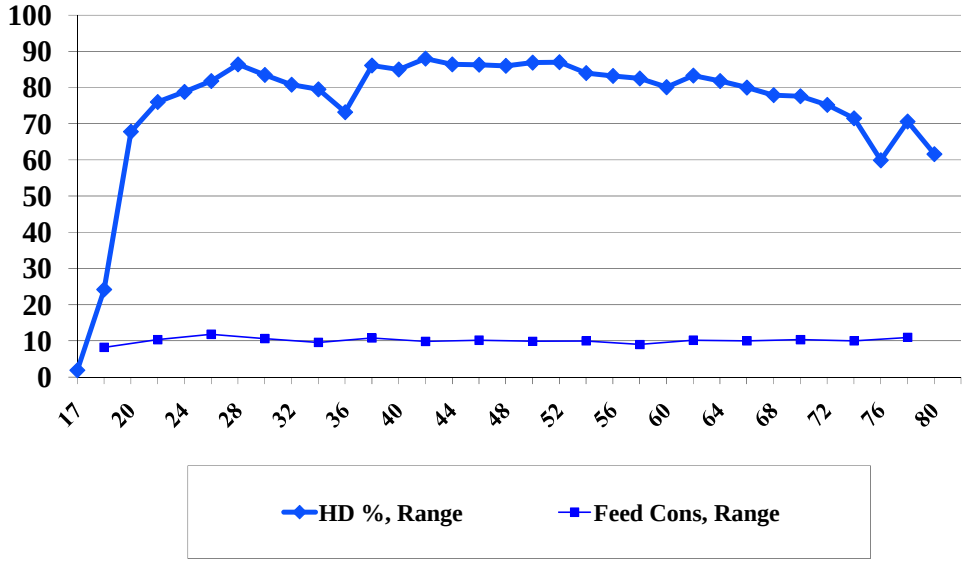

Table 24. Entries in the 37th NCLP&MT by Breeder, Stock Suppliers, and Categories

Breeder	Stock	Category[1]	Source
Hy-Line International 2583 240th Street Dallas Center, IA 50063	W-36	I-A	Hy-Line International 4432 Highway 213, Box 309 Mansfield, GA 30255
	W-98	I-A	Hy-Line International 17458 G. Avenue Perry, IA 50220
	Hy-Line Brown	I-A	Same
	Hy-Line Silver Brown	I-A	Dallas Center Research Farm 2418 N Ave. Dallas Center, IA 50063
	CV-22	I-A	Same
Lohmann Tierzucht Gmbh Am Seedeich 9-11 . P.O.Box 460 D-27454 Cuxhaven, Germany	Lohmann LSL-Lite	I-A	Hy-Line North America 79 Industrial Rd E-town, PA 17022
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
Centurion Poultry, Inc. P.O. Box 591 Lexington, Georgia 30648	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)
Centurion Poultry, Inc. P.O. Box 591 Lexington, Georgia 30648	Hisex White	I-A	(Same)
	Hisex Brown	I-A	(Same)
Centurion Poultry, Inc. P.O. Box 591 Lexington, Georgia 30648	Dekalb TX	I-A	(Same)
	Dekalb Amber Link	II-A	(Same)
Instiut de Selection Animale (A Hendrix Genetic Company) ISA North America 650 Riverbend Drive, Suite C Kitchener, Ontario N2K 3S2 Canada	Shaver White	II-A	McKinley Hatchery P O Box 1900 772 Queen Street St. Mary's, Ontario N4X 1C2 Canada
	ISA Brown	II-A	(Same)

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