Progress In Poultry
"THROUGH RESEARCH"

A COMPARISON OF FORCE MOLTING METHODS - II

Donald Bell, Farm Advisor, Riverside County
Milo Swanson, Avian Scientist, Riverside Campus
Douglas Kuney, Staff Research Associate, Riverside Campus

In 1975 a short experiment was conducted to screen several methods of force molting laying hens (see PIP No. 5). One method appeared to stand out in overall profitability. It was originally described in a technical bulletin from the University of Florida (Bulletin 728) and, therefore, we have called it the "Florida method." It differs from the University of California method in that water is withheld for the first three days, the feed withdrawal period is shorter, and a more nutritionally balanced holding ration is used.

Two additional trials have now been completed in which the Florida method was used as one of the molting procedures. This report summarizes the results obtained.

EXPERIMENTAL PROCEDURE

TRIAL 1. The study was conducted in a privately owned test house on a commercial egg farm in Riverside County, California. Only the Florida and standard University of California methods were compared.

Stock: 960 Shaver strain White Leghorn hens, 60 to 80 weeks old.

Duration of Experiment: Nine 4-week periods--December 1975 to August 1976.

Housing: Evaporative cooled environmental housing vs California open-type with curtains and hot weather foggers. Three hens per 12" x 18" cage, back to back.

Feeding: Front feed trough, *ad libitum* feeding.

Watering: Swish cups in back of cages.

Experimental Design: Completely randomized block within each housing type. Two molting methods x 2 replicates x 2 housing types x 7 blocks = 32 groups (30 birds per group).

Molting Procedures:

Florida method

1. No water, days 1 - 3
2. No feed, days 1 - 7
3. Low protein feed, days 8 - 28 (*ad lib*)

California method

1. No feed, days 1 - 10
2. Cracked milo, days 11 - 28 (*ad lib*)

The outdoor birds received only natural light from days 1 to 28. The indoor birds received 2 hours of artificial light per day during the 28-day period.

Table 1. Low protein feed formula (Florida method)

Ingredient	Pounds
Cracked milo	1832
Ground limestone	120
Dicalcium phosphate	40
Salt	5
Layer pre-mix	2.5
Trace minerals	.5
	2000.0

Both treatments received a 15% protein layer ration from periods 2 through 9.

Issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914, in cooperation with the United States Department of Agriculture. James B. Kendrick, Jr., Director, Cooperative Extension, University of California.

Measurements: Daily egg production, feed consumption, and mortality. Data summarized by 4-week periods.

TRIAL 2. This test was conducted at the Moreno Ranch poultry facility of the University of California, Riverside. The eight treatments included both the California and Florida procedures plus six methods combining various features of the two.

Stock: Two commercial White Leghorn strains, 60 weeks of age; total of 896 birds.

Duration of Experiment: Ten 4-week periods - January to September 1977.

Housing: California open-type house with curtains and hot weather foggers. All cages 12" wide by 16" deep, back to back. Three birds per cage except one cage in each replicate with just two birds.

Feeding: Front feed trough, ad libitum hand feeding.

Watering: Hart cups in rear of cage.

Experimental Design: Completely randomized block. Two strains x 8 molting methods x 4 blocks = 64 groups (14 birds per group).

Molting Procedures:

Method	Feed withheld (days)	Water withheld (days)	18-Day holding ration
#1 (Cal)	10	0	Milo
2	10	0	Low protein
3	10	3	Milo
4	10	3	Low protein
5	7	0	Milo
6	7	0	Low protein
7	7	3	Milo
8 (Fla)	7	3	Low protein

All treatments received a 17% protein layer ration from periods 2 through 10.

Table 2. Low protein feed formula

Ingredient	Pounds
Cracked milo	1830
Ground limestone	120
Dicalcium phosphate	40
Salt	5
Layer pre-mix	5
	2000

Measurements: Daily egg production, feed consumption and mortality; sample egg weights at 4-week intervals; sample body weights at 0, 28, 56, and 280 days; sample Haugh unit values and shell thickness at 84, 140, 196, and 252 days. Data summarized by 4-week periods.

RESULTS

TRIAL 1. Table 3 summarizes the performance of the birds with the two molting treatments for each period and overall results by molt treatment and housing type.

The birds molted with the Florida molting method outlaid the birds molted by the California method by 13 eggs per hen housed. Egg production rates from the 4th period on were five to seven percent higher in this group. These differences were highly significant.

Feed consumption was also significantly higher in the Florida group. Feed conversion was improved but not significantly so. Mortality was practically the same. The only area of difference in the housing comparison was a significantly higher feed consumption rate in the outdoor birds.

Economic results (Table 4) were based on the following prices for feed and eggs:

Low protein molt mash (Florida) - $5.44 per 100 lbs.
Milo (California) - $5.60 per 100 lbs.
Layer ration - $5.82 per 100 lbs.
All eggs - 45¢ per dozen.

Overall, the birds molted with the Florida molting method returned 30¢ more income over feed cost per hen housed, which was significant at the five percent level.

This significantly higher income was present in five of the last six periods of the experiment. The indoor hens netted 12¢ higher profit, but this was not statistically significant.

Table 3. Egg production, feed intake, and mortality - Trial 1

4-Week period	Treatment	Egg Production Hen-day (%)	Egg Production Hen-housed (eggs)	Feed Consumption (lb/hen/day)	Feed Conversion (lb/dozen)	Mortality (%)
1	California	5.7	1.6	.111	23.7	2.50
	Florida	5.1**	1.4**	.128*	31.5**	.83*
2	California	16.2	4.4	.205	19.13	.21
	Florida	19.6	5.4	.211	14.17	.42
3	California	54.2	14.8	.216	4.90	.21
	Florida	59.0	16.3	.219	4.53	.42
4	California	63.4	17.2	.224	4.25	.42
	Florida	68.8**	18.9*	.233**	4.07*	.63
5	California	68.4	18.4	.218	3.84	1.04
	Florida	73.2**	20.0*	.232**	3.81	.83
6	California	66.0	17.6	.218	3.97	1.46
	Florida	71.5**	19.3**	.231**	3.88	1.67
7	California	63.2	16.6	.214	4.09	.21
	Florida	69.2**	18.4**	.226	3.92	1.04
8	California	57.0	14.9	.175	3.68	1.25
	Florida	64.1**	16.8**	.184	3.45*	1.25
9	California	57.0	14.9	.206	4.35	0
	Florida	63.5*	16.5*	.217*	4.12*	.63*
Overall Results:						
	California	49.9	120.4	.198	4.78	7.29
	Florida	54.6**	133.0**	.209**	4.60	7.50
	Indoor	52.3	127.7	.201	4.62	6.04
	Outdoor	52.1	125.8	.207*	4.76	8.75

* Significant difference ($P < 0.05$).
** Significant difference ($P < 0.01$).

All other differences nonsignificant ($P > 0.05$).

Table 4. Economic results - Trial 1

Period	Treatment	Egg income minus feed cost (per avg. hen)
1	California	$ - .11
	Florida	- .14**
2	California	- .16
	Florida	- .14
3	California	.21
	Florida	.26
4	California	.29
	Florida	.34*
5	California	.35
	Florida	.38
6	California	.32
	Florida	.36*
7	California	$ .29
	Florida	.35**
8	California	.29
	Florida	.34**
9	California	.24
	Florida	.29*
Overall Results:		
	California	$ 1.72
	Florida	2.02*
	Indoor	1.93
	Outdoor	1.81

* Significant difference ($P < 0.05$).
** Significant difference ($P < 0.01$).
All other differences nonsignificant ($P > 0.05$).

TRIAL 2. Egg production, feed intake, and mortality data are presented in Table 5. The upper portion of the table summarizes the results by molting method and strain, whereas the lower portion separates out the effects of strain of bird, withholding water, length of starvation period, and type of ration fed immediately after starvation. The same format is followed in succeeding tables.

The egg production and feed intake data in Table 5 represent average values for the full duration of the trial, including the molting period. There were some significant strain differences in performance, but none of the variables in the method of molting had any real effect on production rate, feed efficiency, or mortality.

Body weight changes over various time periods are summarized in Table 6. Neither water withholding nor length of starvation period affected recovery of weight losses, but the type of holding ration did. Hens fed cracked milo up to the 28th day regained their body weight more rapidly after molting and weighed significantly more at the end of the experiment than those fed the low protein mash fortified with minerals and vitamins.

There were also strain differences in pattern of body weight recovery. Strain B was slower in returning to its initial body weight, and it did not gain as much total weight over the 280-day trial as Strain A. At the start of the test, Strain A hens averaged 74 grams heavier than Strain B; at the end of the test, this difference had increased to 166 grams. The higher rate of feed consumption for Strain A as noted in Table 5 no doubt accounts for the greater weight gain.

Average egg size and distribution into egg weight classes also differed by strain, with Strain A laying significantly more Jumbo and Extra Large and fewer Medium eggs than Strain B (Table 7). Among the variables in molting method, only water withholding had any effect on egg size. When the results were combined for all treatments where water was withheld the first three days of the starvation period, average egg size was increased 0.9 grams over those eggs laid by hens with free access to water, and the percentage of Jumbo eggs was significantly higher. However, there was no significant increase in the percentage of eggs in the "Large and Over" category. The effects of length

(continued on page 6)

Table 5. Egg production, feed intake and mortality (280 days) - Trial 2

Molting method			Strain	Egg Production		Feed		Mortality
No feed	No water	Holding ration		Hen-day	Hen-housed	Consumption	Conversion	
(days)	(days)			(%)	(eggs)	(lb/hen/day)	(lb/dozen)	(%)
10	0	Milo	A	59.3	158	.234	4.73	7.14
(California method)			B	58.0	147	.222	4.61	17.86
10	0	Low prot.	A	57.8	142	.235	4.90	17.86
			B	52.1	141	.210	4.88	7.14
10	3	Milo	A	57.9	147	.231	4.79	16.07
			B	56.4	154	.216	4.62	7.14
10	3	Low prot.	A	57.1	157	.231	4.86	3.57
			B	52.2	143	.218	4.83	12.50
7	0	Milo	A	57.5	150	.231	4.84	10.71
			B	54.3	143	.218	4.83	12.50
7	0	Low prot.	A	58.6	159	.229	4.70	8.93
			B	54.8	149	.220	4.87	5.36
7	3	Milo	A	57.9	156	.233	4.86	7.14
			B	51.8	144	.212	4.93	3.57
7	3	Low prot.	A	57.4	151	.239	5.03	7.14
(Florida method)			B	53.0	144	.214	4.86	5.36
Overall Results:			Strain A	57.9	152	.233	5.03	7.14
			Strain B	54.0**	144	.216***	4.86	5.36
		Water ad lib		56.5	149	.225	4.80	10.94
		No water 3 days		55.5	149	.224	4.87	7.59
		10 days no feed		56.4	148	.224	4.80	10.94
		7 days no feed		55.7	150	.225	4.86	7.59
		Milo		56.6	150	.225	4.78	10.27
		Low protein		55.4	148	.224	4.89	8.26

** Significant difference ($P < 0.01$).
*** Significant difference ($P < 0.001$).
All other differences below double line are nonsignificant ($P > 0.05$).

See Table 10 for statistical analysis of the eight molting methods.

of starvation period (7 vs 10 days) and the holding ration (milo vs low protein mash) on egg size were inconsequential.

There were essentially no detectable effects of either strain or molting variable on albumen quality and shell quality (Table 8). Hens from Strain B produced eggs with slightly smoother shells, but other quality difference proved to be statistically nonsignificant.

An economic analysis of the data (Table 9) failed to demonstrate any effect of the molting variables on feed cost per hen housed, feed cost per dozen eggs, and egg income over feed cost per hen housed. A strain difference was noted in feed cost per hen housed in favor of Strain B, but Strain A laid more eggs, resulting in no difference in feed cost per dozen eggs collected.

(continued on page 7)

Table 6. Body weight changes - Trial 2

Molting Method			Strain	Time Period		
No feed (days)	No water (days)	Holding ration		0-28 days (% change)	0-56 days (% change)	0-280 days (% change)
10	0	Milo	A	- 9.9	+ 7.2	+ 12.9
(California method)			B	- 19.4	+ 2.2	+ 17.9
10	0	Low protein	A	- 10.3	+ 6.7	+ 14.2
			B	- 23.8	- 2.8	+ 9.4
10	3	Milo	A	- 9.6	+ 10.2	+ 27.9
			B	- 15.2	+ 9.3	+ 19.2
10	3	Low protein	A	- 18.6	+ 3.4	+ 19.6
			B	- 18.9	+ 0.9	+ 11.2
7	0	Milo	A	- 9.0	+ 7.0	+ 17.8
			B	- 16.3	+ 4.6	+ 14.2
7	0	Low protein	A	- 15.9	+ 3.7	+ 15.3
			B	- 23.2	- 3.8	+ 6.4
7	3	Milo	A	- 5.8	+ 9.6	+ 23.2
			B	- 14.7	0.0	+ 10.2
7	3	Low protein	A	- 10.1	+ 3.3	+ 10.8
(Florida method)			B	- 19.9	- 2.9	+ 14.0
Overall Results:			Strain A	- 11.1	+ 6.4	+ 17.7
			Strain B	- 18.9***	+ 0.9	+ 12.8*
			Water ad lib	- 16.0	+ 3.1	+ 13.5
			No water 3 days	- 14.1	+ 4.2	+ 17.0
			10 days no feed	- 15.7	+ 4.6	+ 16.5
			7 days no feed	- 14.4	+ 2.7	+ 14.0
			Milo	- 12.5	+ 6.3	+ 17.9
			Low protein	- 17.6**	+ 1.1**	+ 12.6*

* Significant difference ($P < 0.05$).
** Significant difference ($P < 0.01$).
*** Significant difference ($P < 0.001$).
All other differences below double line nonsignificant ($P > 0.05$).

See Table 10 for statistical analysis of the eight molting methods.

The above statistical analyses were used to determine the effects of individual molting variables and strain on performance. This does not provide a direct comparison of the molting methods _per se_. To accomplish this, data for the two strains were combined and subjected to Duncan's Multiple Range Test. The results are given in Table 10.

Note that significant differences among molting methods were found in just three of the 23 parameters tested -- egg weight, percent Extra Large, and percent Large. Molting method had no significant effect on rate of egg production, feed intake or conversion, mortality, body weight changes, egg quality, or economic returns.

Table 10 provides a direct comparison between the California (No. 1) and Florida (No. 8) molting methods. Egg size was significantly increased with the Florida method, and this was reflected

(continued on page 11)

Table 7. Average egg weight and size distribution - Trial 2

Molting Method					Egg Size					
No feed (days)	No water (days)	Holding ration	Strain	Egg wt. (g)	Jumbo (%)	X-Lge. (%)	Lge. (%)	Med. (%)	Small (%)	Lge. & over (%)
10	0	Milo	A	63.5	9.2	36.9	50.1	3.8	0.0	96.2
(California method)			B	62.0	3.3	33.3	53.9	9.4	0.0	90.6
10	0	Low prot.	A	64.5	10.7	46.0	41.1	2.2	0.0	97.8
			B	62.2	3.7	34.6	55.7	5.0	1.0	94.0
10	3	Milo	A	65.7	16.1	50.0	31.6	2.3	0.0	97.7
			B	62.4	7.6	52.3	50.1	9.6	0.3	90.1
10	3	Low prot.	A	66.1	18.4	51.4	29.6	0.7	0.0	99.3
			B	62.6	6.6	32.0	55.3	6.2	0.0	93.8
7	0	Milo	A	64.2	9.9	43.4	43.4	3.3	0.0	96.7
			B	62.3	6.6	34.6	50.0	7.0	1.8	91.2
7	0	Low prot.	A	65.2	16.4	43.1	37.6	2.5	0.3	97.2
			B	61.8	3.1	31.4	57.3	7.4	0.7	91.8
7	3	Milo	A	64.7	11.5	45.9	41.0	1.3	0.3	98.4
			B	62.5	5.6	34.6	52.3	7.6	0.0	92.4
7	3	Low prot.	A	66.0	18.2	51.4	29.8	0.6	0.0	99.4
(Florida method)			B	63.0	6.9	39.5	47.6	6.0	0.0	94.0
Overall Results:			Strain A	65.0	13.8	46.0	38.0	2.1	0.0	97.8
			Strain B	62.4***	5.4***	34.0***	52.8***	7.3***	0.4	92.3***
		Water _ad lib_		63.2	7.9	37.9	48.6	5.1	0.4	94.4
		No water 3 days		64.1***	11.4*	42.1	42.1**	4.3	0.0	95.7
		10 days no feed		63.6	9.5	39.6	45.9	4.9	0.1	94.9
		7 days no feed		63.7	9.8	40.5	44.9	4.5	0.4	95.1
		Milo		63.4	8.7	38.9	46.6	5.5	0.3	94.2
		Low protein		63.9	10.5	41.2	44.2	3.8	0.2	95.9

* Significant difference ($P < 0.05$).
** Significant difference ($P < 0.01$).
*** Significant difference ($P < 0.001$).
All other differences below double line are nonsignificant ($P > 0.05$).

See Table 10 for statistical analysis of the eight molting methods.

Table 8. Interior and shell quality - Table 2

Molting Method							
No feed	No water	Holding ration	Strain	Haugh units	Shell thickness	Percent cracks 1/	Shell score 2/
(days)	(days)				(inches)	(%)	
10	0	Milo	A	77.8	.0146	8.5	.68
(California method)			B	78.7	.0147	5.2	.52
10	0	Low protein	A	78.0	.0144	8.5	.58
			B	78.8	.0142	7.6	.54
10	3	Milo	A	77.4	.0148	8.5	.58
			B	79.3	.0146	7.0	.53
10	3	Low protein	A	78.8	.0146	10.4	.59
			B	79.4	.0144	10.7	.58
7	0	Milo	A	79.9	.0145	7.8	.58
			B	79.1	.0145	6.1	.54
7	0	Low protein	A	79.7	.0147	9.5	.70
			B	80.4	.0144	7.4	.50
7	3	Milo	A	77.6	.0146	5.4	.62
			B	78.8	.0145	5.1	.46
7	3	Low protein	A	80.1	.0144	5.0	.71
(Florida method)			B	77.2	.0147	5.5	.50
Overall Results:			Strain A	78.7	.0146	7.6	.63
			Strain B	79.0	.0145	6.8	.52**
		Water ad lib		79.0	.0145	7.6	.58
		No water 3 days		78.6	.0146	7.0	.58
		10 days no feed		78.5	.0145	8.1	.58
		7 days no feed		79.1	.0145	6.5	.58
		Milo		78.6	.0146	6.5	.57
		Low protein		79.1	.0145	8.1	.59

1/ Determined by hand candling one day's production at 4-week intervals.
2/ Shell roughness score: 0 = smooth; 3 = very rough.

** Significant difference ($P < 0.01$).
All other differences below double line are nonsignificant ($P > 0.05$).

See Table 10 for statistical analysis of the eight molting methods.

Table 9. Economic results - Trial 2

Molting Method				Feed Cost[1/]		Egg income minus
No feed	No water	Holding ration	Strain	Per hen housed	Per dozen	feed cost per hen housed[2/]
(days)	(days)			(dollars)	(cents)	(dollars)
10	0	Milo	A	4.00	30	1.89
(California method)			B	3.63	30	1.83
10	0	Low protein	A	3.68	32	1.61
			B	3.68	31	1.55
10	3	Milo	A	3.77	31	1.72
			B	3.79	31	1.90
10	3	Low protein	A	4.08	31	1.79
			B	3.74	32	1.48
7	0	Milo	A	3.89	31	1.73
			B	3.68	31	1.61
7	0	Low protein	A	4.01	30	1.93
			B	3.82	31	1.68
7	3	Milo	A	4.02	31	1.81
			B	3.79	32	1.58
7	3	Low protein	A	4.05	32	1.62
(Florida method)			B	3.75	31	1.61
Overall Results:			Strain A	3.94	31	1.76
			Strain B	3.73***	31	1.65
			Water ad lib	3.80	31	1.73
			No water 3 days	3.87	31	1.69
			10 days no feed	3.80	31	1.72
			7 days no feed	3.88	31	1.70
			Milo	3.82	31	1.76
			Low protein	3.85	31	1.66

1/ \$5.50/cwt for milo and low protein ration.
\$6.50/cwt for 17% protein layer ration.

2/ Large and above, 45¢/dozen; Medium, 40¢/dozen; Small, 25¢/dozen; PeeWee, 15¢/dozen.

*** Significant difference ($P < 0.001$).
All other differences below double line are nonsignificant ($P > 0.05$).

See Table 10 for statistical analysis of the eight molting methods.

Table 10. Summary of performance (combined strain data) by molting method analyzed with Duncan's Multiple Range Test - Trial 2

Parameter	Molting Method[1/]							
	#1 (Calif)	#2	#3	#4	#5	#6	#7	#8 (Fla)
Hen-day prod. (%)	58.7[a]	55.0[a]	57.2[a]	54.7[a]	55.9[a]	56.7[a]	54.9[a]	55.2[a]
Hen-housed eggs	153[a]	142[a]	151[a]	150[a]	147[a]	154[a]	150[a]	148[a]
Feed/hen/day (lb)	.228[a]	.223[a]	.224[a]	.225[a]	.225[a]	.225[a]	.223[a]	.227[a]
Feed/doz. eggs (lb)	4.67[a]	4.89[a]	4.71[a]	4.85[a]	4.84[a]	4.79[a]	4.90[a]	4.95[a]
Mortality (%)	12.5[a]	12.5[a]	11.6[a]	8.0[a]	11.6[a]	7.2[a]	5.4[a]	6.3[a]
Body weight change								
0-28 days (%)	-14.7[a]	-12.0[a]	-12.4[a]	-18.8[a]	-12.7[a]	-19.6[a]	-10.3[a]	-15.0[a]
0-56 days (%)	+ 4.7[a]	+ 2.0[a]	+ 9.8[a]	+ 2.2[a]	+ 5.8[a]	0.0[a]	+ 4.8[a]	+ 0.2[a]
0-280 days (%)	+15.4[a]	+11.8[a]	+23.6[a]	+15.4[a]	+16.0[a]	+10.9[a]	+16.7[a]	+12.4[a]
Avg. egg weight (g)	62.8[b]	63.4[ab]	64.1[ab]	64.3[a]	63.2[ab]	63.5[ab]	63.6[ab]	64.5[a]
Jumbo (%)	6.3[a]	7.2[a]	11.9[a]	12.5[a]	8.3[a]	9.8[a]	8.6[a]	12.6[a]
X-Large (%)	35.1[b]	40.3[ab]	41.2[ab]	41.7[ab]	39.0[ab]	37.3[ab]	40.3[ab]	45.5[a]
Large (%)	52.0[a]	48.4[ab]	40.9[b]	42.5[ab]	46.7[ab]	47.5[ab]	46.7[ab]	38.7[b]
Medium (%)	6.6[a]	3.6[a]	6.0[a]	3.5[a]	5.2[a]	5.0[a]	4.5[a]	3.3[a]
Small (%)	0.0[a]	0.5[a]	0.2[a]	0.0[a]	0.9[a]	0.5[a]	0.2[a]	0.0[a]
Large & Over (%)	93.4[a]	95.9[a]	93.9[a]	96.6[a]	94.0[a]	94.5[a]	95.4[a]	96.7[a]
Haugh units	78.3[a]	78.4[a]	78.4[a]	79.1[a]	79.5[a]	80.1[a]	78.2[a]	78.7[a]
Shell thickness (in)	.0147[a]	.0143[a]	.0147[a]	.0145[a]	.0145[a]	.0146[a]	.0146[a]	.0146[a]
Cracks (%)	6.9[a]	8.1[a]	7.8[a]	10.6[a]	7.0[a]	8.5[a]	5.3[a]	5.3[a]
Shell score	.60[a]	.56[a]	.56[a]	.59[a]	.56[a]	.60[a]	.54[a]	.61[a]
Feed cost/hen housed ($)	3.82[a]	3.68[a]	3.78[a]	3.91[a]	3.79[a]	3.92[a]	3.91[a]	3.90[a]
Feed cost/dozen ($)	.30[a]	.32[a]	.31[a]	.32[a]	.31[a]	.31[a]	.32[a]	.32[a]
Egg income minus feed cost/hen housed ($)	1.86[a]	1.58[a]	1.81[a]	1.64[a]	1.67[a]	1.81[a]	1.70[a]	1.62[a]

1/ See page 2 for details of molting methods.
Means with different superscripts within rows are significantly different ($P < 0.05$).

in a higher percentage of Extra Large eggs. These results are consistent with the analysis of the overall data, which showed that water withholding for the first three days of starvation yielded a larger average egg weight and more eggs in the Jumbo and Extra Large size classes.

DISCUSSION

The California method of molting chickens has been used successfully for many years with very few problems. Occasionally there is a report of increased mortality, but such losses are not sufficiently frequent to discourage use of the method. Comments are also made that the holding ration (cracked grain) does not provide an adequate level of vitamins and minerals to build reserves for the next laying cycle. However, various experiments we have conducted to upgrade the nutritional aspects of the California method have rarely proved to be of economic benefit.

The Florida method is similar to the California method with the exceptions that the former calls for three days of water removal, a shorter feed withdrawal period, and a more balanced holding ration. We have noted that when water withholding is used, the hens undergo a more complete drop of feathers. Whether or not feather drop is critical to the success of a molting program is a question without an answer at this time. Adequate stress, we feel, is important. Water withholding, as used in the Florida method, provides a stress not present in the California method, but the longer feed withdrawal period and the lower nutritional value of the holding ration in the California method possibly provide offsetting stresses that may be of less risk than water withholding under California conditions.

In Trial 1 reported above, hens molted by the Florida method laid at a significantly higher rate and returned more income over feed cost than those molted by the California procedure. These advantages were not evident in Trial 2. In fact, the numerical differences in egg production, feed cost per dozen, and egg income over feed cost favored the California method, but the differences proved to be nonsignificant.

These inconsistencies in results are not easily explained. The facilities for the two trials were not identical, the hens were from different hatches, and the weather conditions of Trial 1 were not the same as for Trial 2. These variables may account, in part, for lack of repeatability in results.

Further testing of molting methods appears to be warranted, particularly as new ideas and approaches are suggested. However, at this point, we are of the opinion that simple and easily applied molting procedures, such as the California method, can be as effective as more complicated ones in terms of performance and economic returns.

ACKNOWLEDGEMENTS

The authors are indebted to Eleanor Beckwith and Carol Adams, Senior Statisticians, Cooperative Extension, Riverside Campus, for statistical analyses of the data.

SELECTED REFERENCES

1. Swanson, M.H and D.D. Bell, 1974. Force Molting of Chickens II. Methods. Univ. of Calif. Leaflet 2650.

2. Wilson, H.R., J.S. Moore, A.W. O'Steen, J.L. Fry and R.H. Harms. Forced Molting of Laying Hens. Bul. No. 728. Gainesville, Univ. of Fla. 1969.

##

Milo H. Swanson

Milo H. Swanson, Editor PIP
Cooperative Extension
University of California
Riverside, CA 92521

Distribution of PROGRESS IN POULTRY is made to industry leaders and fellow researchers. Anyone wishing to be placed on the mailing list may send a request to the Editor.