University of California - - - - - Cooperative Extension

PIP Progress in Poultry

"Through Research"

NO. 40 - MAY 1996

TWO MOLT METHODS COMPARED

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INTRODUCTION

The method of inducing a molt in commercial egg laying chicken flocks has been the subject of numerous experiments during the past 30 years. Most of these experiments have involved the use of feed removal, light restriction, and some type of feed management to either keep the flock out of production for a specified period of rest or to bring them back into full production as soon as possible. Feed removal periods have been as short as 4 or 5 days to as long as 14 days or more. Feeding programs following the feed removal period have utilized low calcium diets, grower type diets, or high fiber diets and these diets could be fed for a 2 to 3 week period. Some methods use modified or normal layer diets which are designed to return the flock back to full production in as short a period as possible. Artificial lights are usually removed in open-type housing on day one or reduced to 8-10 hours in controlled environment housing for approximately 4 weeks and then returned to a normal lighting program for the remainder of the cycle. Some researchers recommend increasing the lights to 24 hours for the week prior to the initiation of the molt, but the justification for this is not well documented in the scientific literature.

During the period 1967 to 1984, the University of California studied the question of whether or not it was beneficial to provide the flock with a "rest" following the feed removal period in nine separate experiments. (These experiments are discussed in detail in the papers listed at the end of this report). In general, flocks return to a 50% egg production rate during the 4th to 8th weeks depending upon the feeding program used following the feed removal period. An early return to production would appear to be beneficial, but quite often early eggs are offset by poor production or egg quality at the end of the cycle. This may not be a problem when the overall cycle length is kept to 32 weeks or less. Additionally, the price received for eggs at the beginning vs the end of the cycle must also be considered. An early improvement in egg production during a low egg price period would not be as advantageous for an early return to production as during a period of high egg prices.

The following experiment was designed to evaluate the overall results from a commonly used "fast return to production system" and to compare it with a slow system designed to reduce body weight by feed quantity restriction during the latter 3 weeks of the molt period.

EXPERIMENTAL METHODS

Two treatments consisting of six 100 bird groups each were used for this experiment. Twelve hundred 63 week-old Dekalb XL White Leghorns were placed 5 per cage in 16" wide by 18" deep cages (58 in^2 per hen). Both treatments received artificial lights for 24 hours per day for the 7 days prior to feed removal. On day one of the experiment, artificial lights were turned off and natural day-length was used for the first 28 days of the experiment. During this time of the year, natural day-length is approximately 10 to 10½ hours in length. At 29 days, artificial lights were turned on to provide an effective day-length of 13½ hours. This was increased ½ hour per week until a total of 16 hours was reached.

Treatments were designated "fast" and "slow" meaning fast and slow return to original body weight following feed removal. The "fast" method birds were molted using the above lighting program and the following feeding program:

1. No feed until 30% of the original body weight was lost (8 days).
2. Full feed of molt mash #1 for 13 days
    a. 15.5% crude protein
    b. 1379 kcal M.E. per pound (3034 kcal/kg)
    c. 2.69% calcium
    d. $7.25/100 pounds
3. Full feed of molt mash #2 for 7 days
    a. 16.5% crude protein
    b. 1332 kcal M.E. per pound (2930 kcal/kg)
    c. 3.73% calcium
    d. $7.35/100 pounds
4. Return to 13½ hours of lights and full fed layer diet on day 29.
5. From day 29 through 40 weeks of the test, both treatments received the same diets.
    a. Several layer diets, all priced at $7.50/100 pounds.

The "slow" method birds were molted as follows:

1. No feed until the breeder standard for 17 weeks of age was reached (4 days).
    a. 1275 grams (2.8 pounds)
2. Intermittent light, heavy and skip-a-day feeding to maintain 1250 to 1350 gram weights until 28 days.
    a. 8.8% crude protein
    b. 1328 kcal M.E. per pound (2922 kcal/kg)
    c. .8% calcium
    d. $5.73/100 pounds
3. Return to 13½ hours of lights and full fed layer diet on day 29.
4. From day 29 through 40 weeks of the test, both treatments received the same diets.
    a. Several layer diets, all priced at $7.50/100 pounds.

RESULTS AND DISCUSSION

Figure 1 illustrates the daily changes in body weight for the two treatments during the first 30 days of the experiment. The "fast" method birds reached a 30% loss in weight on the 9th day following 8 days of feed removal. Note, water was available at all times. Upon feeding, the treatment returned to 94% of their original weight on the 30th day. The "slow" method birds reached their 1275 gram (2.8 pounds) target weight on day 5 following 4 days without feed. This represented a 22.6% loss in body weight. Periodic restricted feeding resulted in weights fluctuating between 80 and 85% of the original pre-molt weight until 30 days when the final weight represented 86.5% of the pre-molt weight. Body weights of the "slow" treatment birds remained lower for the entire experiment and averaged 1630 grams (3.6 pounds) compared to 1710 grams (3.8 pounds) for the "fast" treated birds - a difference of 80 grams (.18 pounds). See figure 2.

Figure 1. University of California Molt Experiment

Body Weight Losses - 1st 30 days

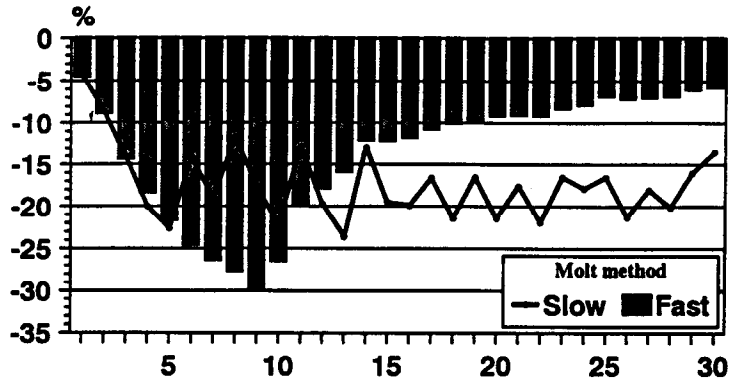
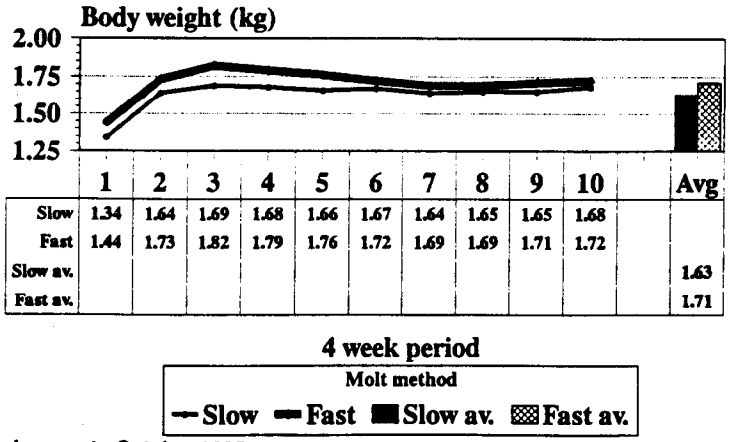


Figure 2. University of California Molt Experiment

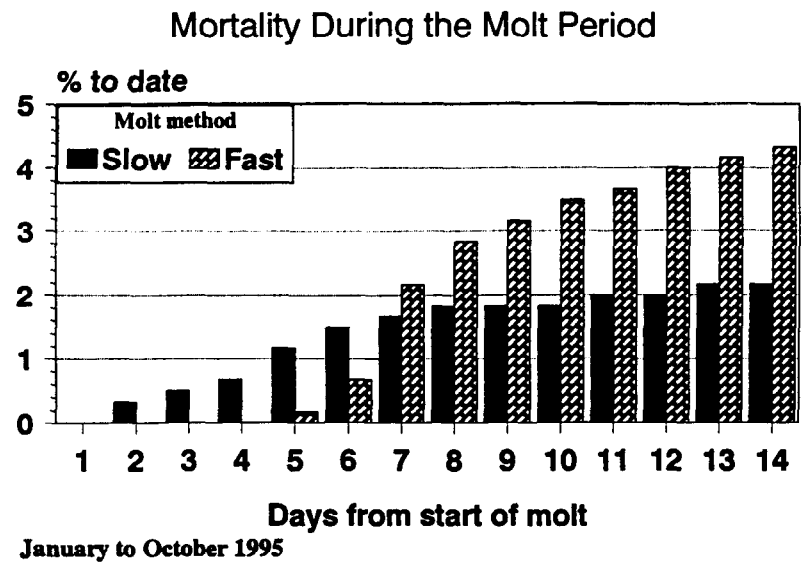
Body Weight



	1	2	3	4	5	6	7	8	9	10	Avg
Slow	1.34	1.64	1.69	1.68	1.66	1.67	1.64	1.65	1.65	1.68	
Fast	1.44	1.73	1.82	1.79	1.76	1.72	1.69	1.69	1.71	1.72	
Slow av.											1.63
Fast av.											1.71

Mortality during the first 2 weeks of the experiment is shown in figure 3. Mortality began on day 2 in the "slow" molted treatment, but this was not due to the treatment as treatments were identical during the first 4 days of the experiment. To-date mortality appeared to stabilize at about 2% in the "slow" treatment during days 7 through 14. Mortality in the "fast" treatment, though, did not start until day 5 but appeared to accelerate during the latter days of the feed withdrawal period. By 14 days, the fast treatment birds had accumulated about twice the mortality compared to the birds on the "slow" treatment. Overall losses totaled 8.35% for the "slow" molt treatment compared to 11.33% for the birds on the "fast" treatment (figures 4 and 5).

Figure 3. University of California Molt Experiment



January to October 1995

Figure 4. University of California Molt Experiment

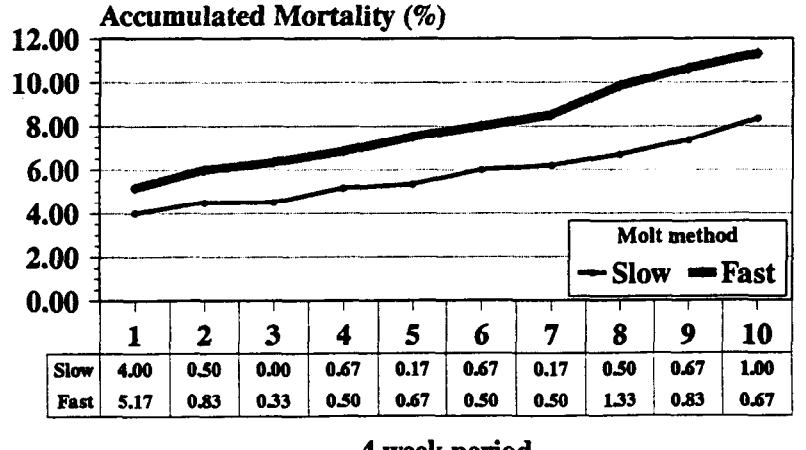


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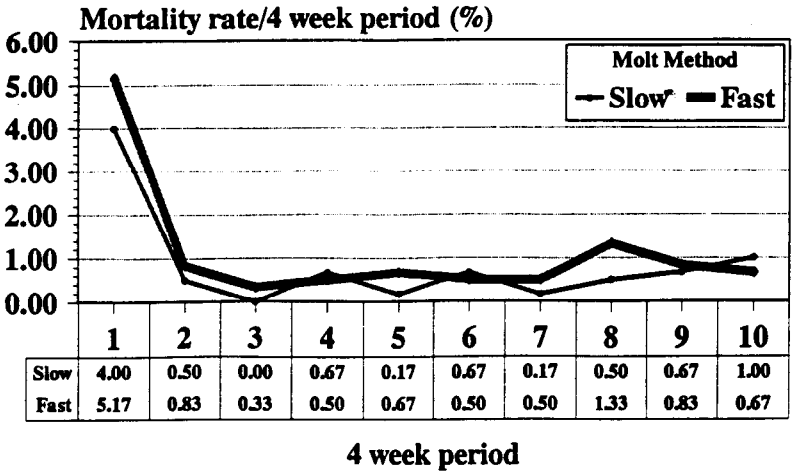
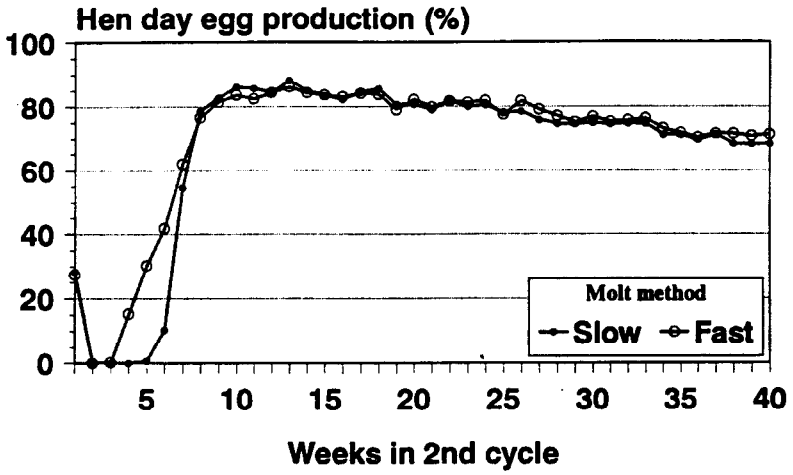
Figure 5. University of California Molt Experiment
Mortality



	1	2	3	4	5	6	7	8	9	10
Slow	4.00	0.50	0.00	0.67	0.17	0.67	0.17	0.50	0.67	1.00
Fast	5.17	0.83	0.33	0.50	0.67	0.50	0.50	1.33	0.83	0.67

January to October 1995

Figure 6. University of California Molt Experiment
Egg Production



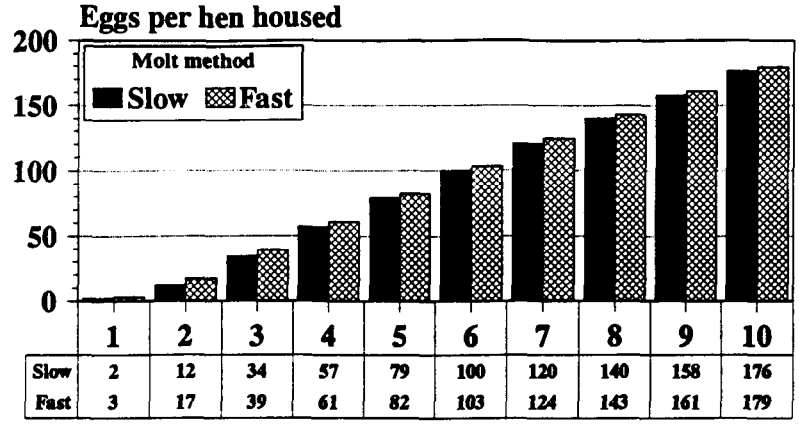
January to October 1995

Egg production for both treatments reached zero by day 5 or 6. Production remained at zero for two weeks for the "fast" treatment birds and four weeks for the "slow" treatment birds (Figure 6). The rate increased first in the "fast" treatment, but with a steeper incline in the "slow" treatment birds. Each group reached 50% rate of lay during the 6th week - only a few days difference between the two treatments. Egg production for both treatments peaked at about 85% and remained above 80% for about 16 weeks. The egg production rate was still at a very satisfactory level (70%) at the end of 40 weeks. The "fast" treatment birds averaged 69.1% compared to 66.6% for the "slow" treatment birds.

Egg production per hen housed also favored the "fast" molted birds. During the early weeks of the experiment, accumulated differences exceeded 5 eggs, but at the end, this advantage was reduced to 3 eggs due to higher mortality rates in the "fast" treatment (figure 7). The "fast" treatment birds produced 179 eggs per hen housed compared to 176 eggs for the "slow" treatment birds.

Figure 7. University of California Molt Experiment

Eggs per Hen-Housed



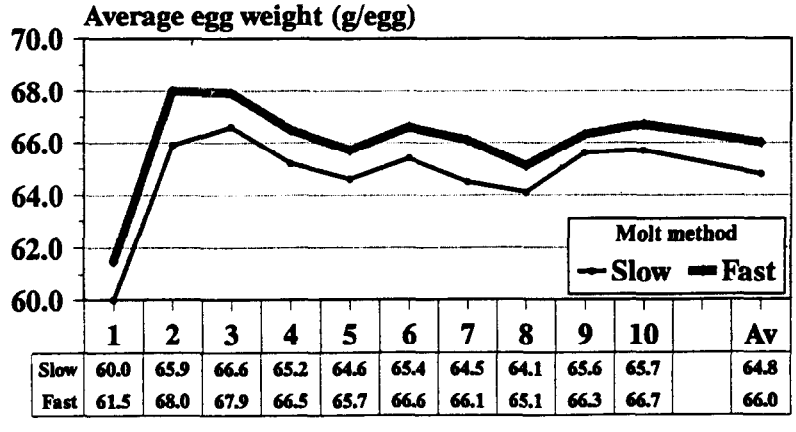
	1	2	3	4	5	6	7	8	9	10
Slow	2	12	34	57	79	100	120	140	158	176
Fast	3	17	39	61	82	103	124	143	161	179

4 week period

January to October 1996

Figure 8. University of California Molt Experiment

Egg Weight



	1	2	3	4	5	6	7	8	9	10		Av
Slow	60.0	65.9	66.6	65.2	64.6	65.4	64.5	64.1	65.6	65.7		64.8
Fast	61.5	68.0	67.9	66.5	65.7	66.6	66.1	65.1	66.3	66.7		66.0

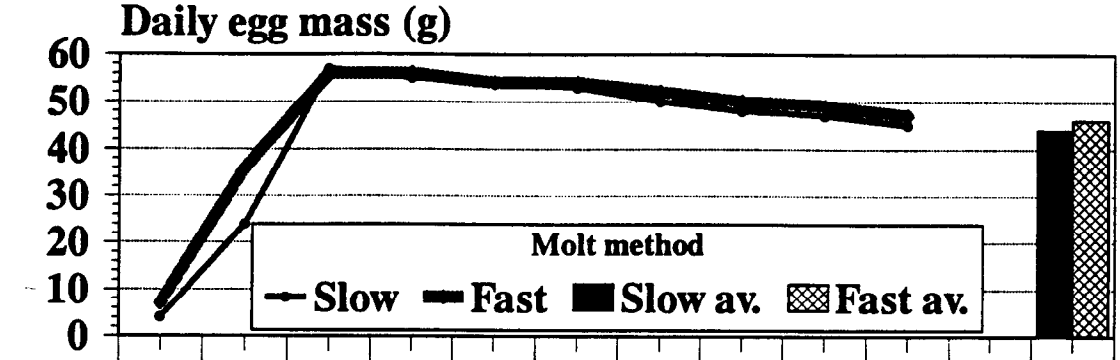
4 week period

January to October 1995

Egg weight favored the "fast" molted birds during every period (figure 8). Their eggs averaged 66.0 grams per egg compared to 64.8 grams for the "slow" molted birds. The effect of this difference was economically unimportant as egg value was optimized at lower average egg weights. Normal distribution of eggs in different size categories do not change significantly with eggs of this average weight and values do not change when all eggs above 55 grams are priced the same. It is interesting to note, though, that both groups produced very high daily egg masses with peaks in excess of 56 grams per day ((figure 9). The "fast" treatment produced a 2 gram per day higher daily egg mass and .4 kg per hen housed higher total egg mass during the experiment.

Figure 9. University of California Molt Experiment

Daily Egg Mass



	1	2	3	4	5	6	7	8	9	10		Av
Slow	4	24	57	55	54	53	50	48	47	45		
Fast	7	36	56	56	54	54	52	50	49	47		
Slow av.												44
Fast av.												46

4 week period

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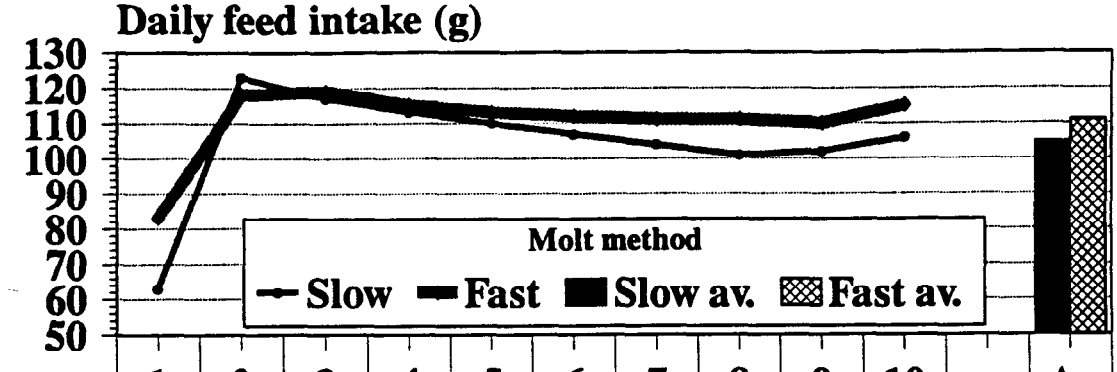
The "slow" molted treatment birds ate significantly less feed during the molt period and throughout the entire experiment (figure 10). During period one, the birds fed with restricted feeding required only 63 grams of feed per day compared to 83 grams for the "fast" molted hens. In addition, the feed used by the "slow" molt treatment birds was significantly lower in cost because of its low protein level. Through the entire experiment, the "slow" molted hens consumed 105 grams of feed per day compared to 111 grams for the "fast" treatment hens.

Figure 10. University of California Molt Experiment

Daily Feed Consumption



	1	2	3	4	5	6	7	8	9	10		Av
Slow	63	123	117	113	110	107	104	101	102	106		
Fast	83	118	119	115	113	112	111	111	110	115		
Slow av.												105
Fast av.												111

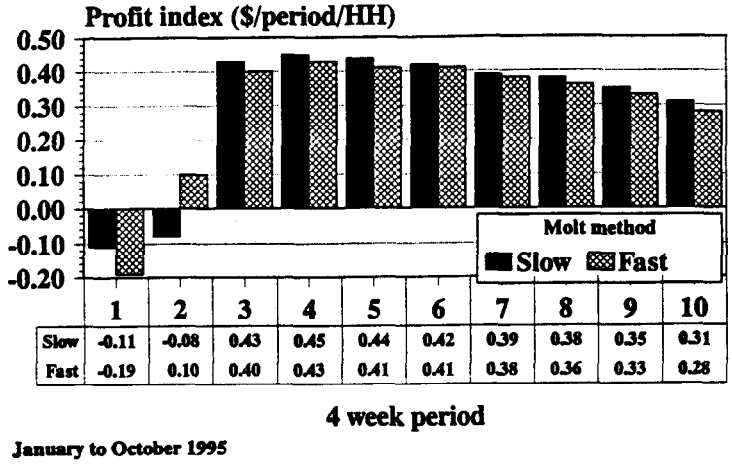
4 week period

Jaunaury to October 1995

Data were analyzed for economic significance using the University of California "flock indexing" system. This procedure places egg numbers, egg weight, feed consumption and mortality into an economic relationship which is comparable to egg income minus feed cost per hen housed. Standardized egg prices (55¢ per dozen for large eggs) are used to evaluate income. Feed prices are standardized at the values listed in the METHODS section. Figure 11 illustrates the index values by treatment and period. Figure 12 indicates the period index advantages for the "slow" method. The "fast" method birds gained an early economic advantage due to their early return to production. By period 3, the "slow" birds maintain a consistent 1¢ to 3¢ per period advantage to the end of the experiment due to reduced feed intake and higher bird numbers. Accumulated index values were essentially the same through 8 periods (32 weeks), but by the end of the experiment, the "slow" method birds had reached a total advantage of 6.6¢ per hen housed over the fast method birds.

Figure 11. University of California Molt Experiment

Profit Index



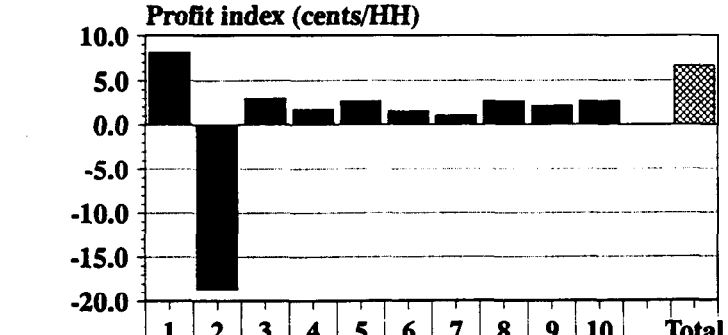
	1	2	3	4	5	6	7	8	9	10
Slow	-0.11	-0.08	0.43	0.45	0.44	0.42	0.39	0.38	0.35	0.31
Fast	-0.19	0.10	0.40	0.43	0.41	0.41	0.38	0.36	0.33	0.28

4 week period

January to October 1995

Figure 12. University of California Molt Experiment

Profit Index by Period - Advantage of Slow Molt



	1	2	3	4	5	6	7	8	9	10	Total
Cts/4 wks.	8.1	-18.6	3.0	1.7	2.6	1.5	1.0	2.6	2.1	2.6	6.6

Period

January to October 1995

A summary of results with their statistical significance (P=.05) is listed in table 1.

Table 1. University of California Molt Experiment Summary

Trait	Slow	Fast	Probability
Hen day egg production (%)	66.6	69.1	0.011
Eggs per hen housed	176	179	
Total mortality (%)	8.33	11.33	0.139
Av. egg weight (g)	65.2	66.4	0.006
Daily egg mass (g)	43.4	45.9	0.002
Total egg mass (kg/HH)	11.49	11.89	0.228
Daily feed intake (g)	104.5	110.6	0.0001
Feed per dozen (kg)	1.88	1.92	0.181
Feed:egg ratio	2.41	2.41	
Av Egg value (cts/doz.)	55	55	
Economic index ($/HH)	2.98	2.91	

January to October 1995

COMMENTS

The molting methods studied are but two of the hundreds of variations in use on commercial egg production farms today. Even though performance results may appear to be comparable, these programs differ in their ease of application, cost, and in real performance. As a result, real economic differences are common occurrences. The 6.6¢ per hen difference in flock index represents a significant improvement of income and it was entirely the result of the feeding program implemented during the first 4 weeks of the experiment. Restricted feeding of a low cost molting ration saved 8.1¢ per hen housed. The result of this feeding program was to reduce the average body weight of the flock, to reduce egg production and egg weight, and to lower feed requirements by 6.1 grams per day. Interestingly, the feed conversion (pounds of feed to produce 1 pound of eggs) was exactly the same for the two treatments. As feed consumption was reduced, egg mass was reduced correspondingly.

Of particular interest in this experiment was the technique of reducing adult body weight. Most molting programs are designed to return the flock to its original weight, but through the use of a restricted feeding program, a lower body weight flock was produced which proved to be capable of comparable feed conversion with higher net income.

The use of 24 hour pre-molt lights during the 7 days before feed was removed was part of the published program used for the "fast" system and therefore was used for both treatments. Justification for pre-molt lighting will be studied in a future experiment.

ACKNOWLEDGEMENTS

The authors wish to express their appreciation to Embly Ranch Inc. for providing the facilities and personnel to conduct this experiment. In addition we wish to thank Carol Adams, University of California biometrician (retired), for her assistance with the design of the experiment and analysis of the results.

Selected References of University of California research on fast vs slow molting procedures.

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2. Fast vs Slow Molting Methods, September 1969, Poultry Scratch.
3. Force Molting Methods, February 1970, Poultry Scratch.
4. 1970-71 Molting Experiment Results, October 1991, Poultry Scratch.
5. Another Comparison of Fast and Slow Molting, July 1972, Poultry Parade newsletter.
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