An Alternative Molting Procedure

By
Don Bell, Poultry Specialist (emeritus)
University of California, Riverside

(A supplement to "Farm Evaluation of Alternative Molting Procedures": Bell, D.D., and D.R. Kuney, 2004 Journal of Applied Poultry Research, 13: pages 673-679)

Description of Problem (from the article mentioned above)

"Public concern in parts of the world about the welfare of farm animals has resulted in the need to re-evaluate current recommended care practices. In some cases, restrictive legislation has been the result of failing to do so. One of the areas of greatest concern to the table egg industry involves the use of induced molting to lengthen the productive life of the flock. Traditional molting procedures, which involve feed removal, have been severely criticized by welfare groups.

"In 1974, Swanson and Bell categorized molting procedures into three basic types: feed and/or water removal, low nutrient rations, and anti-ovulatory drugs or feed additives. Numerous variations of procedures within categories exist and most have been evaluated by researchers. In general, most producers today use some form of feed removal for periods of 5-14 days. These methods usually serve as control models in most molting research Egg producers and researchers have found that results with feed removal methods are excellent and that programs are easily followed.

"General discussions of the molting/welfare question can be found in Bell and Weaver (2002), Bell (1996), and Keshavarz and Quimby (2002). Research using low nutrient methods is also readily available as are experiments using feed additives. **(See original article for reference information)**

"The current American Veterinary Medical Association's (AVMA) Policy Statement and Guidelines (2002) on induced molting states, in part: "The commercial induced molting procedure is carefully monitored and controlled. Acceptable practices include reduction of photoperiod "day length" and dietary restrictions that result in cessation of egg production, but water should not be withdrawn. Intermittent feeding of diets of low nutrient density are recommended rather than total feed withdrawal. Special attention should be paid to flock health, mortality, and bird weight. Egg quality and safety should be monitored through an egg quality assurance program. The welfare of the birds should be a major consideration in this and any management practice. The AVMA encourages on-going research into the effect of various methods of induced molting on the performance and well-being of laying chickens." **(It should be noted that this policy has been updated to state that "Neither water nor feed should be withdrawn" – September 1, 2004 AVMA new) .**

"United Egg Producers (UEP), an association of egg producers, has published a position statement regarding induced molting: "Producers and researchers are encouraged to work together to develop alternatives to feed withdrawal for molting. These alternatives should include the following: 1. The hens should be able to consume nutritionally adequate and palatable feed. 2. Body weight loss should be sufficient so as not to compromise hen welfare during the postmolt period. 3. Mortality during the molt should not substantially exceed normal flock mortality." Effective January 1, 2006, UEP's Board of Directors voted to require that only non-feed withdrawal methods that provide for nutritionally adequate and palatable feed, suitable for a non-producing hen, will be permitted by Animal Care Certified companies.

"The purpose of this paper is to review the results of recent farm research using non-feed removal molting methods compared to feed removal methods and to point out the problems the farmer has in making appropriate decisions regarding the care of flocks and the economic implications of these decisions." **As indicated, this is a supplementary article to the original with considerably more data and a more detailed description of the methods used.**

Experimental Methodology

"Traditional research methods involve carefully designed and monitored experiments where significant differences due to treatment can be separated from normal variability. Such research is usually limited to university or commercial test facilities and by its nature is also limited by the number of birds involved and the ability to measure small but economically important differences. As a result, such experiments are commonly often given little attention by the commercial industries.

"Poultry farmers usually want to see for themselves if something is applicable on their farms and this is most commonly done with paired house comparisons. If enough houses are available, such on-farm research can be exceedingly valuable, especially when results are analyzed by statistically valid procedures. Multiple paired house experimentation is particularly useful when interpreting mortality data. Unfortunately, though, one or two identical houses with sister flocks are all that is commonly available on commercial farms and natural variation is not measurable without repeated tests. It is not considered adequate to compare a one-house experience with past experience on the same farm or with breeder standards. A two-house comparison is decidedly better, but any two- house comparison will yield performance differences even when everything appears to be the same. The only legitimate use of this procedure is either over time with consecutive flocks or by the use of multiple site paired house tests. The repeatability of the results associated with a treatment would give the user an indication of the relative merit of one system over the other.

"To reach the goals of the AVMA and UEP, a set of treatment goals was established to study this issue. These included: 1. No feed removal. 2. No major loss in body weight. 3. No increase in mortality. 4. No injections or use of toxic substances. 5. Comparable performance results. 6. The program had to be cost- effective.

"In order to evaluate various molting procedures under commercial conditions, three California egg producers agreed to compare their traditional molting programs with a method, which did not require the removal of feed. University of California (UC) Poultry Specialists coordinated the experiments on the three farms and performed analyses of the data.

"The current research (year 2000) used three farms, two to four identical houses per comparison (1 or 2 treatment houses vs. 1 or 2 control houses), sister birds (raised together), five strains (one farm used 2 sets of houses for 2 strains and one farm repeated the first test with a second strain in a new set of housing), and a total of 440,000 hens in the five tests. Each flock was between 66 and 70 wk of age at the start of the experiments and was kept for 37-38 wk in the second cycle of production". **Treatments are described in Tables 1 & 2.** *"All groups were fed with mechanical feeders. Feeding of the low nutrient program during the first 4 wk was intended to be about 50% of normal feed consumption levels. This was achieved in most case by manipulation of feeding time but with more difficulty in some cases than in others. Even though the "no added salt" treatment was named low sodium (0.02%), in reality, it was also low in calcium (0.83%) and crude protein (7.8%). Actual feed consumption during wk 1-4 for the low sodium treatments represented approximately one-half of normal feed consumption levels* **(Table 3)**. *This combined with the low levels of sodium, calcium, and protein resulted in very low daily intakes of these three nutrients - substantially below recommendations for* ***laying*** *birds."*

Each low nutrient diet (no salt) was compared with a house of sister birds molted by feed removal using the farm's standard molting method. Feed was removed for a variable number of days (Table 4) and followed with the company's "molt diet" fed free choice through day 28 of the experiment. After 28 days, lights were returned in all houses and all flocks were placed on the farm's standard feeding program for egg production.

"Sample birds were weighed individually either daily or weekly during the molt phase of the experiment to monitor their progress in losing weight. Egg production, mortality and feed consumption were summarized daily for the first 56 days and weekly thereafter. Egg weights were measured weekly after the flocks returned to production following the molt. Egg quality measurements were made at 20 and 38 wk post molt for three of the five tests. All data were entered into the UC flock-indexing program for economic analyses. No statistical analyses were made for the major measurements due to the lack of replication within flocks and because of the differences in controls between companies."

Results and Discussion

Performance was summarized in the original article in a brief manner with emphasis on the main effects associated with the two molt procedures for each flock. This resulted in 10 sets of data. In addition, egg quality measurements were summarized for 6 of the 10 flocks.

Data in this supplemental article includes additional information concerning performance during the first 4 to 8 weeks of the molt period (mortality, body weight loss, and feed consumption) (Table 3). Also included are groupings of results based upon the advantages or disadvantages of the two principle comparisons (Table 4). And finally, a set of six weekly performance profiles were developed for the five non-feed-removal molts (Tables 5a, 5b, and 5c).

Table 1 summarizes the general and specific recommendations for non-feed-removal molting based upon the methods used in the 2000/2001 experiments. These represent the basic feeds and programs used in the experiments, but each cooperator applied these specifications in their own way with different types of housing, strains of birds, and comparison molting methods.

Table 1: General molting recommendation based upon 2000/2001 UC Field Research

General

1. Develop a standard flock performance profile for your company based upon a minimum of 5 flocks.
2. Different strains perform differently with the same molting procedures.
3. Flocks respond differently to molting depending upon the season and control of the environment.
4. Flocks perform in their second cycle relative to their first cycle performance.

Specific recommendations

1. (Day 1) Reduce the day length to 8 hours in controlled environment houses or to natural day length in open houses.
2. (Day 1) Remove all sickly, crippled, and non-producing birds from the flock.
3. (Day 1) Weigh a pre-molt sample of birds representing each major subdivision within the house to be molted.
4. (Day 1) Feed the flock so that every bird gets 10 to 12 pounds per 100 of the diet listed in Table 2 during each 24 hr period.
5. Continue to feed this diet for 28 days.
6. Do not remove the water.
7. Carefully monitor the body weights of the flock (preferably daily) during the first 2-weeks of the molt, then weekly.
   (Body weights should never go below 75% of the original weight)
8. Carefully monitor mortality rates on a daily basis.
   (The mortality rate should never be allowed to exceed 0.5% per week - preferably less than 0.25%)
9. On the 29th day, return the flock to normal lights and a layer diet - half fed for the first several days.
10. Commence full feeding of the regular layer diet by days 30 to 32.

Then compare your results with your company profile for second cycle performance.

Table No. 2 lists the diets used for the non-feed-removal molts. Basically, they consist of ground corn, two sources of calcium, one of phosphorus and a grow/lay vitamin and mineral pack (note there is no added salt to these diets). It should also be noted that these formulas were based upon 12% moisture content (finished feed). Daily intake of nutrients (Table 2) is based upon actual daily feed intake ((56 grams or 0.123 pounds per day per bird).

Table No. 2: Feed description, daily feed and nutrient intake.

Ingredients	**%**	**Analysis**		**Daily Intake**	**Feed (g) 1st 4-wks**	**Nutrient 1st 4-wks**
Corn, ground	97.10	Energy, ME, kcal/lb.	1491	Energy, ME, (kcal)	56	184
Dicalcium phosphate	1.50	Crude protein (%)	7.78	Protein (g)	56	4.4
Limestone	1.25	Calcium (%)	0.83	Calcium (mg)	56	460
Vitamin/mineral pack	0.15	Avail, Phosphorus (%)	0.41	Avail. Phosphorus (mg)	56	230
(no added salt)		Sodium (%)	0.02	Sodium (mg)	56	11

.

Table No. 3 shows the weekly mortality, body weight losses, and feed consumption during the first 4-8 weeks of the molt period associated with the flocks with economic advantages for non-feed-removal vs flocks with advantages for feed removal.

Table No. 3

			Advantage for no feed removal		Advantage for feed removal	
			Flocks 1 & 2	Flocks 1 & 2	Flocks 3,4 & 5	Flocks 3,4 & 5
			No Salt	Feed removed	No Salt	Feed removed
Mortality	+1 wk	(%)	0.193	0.335	0.562	0.780
(Wkly)	+2 wk		0.147	0.867	0.607	0.908
	+3 wk		0.158	1.126	0.433	0.447
	+4 wk		0.092	0.504	0.650	0.239
Av			0.147	0.708	0.563	0.594
	+5 wk		0.099	0.225	0.245	0.168
	+6 wk		0.090	0.074	0.371	0.312
	+7 wk		0.165	0.115	0.463	0.329
	+8 wk		0.091	0.093	0.300	0.221
Av			0.111	0.128	0.345	0.257
Av. BW loss	@ +1wk	(%)	10.8	22.0	15.0	17.2
	@+2wk		12.2	22.6	19.2	15.2
	@+3wk		13.4	16.3	19.8	15.3
	@+4wk		9.5	15.8	20.6	13.7
Feed consumption	Wk 1	(Lbs/100)	11.4	0.0	15.8	1.0
during the 1st 4 wks	Wk 2		11.4	8.0	12.6	10.1
	Wk 3		11.5	17.0	12.8	17.7
	Wk 4		13.0	17.0	15.6	19.3
Av			11.8	10.5	14.2	12.1
	Wk 5		19.6	21.8	20.7	21.8
	Wk 6		22.0	23.0	22.5	23.6
	Wk 7		22.1	23.3	23.2	24.0
	Wk 8		23.1	24.0	22.9	23.6
Av			21.7	23.0	22.3	23.2
	Total 8-wk	Lbs.	11.7	11.7	12.8	12.3
Age @ 50% EP		(Days)	45	44	42	40
Av EP	Wks 2-4	(%)	1.0	0.0	4.7	0
Av EP	Wks 10-12	(%)	81.0	81.2	83.1	86.4
Av EP	Wks 36-38	(%)	67.4	69.6	63.6	67.3

Mortality during the 1st 4 to 8 weeks is listed in tables 3 and 5b. Flocks 1 & 2 experienced the lowest total mortality at 8 weeks of age. All flocks showed a major reduction in mortality during the second 4-week period. The presence or absence of added salt appeared to make little or no difference in mortality during this period.

Body weight losses during the first 4 weeks for both treatments appeared, in most cases, to be less than 20%. Losses were decidedly less in flocks 1 & 2 with the low salt diets while they were practically equal on the other two farms. This was due in large part to the differences in the number of days without feed. Mortality in flocks 3,4 &5 were higher than expected irrespective of the molt procedure used.

Feed consumption patterns were different as a result of complete feed removal vs. limited feed consumption, but total feed consumption for the entire 8-week period was remarkably similar between the two feeding programs. Compensatory consumption resulted in practically the same total consumption. Table 4 compares lay-house performance for the two treatments for the increasing profits for the no-feed-removal vs. increased profits for the feed removal programs.

Table 4: A comparison of flock performance advantages for different molting systems.

Summary of Molt Test through 38 weeks of age				
	Advantage for no feed removal		**Advantage for feed removal**	
Farm No.	**1**	**1**	**2 & 3**	**2 & 3**
	Flocks 1 & 2	**Flocks 1 & 2**	**Flocks 3,4 & 5**	**Flocks 3,4 & 5**
	No Salt	**Feed removed**	**No Salt**	**Feed removed**
Previous cycle HH eggs to 60 wks	221.5	220.8	229.2	230.4
No. hens started	143,742	143,448	86,311	66,653
Weeks in test	38	38	38	38
Age at molt	66 & 65 wks	66 & 65 wks	69, 65 & 65 wks	69, 65 & 65 wks
Strain	Hyline W36 & W98	Hyline W36 & W98	Hyline W77, Babcock B300 & Shaver white	Hyline W77, Babcock B300 & Shaver White
Days without feed	0	10 & 13	0	11, 6, & 6
Molt Date	January 2000 August 2000	January 2000 August 2000	January 2000 April 2000	January 2000 April 2000
Hen-day egg production (%)	65.15	65.35	65.90	68.53
Eggs/hen-housed	168.45	166.00	164.30	172.00
Feed/day (lbs)	21.85	22.40	21.50	21.67
Feed/dozen (lbs)	4.02	4.11	3.91	3.79
Feed: egg ratio	2.32	2.37	2.30	2.24
Av. case wt (lbs)	52.35	52.10	50.95	50.80
Av. egg wt. (g)	65.55	65.67	64.28	63.98
Av. weekly mortality (%)	0.174	0.209	0.321	0.281
Total mortality (%)	6.34	7.27	11.63	10.25
Total egg mass (kg/hh)	11.04	10.90	10.56	11.01
Egg income minus feed cost/hh ($) - no premium for Xlg or J.	4.11	3.97	4.08	4.37

Table No. 4 lists two flocks (1 & 2) with increased profitability from the birds molted without feed removal compared to three flocks (3,4,5) that experienced higher profits with the feed removal molting methods. When one looks at the overall comparability of egg production, feed consumption, egg weight and total egg mass, one would have to question whether or not the net effects favored one group or the other.

"The inconsistent results relative to molting method may be interpreted: 1). that the molting methods gave comparable results, 2). that some farmers have better existing programs than others, or 3). that some farmers are more skilled in their execution of the low sodium molting program. The problem with interpreting such results is that no one can be sure that the difference noted were attributable to treatment or to house effects. With the exception of the egg production pattern during the first 4 wk of the molt and the 14 d body weight losses, ***,*** *the farm effect appeared to be greater than the treatment effect. Farm 1 proceeded to evaluate a second flock after good experiences with the first flock. This is one way to test a principle - repeat it with successive flocks.*

"Farmers, though, can't always test new concepts and therefore other means of evaluation must be tried. The authors believe that various molt programs can also be evaluated by comparing cycle 1 and cycle 2 performance. For example, if the egg production rate at the peak of production for the second production cycle is within 10% of the first cycle peak, the method could be considered to be a good program for egg production. Similarly, mortality rates during and following the molt should be only slightly higher than for the comparable period in the first lay cycle. Particular care must be taken regarding excessive mortality. Egg weights are considerably higher in the second production cycle and should be equal to or more than first cycle weights at 60 wk. Daily feed consumption should be comparable to first cycle levels. Mortality and body weight losses should be monitored daily during the molt period. If feed is to be removed, it should be returned when body weights reach 18 week of age levels or no less than 70% of starting weights. Feed should be returned when accumulated mortality levels reach 1.2% or less."

Suggested Reading

The original report that this supplement is based upon includes additional materials regarding this experiment and references that should also be read.

"**Farm Evaluation of Alternative Molting Procedures**": Bell, D.D., and D.R. Kuney, 2004 Journal of Applied Poultry Research, 13: pages 673-679

The booklet "**Induced Molting of Egg Laying Strains of Chickens**" by the author includes considerable data on alternative molting methods as well as a 200+ item reference list that will give the reader additional insight relative to the subject of molting methods. Included in this publication is an up-to-date set of egg production standards (page 45) which can be used to evaluate flock egg production rates.

A third publication, "**First and Second Cycle Egg Production Characteristics in Commercial Table Egg Flocks"** by Don Bell is available in the Poultry Science Journal, 1992, Vol. 71, pages 448-459. This paper summarizes the performance of 1,231 first cycle flocks and 887 second cycle flocks. Ask your Extension advisor or nutritionist for a copy.

Flock Profiling

Tables 5a, 5b, and 5c are examples of farm performance profiles using the data generated from this experiment. It is suggested that egg producers compile similar performance profiles from their past experience. A good profile needs to be current (1-2 years), represent all seasons, and should not exclude poor flocks. If done properly, they can provide you with the performance characteristics that you should look for when making changes in your regular management. One comparison can't give you the final answer for questions as complex as selecting the proper molt method.

Other Alternatives to Feed-removal Molting Methods

The methods discussed in this article represent only a fraction of the list of alternative molting methods that may be considered. The use of alternative feedstuffs to accomplish a molt must be based upon its availability, the quality and consistency of the product, ease of use, and cost – and, obviously, the results. Other low nutrient feedstuffs have been used with varying degrees of success. These include wheat middlings, oat hulls, grape pomace, jojoba meal, alfalfa meal, and other similar low nutrient materials. How the products are fed is probably of equal importance to the selection of the feedstuff itself.

As with any "new" management procedure, be sure that you understand the details of the program, carry it out to the smallest detail, and always compare it with your existing programs. Be sure that your comparisons include all aspects of the question, which have economic effects on your business. And, finally, never be satisfied with the way you've always done things. Conditions change; prices change; the market changes. All of these have a bearing on how you should manage your flocks.

Table 5a: Summary of post-molt performance (egg production profiles)
Non-feed-removal flocks - 2000-2001

Flock Description

Flock	#1	#2	#3	#4	#5
Farm	1	1	2	3	3
Strain	W-36	W-98	W-77	B-300	S-White
House size ('000s)	102	41	25	17	17

Flock #1 data adjusted one week in all tables.

	Hen-day egg production (%)						**HH egg production**					
Week no.	**Flock #1**	**Flock #2**	**Flock #3**	**Flock #4**	**Flock #5**	**Avg**	**Flock #1**	**Flock #2**	**Flock #3**	**Flock #4**	**Flock #5**	**Avg**
1	46.3	13.3	53.6	54.7	36.8	40.9	3.2	0.9	3.7	3.8	2.6	2.9
2	1.5	0.0	5.2	4.2	8.0	3.8	3.3	0.9	4.1	4.1	3.1	3.1
3	0.7	0.8	11.8	1.4	0.8	3.1	3.4	1.0	4.9	4.2	3.2	3.3
4	2.1	0.6	4.7	0.9	1.4	1.9	3.5	1.0	5.3	4.3	3.3	3.5
5	9.8	3.1	8.2	1.1	1.7	4.8	4.2	1.2	5.8	4.3	3.4	3.8
6	25.6	17.5	43.4	24.9	16.4	25.6	6.0	2.5	8.8	6.0	4.5	5.6
7	49.6	62.2	63.8	73.1	68.7	63.5	9.5	6.8	13.1	11.0	9.2	9.9
8	68.0	82.8	71.8	80.3	80.4	76.7	14.2	12.5	18.0	16.4	14.6	15.1
9	76.2	82.5	75.3	84.9	85.4	80.8	19.5	18.2	23.2	22.1	20.3	20.6
10	78.9	82.6	78.7	84.1	86.2	82.1	25.0	23.8	28.5	27.7	26.1	26.2
11	82.8	80.0	80.1	82.6	87.0	82.5	30.8	29.3	34.0	33.2	31.9	31.8
12	81.8	80.2	79.9	83.7	85.6	82.2	36.4	34.8	39.4	38.7	37.6	37.4
13	80.0	82.2	78.5	82.3	85.0	81.6	42.0	40.5	44.7	44.2	43.2	42.9
14	80.7	80.3	78.7	87.9	85.7	82.7	47.6	46.0	50.1	50.0	48.9	48.5
15	79.1	80.4	77.4	86.6	86.5	82.0	53.1	51.5	55.3	55.6	54.6	54.0
16	81.9	78.5	75.9	84.0	84.0	80.9	58.7	56.8	60.4	61.1	60.1	59.4
17	79.6	78.5	76.7	78.5	83.2	79.3	64.2	62.1	65.6	66.2	65.6	64.8
18	81.1	79.2	74.9	82.5	83.4	80.2	69.8	67.5	70.6	71.5	71.0	70.1
19	81.5	78.5	76.9	81.6	83.0	80.3	75.5	72.9	75.8	76.8	76.4	75.5
20	77.0	81.3	77.7	81.7	83.6	80.3	80.8	78.4	81.0	82.1	81.8	80.8
21	83.3	77.7	76.7	82.3	81.7	80.3	86.5	83.6	86.1	87.3	87.1	86.1
22	81.0	76.9	65.7	80.6	82.9	77.4	92.1	88.8	90.5	92.5	92.5	91.3
23	80.1	78.1	75.0	81.3	82.9	79.5	97.6	94.0	95.5	97.6	97.8	96.5
24	77.6	77.4	73.7	77.9	80.1	77.3	102.9	99.2	100.4	102.6	102.9	101.6
25	77.3	76.6	73.2	79.7	80.7	77.5	108.2	104.3	105.3	107.6	108.1	106.7
26	78.5	75.8	73.7	76.4	79.1	76.7	113.6	109.4	110.1	112.4	113.1	111.7
27	76.5	75.0	73.1	75.1	77.9	75.5	118.8	114.3	115.0	117.2	118.1	116.7
28	73.9	78.0	71.5	74.9	78.7	75.4	123.9	119.5	119.7	121.8	123.1	121.6
29	75.4	72.3	72.3	74.2	78.4	74.5	129.0	124.3	124.4	126.5	128.1	126.4
30	75.5	72.3	70.8	70.7	74.4	72.7	134.1	129.0	129.1	130.9	132.8	131.2
31	72.9	70.8	69.5	67.5	71.8	70.5	139.1	133.7	133.7	135.0	137.3	135.7
32	72.6	71.5	68.5	67.1	70.6	70.1	144.0	138.3	138.1	139.2	141.7	140.3
33	74.8	73.1	67.8	67.3	67.9	70.2	149.1	143.1	142.6	143.3	146.0	144.8
34	67.5	68.8	67.3	66.6	69.4	67.9	153.7	147.6	147.0	147.4	150.3	149.2
35	73.9	69.3	67.2	64.8	69.7	69.0	158.7	152.0	151.3	151.3	154.6	153.6
36	71.5	70.0	65.3	62.8	67.5	67.4	163.5	156.5	155.6	155.1	158.8	157.9
37	66.2	66.3	63.2	60.0	65.0	64.1	168.0	160.8	159.6	158.7	162.8	162.0
38	65.9	64.7	63.8	59.4	64.1	63.6	172.0	164.9	163.8	162.3	166.8	165.9
Av	65.9	64.4	64.3	66.1	67.3	65.6	172.0	164.9	163.8	162.3	166.8	166.0
Feed removed flocks Av.	65.6	65.1	68.9	68.0	68.7	67.3	171.1	160.9	176.1	168.5	171.4	169.6
Days w/o feed	10	13	11	6	6							

Table 5b. (Mortality and egg weight profiles) - non-feed-removal flocks - 2000/2001

	Weekly mortality (%)						**Egg weight (lbs/case)**					
Week no.	**Flock #1**	**Flock #2**	**Flock #3**	**Flock #4**	**Flock #5**	**Avg**	**Flock #1**	**Flock #2**	**Flock #3**	**Flock #4**	**Flock #5**	**Avg**
1	0.095	0.290	0.270	0.665	0.750	0.414	50.7	52.6	52.1	47.9	47.4	50.1
2	0.084	0.210	0.295	0.620	0.905	0.423	50.8	52.6	46.7	47.9	47.4	49.1
3	0.036	0.280	0.260	0.530	0.510	0.323	51.6	52.6	46.7	47.9	47.4	49.2
4	0.034	0.150	1.231	0.360	0.360	0.427	51.0	52.6	47.0	47.9	47.4	49.2
5	0.057	0.140	0.235	0.250	0.250	0.186	51.0	52.6	50.5	47.9	47.4	49.9
6	0.060	0.120	0.102	0.630	0.380	0.258	52.0	51.6	50.5	47.9	47.4	49.9
7	0.070	0.260	0.130	0.695	0.565	0.344	50.0	49.2	50.5	47.9	47.4	49.0
8	0.062	0.100	0.126	0.410	0.365	0.213	52.0	49.2	50.5	50.6	50.8	50.6
9	0.070	0.140	0.130	0.432	0.278	0.210	52.6	53.3	53.3	50.6	51.1	52.2
10	0.070	0.160	0.120	0.433	0.356	0.228	52.4	53.0	53.1	50.1	50.9	51.9
11	0.080	0.130	0.120	0.393	0.343	0.213	52.0	51.0	52.6	49.4	49.9	51.0
12	0.080	0.140	0.140	0.370	0.290	0.204	51.4	51.2	51.4	49.5	49.9	50.7
13	0.070	0.160	0.150	0.350	0.318	0.210	51.2	52.9	51.6	50.3	50.4	51.3
14	0.100	0.160	0.160	0.366	0.343	0.226	51.7	51.7	52.1	50.8	50.5	51.4
15	0.100	0.190	0.210	0.460	0.314	0.255	52.1	52.5	51.1	49.9	50.0	51.1
16	0.130	0.180	0.180	0.469	0.301	0.252	52.1	52.2	51.6	49.4	49.3	50.9
17	0.100	0.130	0.120	0.374	0.384	0.222	51.5	52.8	52.2	50.4	50.0	51.4
18	0.100	0.190	0.190	0.368	0.396	0.249	51.6	51.8	52.3	49.9	50.1	51.1
19	0.110	0.200	0.150	0.348	0.342	0.230	52.1	52.3	53.2	49.5	50.0	51.4
20	0.100	0.260	0.150	0.327	0.260	0.219	52.2	52.5	53.6	50.1	49.8	51.6
21	0.130	0.230	0.160	0.295	0.264	0.216	52.3	52.6	53.9	50.1	50.4	51.9
22	0.110	0.210	0.150	0.366	0.307	0.229	52.6	52.3	53.4	50.6	50.8	51.9
23	0.070	0.270	0.240	0.360	0.259	0.240	51.9	52.1	53.0	49.4	49.3	51.1
24	0.120	0.280	0.190	0.291	0.284	0.233	50.9	52.1	53.6	50.5	49.9	51.4
25	0.130	0.260	0.190	0.325	0.278	0.237	51.9	52.8	53.3	50.0	50.0	51.6
26	0.110	0.310	0.180	0.399	0.243	0.248	51.4	51.2	52.6	49.9	50.0	51.0
27	0.120	0.340	0.210	0.296	0.236	0.240	53.0	52.6	53.1	50.0	50.9	51.9
28	0.120	0.290	0.240	0.337	0.215	0.240	52.4	51.6	52.2	50.5	50.4	51.4
29	0.180	0.300	0.190	0.335	0.240	0.249	51.9	51.7	52.5	50.9	51.3	51.7
30	0.110	0.310	0.260	0.373	0.269	0.264	52.7	52.4	53.0	50.3	51.0	51.9
31	0.130	0.290	0.220	0.367	0.294	0.260	52.1	52.7	52.8	51.3	51.0	52.0
32	0.130	0.330	0.160	0.383	0.309	0.262	52.6	50.7	53.3	51.1	50.9	51.7
33	0.130	0.410	0.230	0.411	0.314	0.299	52.6	50.7	53.5	50.8	51.1	51.7
34	0.130	0.390	0.180	0.428	0.325	0.291	52.3	52.6	53.1	51.3	51.4	52.1
35	0.140	0.420	0.270	0.487	0.251	0.314	53.3	53.7	53.6	51.0	51.4	52.6
36	0.260	0.420	0.290	0.482	0.396	0.370	52.3	52.1	53.3	51.3	51.6	52.1
37	0.160	0.340	0.200	0.538	0.426	0.333	52.1	53.0	53.4	51.3	51.9	52.3
38	0.104	0.430	0.200	0.390	0.377	0.300	52.1	52.6	53.9	50.9	51.5	52.2
Av	0.104	0.243	0.214	0.407	0.343	0.262	52.0	52.0	52.4	50.2	50.3	51.4
Feed removed flock Av.	0.100	0.317	0.182	0.355	0.306	0.252	52.2	52.0	52.2	50.0	50.2	51.3

Table 5c: (Feed consumption and flock economic index profiles) - non-feed-removal flocks - 2000/2001

	Daily feed intake/ 100						Flock index - egg income-feed cost ($)					
Week no.	**Flock #1**	**Flock #2**	**Flock #3**	**Flock #4**	**Flock #5**	**Avg**	**Flock #1**	**Flock #2**	**Flock #3**	**Flock #4**	**Flock #5**	**Avg**
1	11.9	10.9	17.5	13.4	16.5	14.0	0.11	0.00	0.11	0.13	0.06	0.08
2	11.7	11.0	14.9	10.6	12.2	12.1	0.07	-0.03	0.08	0.10	0.04	0.05
3	11.8	11.1	13.6	12.3	12.4	12.2	0.03	-0.07	0.06	0.06	0.00	0.02
4	14.9	11.0	15.8	16.1	15.0	14.5	-0.01	-0.11	0.02	0.01	-0.05	-0.03
5	17.3	21.8	18.2	22.8	21.0	20.2	-0.06	-0.19	-0.03	-0.09	-0.13	-0.10
6	20.1	23.9	20.6	24.2	22.7	22.3	-0.07	-0.25	0.01	-0.12	-0.18	-0.12
7	20.1	24.0	24.6	23.4	21.5	22.7	0.00	-0.16	0.10	0.00	-0.07	-0.03
8	20.7	25.4	23.4	23.3	22.0	23.0	0.12	-0.01	0.22	0.15	0.08	0.11
9	21.6	24.8	22.7	22.8	24.0	23.2	0.27	0.14	0.36	0.31	0.24	0.26
10	21.9	24.1	23.7	22.6	22.6	23.0	0.42	0.29	0.50	0.47	0.40	0.42
11	21.6	23.4	23.2	21.5	21.8	22.3	0.58	0.44	0.65	0.62	0.57	0.57
12	21.9	24.5	20.1	22.6	22.2	22.2	0.75	0.58	0.81	0.78	0.74	0.73
13	22.2	23.9	23.7	22.1	22.6	22.9	0.90	0.73	0.95	0.93	0.90	0.88
14	21.4	23.5	19.3	21.2	21.1	21.3	1.06	0.88	1.11	1.11	1.07	1.04
15	21.1	25.7	21.7	20.3	19.9	21.8	1.22	1.02	1.25	1.28	1.24	1.20
16	22.5	20.9	20.6	21.2	21.7	21.4	1.37	1.17	1.39	1.44	1.40	1.36
17	21.1	24.2	22.3	21.0	20.1	21.7	1.53	1.31	1.53	1.58	1.56	1.50
18	22.6	23.5	22.1	19.6	20.6	21.7	1.69	1.45	1.67	1.74	1.72	1.65
19	21.1	25.0	20.3	21.2	21.2	21.8	1.85	1.58	1.81	1.89	1.88	1.80
20	22.6	24.6	16.9	21.0	22.1	21.4	1.99	1.73	1.98	2.05	2.03	1.96
21	22.6	24.0	25.3	21.6	23.7	23.4	2.15	1.86	2.11	2.20	2.18	2.10
22	22.4	24.3	21.7	23.4	20.0	22.4	2.31	1.99	2.21	2.34	2.34	2.24
23	21.9	24.4	23.3	21.2	22.0	22.6	2.46	2.13	2.34	2.48	2.49	2.38
24	23.0	22.2	21.0	20.8	21.4	21.7	2.60	2.27	2.48	2.62	2.63	2.52
25	22.5	23.3	24.9	23.3	22.4	23.3	2.75	2.40	2.59	2.76	2.77	2.65
26	23.4	23.6	23.9	21.3	22.7	23.0	2.89	2.53	2.71	2.89	2.91	2.79
27	23.9	23.0	22.8	21.6	23.3	22.9	3.02	2.66	2.84	3.02	3.04	2.92
28	23.2	23.4	25.1	23.7	22.3	23.5	3.15	2.80	2.95	3.13	3.18	3.04
29	24.0	23.3	20.5	23.9	22.8	22.9	3.28	2.91	3.08	3.25	3.31	3.17
30	22.9	23.9	22.3	23.2	23.2	23.1	3.41	3.03	3.19	3.36	3.43	3.29
31	23.8	22.7	22.9	22.9	24.1	23.3	3.54	3.15	3.31	3.46	3.54	3.40
32	23.6	25.7	23.3	23.6	23.9	24.0	3.66	3.25	3.41	3.55	3.64	3.50
33	23.0	24.6	25.1	23.5	23.9	24.0	3.79	3.36	3.51	3.65	3.74	3.61
34	22.7	23.0	26.1	23.5	22.6	23.6	3.90	3.47	3.60	3.74	3.85	3.71
35	23.7	25.1	21.1	23.4	23.5	23.4	4.02	3.57	3.71	3.83	3.95	3.82
36	23.6	24.7	24.1	23.8	23.7	24.0	4.14	3.68	3.80	3.91	4.05	3.92
37	23.5	24.4	23.9	23.2	24.9	24.0	4.24	3.77	3.89	3.98	4.13	4.00
38	21.2	22.5	22.7	23.7	23.3	22.7	4.34	3.87	3.98	4.05	4.22	4.09
Av	21.2	22.5	21.7	21.4	21.4	21.6	4.34	3.87	3.98	4.05	4.22	4.09
Feed removed flock Av.	21.6	23.2	22.3	21.1	21.6	22.0	4.24	3.69	4.40	4.34	4.37	4.21