Less Feed For Layers?

If the amount of feed given to layers is to be restricted, there may be difficulties in distributing it evenly throughout the flock. (Photograph by courtesy of Tampella)

● With feed prices rising rapidly in most countries, it is attractive to consider cutting down the amount of food given to layers kept for table-egg production. Restricting their feed instead of following the more common practice of allowing them to eat ad lib may mean fewer or smaller eggs, but if prices for eggs are comparatively low while those for feedstuffs are high, the loss of egg income may be small in relation to the savings in food costs achieved.

The influence on egg output and profitability of several different methods of rationing has been investigated recently in England. The results of three sets of trials, involving a trio of laying strains and various rationing techniques, suggest among others these conclusions:—that whether it is worthwhile to restrict layers' feed at all varies considerably from farm to farm; and that the effectiveness of a particular rationing technique depends a great deal on the strain of bird kept.

In the trials, at Harper Adams poultry husbandry experimental unit in Shropshire, the conventional feeding programme for layers was taken to be full-feeding with a diet having an energy value of about 2760 kilocalories metabolisable energy per kilo and a protein content of 15%. Against this standard were compared regimes in which the birds' nutrient intake was reduced, either by lowering the quality of the diet or by restricting the total amount fed.

Towards End Of Lay

Both methods of restriction were tried only in the later part of the laying cycle, because it was assumed that any over-consumption of nutrients by full-fed layers is most likely to occur in the last two-thirds of the normal cycle—that is, after about 37 to 40 weeks of age.

Once the birds reach physical maturity and pass the stage of peak egg output, their egg production starts to show a steady decline and they begin to put on fat. Also, many eggs produced in the later part of lay easily exceed the minimum weight needed to qualify for the largest grade, so any loss of average egg weight which might result from rationing feed probably would be less serious financially.

Previous research has indicated that the degree of quantitative restriction to aim for with commercial-type diets is between 7 and 10%, a more severe restriction than this being likely to depress production to the extent that food cost savings are wiped out. Three techniques for restricted feeding commercial flocks were therefore chosen which were expected to give this desired restriction:—

(1) Holding down or "freezing" daily food intake at the level reached at 40 weeks. This "freeze" technique is preferable to fixing food intake at an arbitrary level, explain the researchers, because it accounts automatically for the variations in food consumption caused by such factors as the strain of bird, temperature, composition of the diet and the degree of food wastage.

(2) Withholding food on one day each week. This version of skip-a-day feeding—in this trial it meant not offering food on a Sunday—has the advantage of needing less labour than ad lib regimes. It also avoids the problem of distributing a limited amount of feed evenly through the flock every day.

(3) Limiting feeding-time to only four to six hours daily. This allows intake to be restricted daily without the tasks of weighing and delivering set quantities of food. Probably the restricted feeding-time is best divided into at least two sessions daily, one in the morning and the other in the afternoon.

Table 1. First Trial – Restricting Feed By Quality and Quantity.

Treatment	HHH	HMM	HML	MMM	MML	MLL	H/FR	H/SD	H/4H	M/FR	M/SD	M/4H
Age at 50% production (days)	174	172	172	173	173	173	174	173	173	174	174	174
Peak egg production (%)	89.6	87.0	88.1	86.3	85.4	85.1	86.6	87.6	86.7	86.0	85.3	86.0
Egg yield per bird-housed (no)	275	261	257	264	255	256	258	262	249	252	252	248
Egg grading (%): large	36.2	34.4	33.0	35.4	31.9	33.4	30.9	31.9	31.5	31.5	30.9	32.5,
"seconds"	8.8	8.7	8.7	8.9	8.6	9.0	8.1	8.6	8.1	8.0	8.7	8.5
Food intake per bird housed (lb)	99.2	98.1	97.2	99.4	98.1	97.7	89.5	95.2	91.0	91.9	95.9	94.4
Mortality (%) (20–76 weeks)	8.7	11.1	12.0	10.2	14.4	12.9	11.5	9.3	12.2	9.8	14.0	12.0
Body weight (lb): at 40 weeks	3.67	3.68	3.69	3.64	3.62	3.61	3.69	3.71	3.51	3.64	3.62	3.49
at 76 weeks	3.89	3.82	3.79	3.85	3.75	3.75	3.70	3.83	3.87	3.62	3.73	3.74
Margin of egg income over food cost and livestock depreciation per bird housed (£)	0.35	0.23	0.21	0.28	0.18	0.23	0.31	0.25	0.19	0.27	0.18	0.19

H = High Density Diet
M = Medium Density Diet
L = Low Density Diet
FR = "Freeze"
SD = Skip-a-day
4H = 4 hours daily

Three Ad Lib Diets Compared

In the first Harper Adams trial, these three methods of quantitative food restriction were compared with ad lib feeding either the standard medium density diet or one containing about 0.5% more protein and 110 more kcal ME per kilo. A third, low density, diet was also fed ad lib to some groups during the last third or two-thirds of the laying cycle, as an extra comparison.

A total of 5400 lightweight hybrid pullets were used in the trial. If restriction was by feed *quality*, this was done at 40 and/or 60 weeks, whereas all three methods of *quantitative* restriction began at 40 weeks, on both medium and high density diets.

Freezing the food intake of one group of layers at the 40-weeks level, at between 113.4 and 116.2 grams per hen per day, provided an 11% average reduction in food intake compared with the controls. Missing out the Sunday feed for other birds restricted their consumption by only 4% but gave no better laying performance, while limiting feeding time to two hours night and morning reduced intake by 13-15% and so badly affected production that the birds were returned to ad lib at 60 weeks.

Table 2. Second Trial – Restricting Feed By Quality.

Treatments	HHH	HMM	HML	MMM	MML	MLL
Age at 50% production (days)	172	173	172	174	173	174
Peak egg production (%)	84.6	86.9	85.4	83.9	86.5	86.1
Egg yield (no): bird-housed	276	279	283	271	284	283
bird-day	290	287	295	288	294	289
Egg grading (%): large	27.3	26.6	24.7	27.4	27.0	26.4
"seconds"	6.2	6.3	5.9	5.6	5.6	6.2
Food intake per bird housed (lb)	93.9	99.2	99.0	96.8	101.6	101.9
Food cost per bird housed (£)	1.78	1.82	1.80	1.75	1.83	1.81
Mortality (%) (20-80 weeks)	10.7	6.8	9.1	11.6	5.8	5.5
Body weight (lb): at 40 weeks	3.53	3.51	3.44	3.57	3.55	3.48
at 80 weeks	3.86	3.88	3.90	3.88	3.88	3.77
Margin of egg income over food cost and livestock depreciation per bird housed (£)	0.77	0.77	0.85	0.76	0.85	0.83

H = High Density Diet
M = Medium Density Diet
L = Low Density Diet

Varying the nutrient density of the diet proved to have little effect on food consumption. And because the birds did not compensate adequately by increasing their intake of the poorer quality diets, their production suffered.

In fact productivity was lower between 20 and 76 weeks on all the restriction techniques tried. Egg numbers and size were both reduced, and the resulting losses in egg income outweighed the savings in food cost. There was clearly no economic advantage from restricted feeding under the conditions of this experiment, comment the researchers, who also drew these general conclusions:

- Not all flocks can adjust satisfactorily to changes in dietary quality.
- The method of quantitative rationing influences the layers' response as well as the degree of restriction.
- The daily administration of a fixed quantity of food (the "freeze" method) is likely to be more successful than the "Never-on-Sunday" technique or limiting feeding time to a few hours daily.

However, contrasting results on the effects of varying the nutrient density of layers' diets came from the second trial in the series. Here,

lightweight hybrid pullets were used, housed on deep litter instead of the cages employed in the first trial and restricted in nutrient intake only by alterations to the quality of the diet.

Once again diets of high, medium or low density were offered, the changeover from high to medium or medium to low taking place at 40 and/or 60 weeks. But this time the birds adapted well to the changes in quality, increasing consumption so that their intakes of energy and protein were all similar. Unfortunately, although egg production and grading

Weniger Futter für die Legehenne?

Zusammenfassung—Eine britische Untersuchung hat sich mit verschiedenen Methoden der Futterrationierung für Legehennen befaßt. Hierbei wurde die Futteraufnahme entweder durch Absenkung der Futterqualität oder durch Beschränkung der Gesamtfuttermenge reduziert. Beide Methoden wurden nur im späteren Teil der Legeperiode erprobt, weil man annahm, daß Futterüberverzehr bei ad libitum gefütterten Legehennen wahrscheinlich nach 37-40 Wochen Alter eintritt.

Im ersten Versuch arbeitete man mit leichten Hybridhennen. Im Vergleich zu den Kontrollhennen kam man auf eine Futterverzehrsreduktion von durchschnittlich 11%, wenn die Zuteilungsmenge auf dem Verzehrswert von 40 Wochen Alter "eingefroren" wurde. Weglassen der sonntäglichen Fütterung reduzierte den Futterverzehr um nur 4%, erbrachte aber keine bessere Legeleistung, während die Beschränkung der Fütterungszeit auf 2 Stunden abends und morgens die Aufnahme um 13-15% senkte und die Legeleistung so stark beeinträchtigte, daß man die Tiere bei 60 Wochen wieder auf ad libitum-Fütterung setzte.

Eine Variation der Nährstoffdichte hatte auf den Futterverzehr nur geringfügige Auswirkungen. Im zweiten Versuch passten sich die leichten Hybridhennen an Rationen mit verscheidener Nährstoffdichte jedoch gut an und regulierten ihren Verzehr so, daß die Energie- und Proteinaufnahmewerte alle auf ähnlicher Ebene lagen. Leider wurden die mit dem billigeren Futter mit niedrigerer Nährstoffdichte erzielten Ersparnisse durch die höheren Verzehrsmengen restlos wieder aufgezehrt.

Die Ergebnisse dieser drei Versuche zeigen, daß man die Futterverwertung durch Reduktion der Futteraufnahme der Henne um 5-10% verbessern kann. Ob hiermit jedoch im Vergleich zur ad libitum-Verfütterung eines Futters mit 15% Proteingehalt und 2760 Kcal U.E./kg eine verbesserte Gewinnspanne herausgewirtschaftet wird, hängt in hohem Maße von den relativen Futter- und Eierpreisen ab. Mit diesen Versuchen wurde unter Beweis gestellt, daß die 6-Tage-Fütterung pro Woche eine höchst unökonomische Methode der Futterrationierung für Legehennen ist.

Moins De Nourriture Pour Les Pondeuses?

Sommaire—Quand récemment, on fit des recherches en Angleterre sur les différentes façons de rationner la nourriture des pondeuses, on abaissa la qualité nutritive de l'aliment ou on réduisit la quantité d'aliment consommé. C'est seulement à la fin du cycle de ponte que ces deux méthodes furent essayées parce qu'on pensait qu'une éventuelle surconsommation ne pouvait guère se produire qu'après 37 à 40 semaines.

Dans la première expérience, on utilisa une race légère de poulette hybride. En bloquant la consommation de nourriture au niveau de la quarantième semaine, on obtint une réduction moyenne de 11% par rapport aux bêtes témoins. En ne donnant pas de nourriture le dimanche, on ne réduisit la consommation que de 4% et on n'obtint pas de meilleurs résultats de ponte. Par contre en limitant le temps des repas à deux heures le jour et la nuit, on diminua la consommation de 13-15% mais on obtint des résultats de ponte si mauvais qu'il fallut retourner à une nourriture à volonté la soixantième semaine.

Les variations de la qualité nutritive du régime alimentaire eurent peu d'effets sur la consommation de nourriture. Dans la seconde expérience, des poulettes hybrides légères nourries avec des aliments de densité nutritive variable, s'adaptèrent bien à ces changements de qualité et augmentèrent leur consommation pour que leur absorption d'énergie et de protéines reste la même. Malheureusement, les économies réalisées sur les aliments bon marché à faible densité furent complètement compensées par des niveaux plus élevés de consommation.

Les résultats des trois expériences montrèrent que le taux de conversion alimentaire pouvait être amélioré en réduisant la nourriture des pondeuses de 5 à 10%. Quant à savoir si on augmente sa marge bénéficiaire par rapport à une alimentation libre de 15% de protéines /2760 kcal ME, ceci dépend principalement du prix relatif de l'aliment et des oeufs. Ces expériences ont tout de même prouvé qu'une façon très inefficace de rationner des pondeuses était de les nourrir six jours par semaine.

Meno Mangime Per Le Ovaiole?

Riassunto—Nelle recenti indagini svolte in Inghilterra riguardo i diversi metodi di razionamento del mangime alle ovaiole, l'assorbimento nutritivo degli animali è stato ridotto sia abbassando la qualità della dieta, sia limitando il quantitativo totale del consumo. Entrambe i metodi sono stati sperimentati solo nell'ultima parte del ciclo di deposizione, perchè si è ritenuto che qualunque super-consumo di elementi nutritivi da parte di ovaiole con alimentazione a volontà avvenga nella maggior parte dei casi dopo circa 37 o 40 settimane di vita.

Nel primo esperimento, è stato usato un tipo di pollastre ibride di peso leggero. Il blocco del consumo di mangime al livello delle 40 settimane ha fornito una riduzione media del consumo dell'11% a paragone con gli animali sotto controllo. La mancata somministrazione di mangime della domenica ha limitato il consumo di solo il 4% ma non ha dato nessun migliore rendimento nella deposizione, mentre la limitazione del tempo di alimentazione a due ore alla notte e alla mattina ha ridotto il consumo del 13/15% e ha influito talmente negativamente sulla produzione che gli animali sono stati ripassati all'alimentazione ad lib a 60 settimane.

La variazione della densità nutritiva della dieta ha dimostrato di avere poco effetto sul consumo del mangime. Ma in un secondo esperimento, le pollastre ibride leggere alimentate con diete di diverse densità nutritive, si sono ben adattate ai cambiamenti di qualità, aumentando il consumo cosicchè il loro assorbimento di energia e proteina era del tutto simile. Purtroppo, i risparmi delle diete più economiche e a bassa densità sono stati completamente annullati dai maggiori livelli di consumo.

I risultati di tutti e tre gli esperimenti hanno dimostrato che la conversione del mangime può venire migliorato riducendo il consumo di mangime delle ovaiole di una percentuale fra il 5 e il 10%. Ma se questo procuri un aumentato margine di profitto a paragone con l'alimentazione ad lib di una dieta al 15% di proteine/2760 Kcal ME dipende maggiormente dai relativi prezzi del mangime e delle uova. Quello che hanno dimostrato questi esperimenti è che un'alimentazione di soli sei giorni alla settimana è un sistema di razionamento delle ovaiole altamente inefficiente.

were not significantly different on each treatment, savings from the cheaper, low density diets were completely offset by the higher levels of consumption.

Skip-A-Day Not Satisfactory

The final trial in the series was designed to test the three methods of rationing by limiting the overall quantity of a diet. A heavier type of hybrid pullet was fed the medium density diet on ''freeze'', skip-a-day or limited-time regimes. A 5% reduction in daily food intake was achieved by holding consumption at 119 grams per day from 40 weeks onwards, compared with a $2^1/_2$% restriction from skip-a-day feeding and 8% lower intake for birds limited to six hours feeding per day—three hours in the morning and three in the afternoon.

Although the least restriction came from cutting out the Sunday feed, laying performance on this regime was no better than on the other treatments. But on the other levels of restriction were in any case less severe than those in the first two trials, and productivity was less adversely affected overall by any of them.

The results of all three trials, set out in the tables below, show that the conversion of food into eggs can be improved by reducing layers' food intake by betweeen 5 and 10%. But whether this gives an increased profit margin compared with ad lib feeding of a 15% protein/2760 kcal ME diet depends largely on the relative prices of feed and eggs.

If egg prices fall in relation to those of feedingstuffs, comment the Harper Adams researchers, then restricted feeding of layers becomes more desirable economically. In this case the most successful method of rationing to adopt in practice would be one like the ''freeze'' method which is based on the daily administration of a fixed quantity of food.

What has been clearly demonstrated by these trials, they declare, is that a Never-on-Sunday system of feeding on only six days a week is a highly inefficient way of rationing layers.

—Peter Best

In English trials, restricting the overall amount of feed was more successful than limiting intake by reducing dietary quality.

Table 3. Third Trial – Restricting Quantity Of Feed.

Method of feeding	Full-fed control	"Freeze"	Skip-a-day	6 hr per day
Egg yield (no): bird-housed	260	258	251	251
bird day	272	268	261	260
Egg grading (%): large	29.6	28.8	27.2	28.0
"seconds"	8.2	8.4	8.8	8.7
Food intake per bird housed (lb)	102.8	99.5	100.8	97.7
Food conversion from 40 weeks (g food per g egg)	2.93	2.85	3.07	2.88
Mortality (%) (20–76 weeks)	7.41	7.04	7.04	7.41
Body weight (lb): at 40 weeks	4.96	4.89	4.96	4.94
at 76 weeks	5.11	5.00	5.03	4.72
Margin of egg income over food cost and livestock depreciation per bird housed (£)	1.41	1.43	1.26	1.33

Shelf Life Of Liquid Egg

Normally broken-out whole eggs are frozen for storage, to safeguard their quality and wholesomeness. But there is now evidence that liquid whole egg may safely be stored for short periods even if it is unfrozen provided the holding temperature is closely controlled.

Tests at Michigan State University, USA, suggest that if high quality liquid whole egg is pasteurised correctly, it will remain fresh-tasting and wholesome for up to five days at 9°C. If the temperature can be brought down to 2°C, its acceptable shelf life is as long as 12 days.

At the lower storage temperature the number of viable bacteria, as measured by plate counts, remain low for six days before the multiplication rate increases. No objectionable odours are noted until Day 13. At 9°C the bacteria count stays low for only two days, the first unpleasant odours being detected on the sixth day of storage.