

# Saving Feed And Fuel

Recent months have seen an unprecedented escalation in world prices for feedstuffs and fuel. Inevitably, this situation has triggered off considerable anxiety on the part of poultrymen everywhere. So in this issue **POULTRY INTERNATIONAL** turns the spotlight on some ways in which producers can make economies which could spell the difference between staying in and going out of business.

## 1. Limited Feeding Lowers Costs

● Feed cost, the key expense in egg production, has been examined in just about every way possible in an effort to lower total production costs. This is especially true during the current ingredient shortage. The most promising way to economise seems to be limited feeding which offers an opportunity to cut feed cost by an equivalent of \$7 to \$8 per ton with no production losses. Even in periods of more "normal" prices, feed costs have been lowered by up to 1 US cent per dozen eggs under practical conditions by limited feeding.

In simple terms, limited feeding is a programme of restricting the dietary intake of egg strain layers. The term "limited feeding" is used rather than restricted or controlled feeding because it indicates the kind of precise boundaries that are placed on feed intake. Obviously, this programme requires good feeder management.

### Energy Intake Reduced

In limited feeding, the energy intake of the bird is reduced. In this way the efficiency of energy utilization is increased. Note: *only the energy intake of the layers should be reduced.* Amino acids, vitamins and mineral levels are actually more critical in limited than in full feeding. A ration with proper nutrient balance designed specifically for limited feeding is essential. Without the proper nutrient balance, limited feeding of layers will fail.

Restricted feeding programmes for commercial layers have been tried previously and have usually been unsuccessful. Some reasons for this were insufficient knowledge of the laying hen's amino acid requirements, and the percentage restriction or limitation was too great. Only where accurate knowledge of amino acid requirements of commercial layers has been used to formulate the ration will a limited feeding regime be successful.

There are two methods that can be used to limit layers intake—by weight and by time. In a weight limited programme, hens are restricted to a certain percentage of the feed that a fully fed group consumes. Using a time limitation programme, hens are allowed access to the feed for only eight to ten hours per day, usually in two feeding intervals. By adjusting the time feed is available, the percentage limitation can be decreased or increased.

Either one of these two basic limiting programmes will work. The important point is that sufficient limitation of

feed intake occurs to achieve maximum economic savings, but yet not be so severe as to cause lower performance rates.

### Fully-Fed Controls

Here is how a typical limiting programme might work. Whether mechanically or manually, one line of cages should be fully fed. These are designated the "check-hens" and they serve as the feed intake guide or monitor.

The quantity of feed these birds consume is determined either by weighing the feed fed from the cart on a daily basis or by use of a special weighing device on a mechanical feeder line. The rest of the birds are then given, on a daily basis, 94% of the intake the check-hens averaged per day the previous week.

Why 94%? It has been determined that this level of restriction does not cause any production loss, and minimises the slight egg size reduction which occurs with

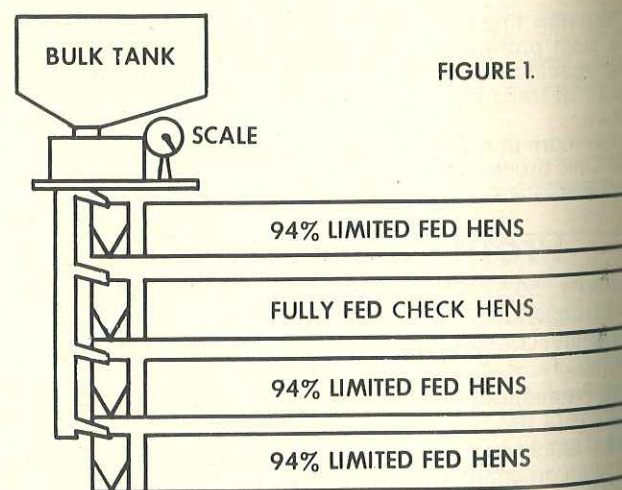
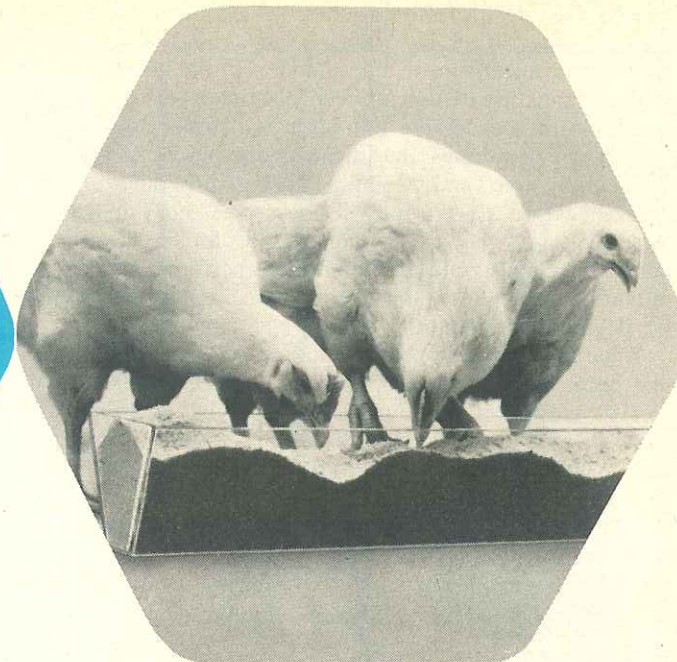


FIGURE 1.

**Figure 1:** A stylised concept of a mechanically fed cage laying house in which the hens are on limited feeding. One row of cages is fully fed to act as a guide to free-choice consumption. All the other hens are fed 94% of the amount of feed eaten during the previous week by the check-hens.

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limited feeding. It also provides a sufficient margin of safety so that, if slightly greater restrictions occur due to poor feeder management, egg output will not suffer.

Important: distribution of feed accurately to all birds is essential since excessive limitation will cause too great a fall-off in egg weights and impaired egg production.

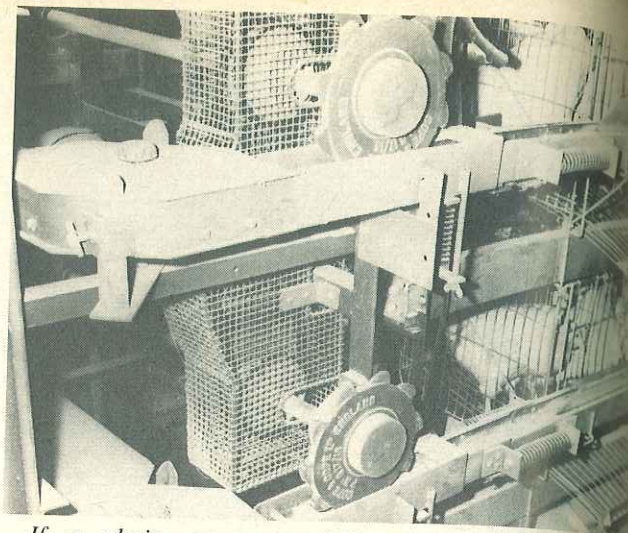
In both time and weight limiting programmes, the check-hens are always fully fed. As previously indicated, these hens serve as a feed intake guide for the rest of the house. They also aid in monitoring performance and in providing information on whether it is desirable to adjust the degree of limitation.

Since for ease of operation the check-hens and limited fed hens receive the same ration, the check-hens will receive extra fortification in amino acids, vitamins, and minerals that they do not need. While the extra fortification is of no harm to these hens, it is also of no benefit and adds slightly to the cost of production. For this reason, and to gain the benefits in limited feeding for as many hens as possible, the check-hen group should be kept to a minimum but with sufficient numbers to evaluate feed intake accurately.

#### A Representative Sample

Normally, the number of hens which serve as the check group are those that are on one mechanical feeder line or the number fed from one cart load. Birds that are representative of the entire house should be chosen and centrally located. Their feed consumption should be recorded daily and averaged weekly. This value serves as the next week's guide for the birds on limited feeding.

The reduction in egg size with limited feeding is only



*If a chain or auger delivery system is used, a high-speed drive unit is necessary to prevent birds near the hopper eating more than those at the end of the feeder line.*

slight. According to how eggs are graded, there is some tolerance in each weight class and once eggs move into the large class, there is no premium for an even larger egg. Thus, after the birds have shifted primarily (65 to 70%) into the largest category, normally after 36 to 38 weeks of age, there will be little, if any, economic effect of a small loss in egg size.

This egg size loss is indeed small, usually less than 1%

#### Kostensenkung durch beschränkte Fütterung

**Zusammenfassung**—Die vielversprechendste Methode der Futterkosteneinsparung bei Legehennen dürfte die der beschränkten Fütterung sein—sie bietet die Möglichkeit, ohne Produktionsverluste auf Ersparnisse im Wert von \$ 7 bis \$ 8 je t zu kommen. Bei der beschränkten Fütterung wird nur die Energieaufnahme des Tiers reduziert. Für die Durchführung eines solchen Fütterungsprogramms ist mit hin eine Spezialration, die nutritive Ausgewogenheit sicherstellt, unbedingt erforderlich.

Man kann die Futtermittelaufnahme der Legehennen auf zweierlei Weise limitieren—über das Gewicht und über die Zeit. Bei einem gewichtslimitierten Fütterungsprogramm erhalten die Hennen einen bestimmten Prozentsatz der Sattelfütterungsmenge. Bei der zeitlichen Limitierung haben die Tiere nur 8-10 Stunden täglich Zugang zum Futter; meist gibt es zwei Fütterungsintervalle. Durch Verkürzen oder Verlängern der Gesamtfütterungsdauer kann man die prozentuale Futterlimitierung steigern oder senken. Grundsätzlich funktionieren beide der hier genannten Programme der Futterbeschränkung.

In der Praxis sollte man so verfahren, daß eine Käfigreihe auf Sattelfütterung steht. Dies sind die Kontrollhennen, deren Futterverzehr genau be-

stimmt wird. Die übrigen Hennen erhalten als jeweils tägliche Zuteilung 94% der vorwöchentlichen Tagesverzehrsmenge der Kontrollhennen.

Es hat sich gezeigt, daß bei dieser Art der Futterbeschränkung keine Produktionsverluste auftreten und die geringfügige Einbuße an Eigröße minimiert wird. Außerdem enthält dieses Futterbeschränkungsprogramm noch ein ausreichendes Sicherheitspolster, so daß auch bei etwas stärkerer Restriktion keine Produktionseinbußen entstehen.

Mittlerweile sind bei Forschungsprojekten und Praxisversuchen beinahe alle bedeutenden Legerassen Futterbeschränkungsprogrammen unterworfen worden. Bei 9 voneinander unabhängigen Vergleichsversuchen mit einer oder mehr Legerassen kamen die restriktiv gefütterten Hennen im Vergleich zu den Kontrollhennen auf eine durchschnittliche Produktionssteigerung von 0,2%. Während der Beschränkungsperiode ergab sich eine Verbesserung der Futtermittelverwertung von 6,5%. Im Vergleich zu den Kontrollhennen wurde ein Eigewichtsrückgang von nur 0,6% festgestellt. Eine Verbesserung der Lebensfähigkeit von 0,5-5,8%, auf die Legeperiode bezogen, wurde ebenfalls beobachtet.

Bei der Verfolgung limitierter Fütterungsprogramme kommen folgende Fehler am häufigsten vor: zu zeitiges Einsetzen der Futterbeschränkung, zu

scharfe Restriktion, Durchführung des Limitationsprogramms mit Standardfutter und fehlende Überwachung der mechanischen Fütterungseinrichtungen. Außerdem ist es ein Fehler, von Zeit zu Zeit auf Sattelfütterung zurückzuschalten, weil die Hennen dann eine Zeitlang zuviel Futter verzehren.

#### Une Alimentation Contrôlée Diminue Les Coûts

**Sommaire**—La façon la plus prometteuse de faire des économies sur la nourriture des poules semble être l'alimentation contrôlée qui permet de diminuer les coûts de nourriture d'un équivalent de 7 à 8 dollars la tonne sans pertes de production. Dans l'alimentation contrôlée, c'est seulement l'absorption d'énergie de l'animal qui est réduite. Il est donc essentiel d'avoir un aliment dont l'équilibre nutritif a été spécialement mis au point pour une alimentation contrôlée.

On peut utiliser deux méthodes pour limiter la consommation des poules: le poids et le temps. Dans un programme à poids contrôlé, on donne aux poules un certain pourcentage de ce qu'un troupeau à alimentation libre consomme. Dans un programme à temps limité, les poules ont accès à la nourriture pendant seulement huit à dix heures par jour, d'habitude en deux périodes distinctes. En modifiant le temps d'accès à la nourriture, on peut

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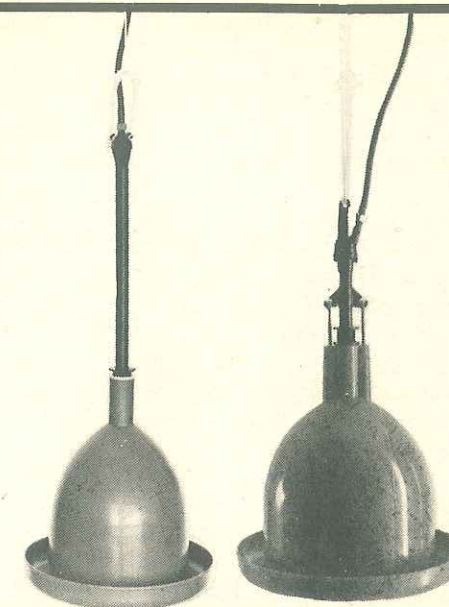
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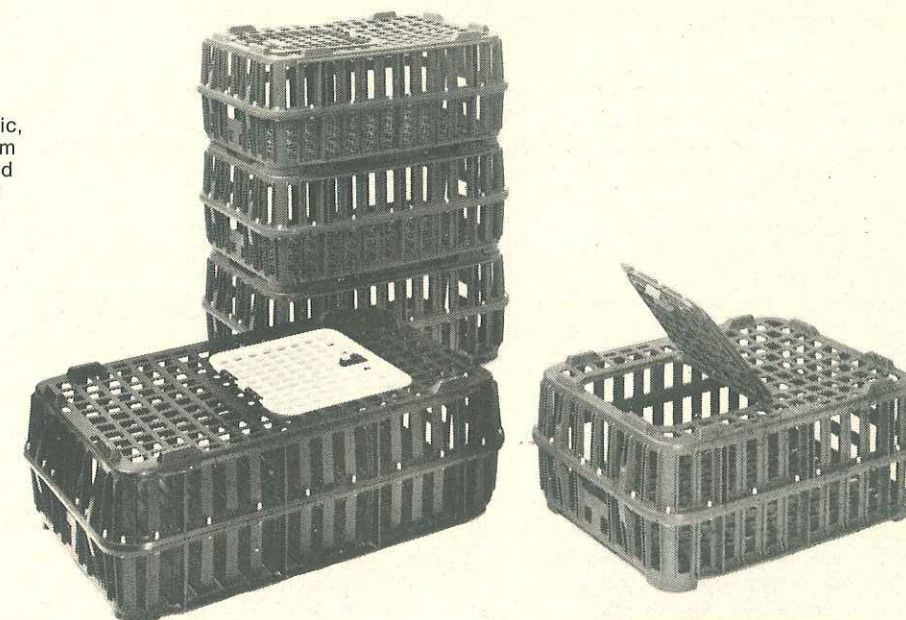
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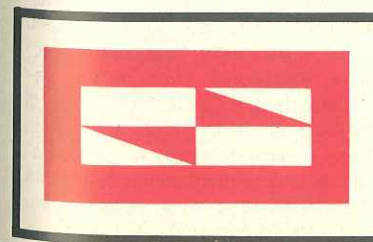
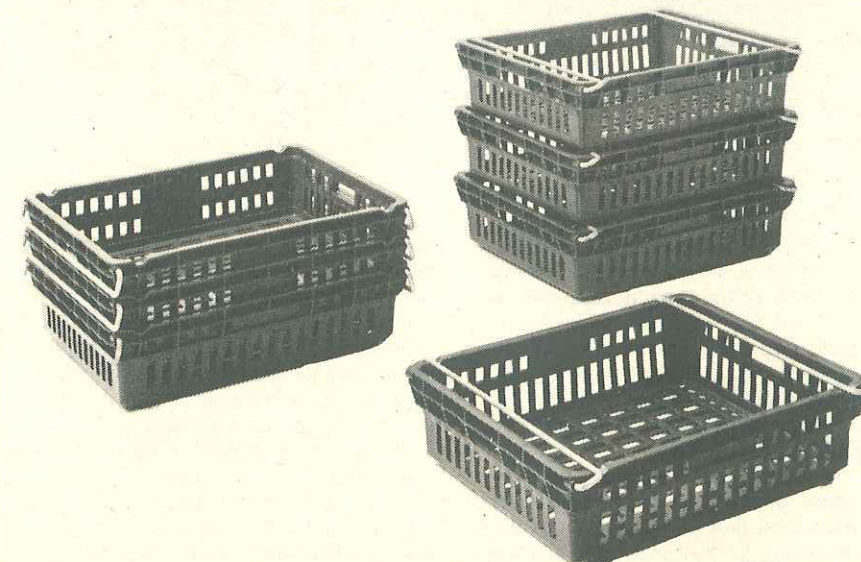
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reduction in absolute weight. With strains producing a relatively large egg size, it is advantageous to start limited feeding as early as 36 weeks. With strains laying a smaller egg, or in hot weather, the limited feeding programme should be delayed until the hens are 40 weeks of age. Also affecting egg size is the absolute weight on which the large egg size tolerances are set. This factor also partly dictates when to start the limited feeding programme.

In a typical mechanically fed limited programme, all hens have feed weighed to them as it is delivered. The fully fed check-hens have this recorded on a positive counter and will be fed as much as they will consume every day. The other hens should be fed 94% of the fully fed group. They are on a negative counter and weight system. After 94% of the fully fed group is given out, no additional feed is supplied to the birds whose intake is being controlled.

If a chain or auger delivery system is used, a high-speed drive unit is recommended to prevent birds at the head of the feeder line from overconsuming in comparison with the birds near the end of the return line. To help prevent birds near the feed hopper getting more than their share, the feeder should go one-and-a-half times round whenever it runs.

With limited feeding, the number of feeds per day is

usually reduced. Three or four meals daily are generally sufficient for mechanically fed layers. It is normal for hens to be out of feed for part of the time. Because of this, the supervisor might sometimes consider no feed in the troughs as a normal situation when there really was a mechanical malfunction. In this case, performance can suffer, so check mechanical feeders frequently.

Adjust the feed quantity supplied to the limited hens weekly, based on the previous week's intake by the check-hens. Periodically quantitate the deliveries by the weight scales or volumetric delivery devices to be sure they are delivering the correct amounts. It is essential to have a platform or other type of scales so feed can be weighed into the house on a daily basis.

The key to a limited intake programme utilising a cart is the man who does the feeding. He must deliver feed uniformly to all the birds. He must not run out of feed before he gets to the end of his run and thus severely restrict the last birds, nor should he have any feed left after he completes his round. His ability to control the speed of the cart and hopper openings, and thus the quantity of feed given to the birds, is the secret of success.

Not everyone wants to install mechanical equipment for limited feeding. Perhaps they do not have the skill to

augmenter ou diminuer le contrôle alimentaire. Un seul de ces deux programmes limitatifs fonctionnera.

Dans un programme limitatif typique, on donne à une ligne de cages une alimentation libre. On obtient ainsi des "poules-témoins" et on détermine la quantité de nourriture qu'elles consomment. On donne alors aux autres poules, sur une base quotidienne, 94% de la nourriture consommée en moyenne chaque jour la semaine précédente par les poules témoins.

On a déterminé qu'un tel taux de restriction ne causait aucune perte de production et qu'il minimisait la légère réduction en taille des oeufs qu'on obtenait avec une alimentation contrôlée. On a aussi une marge de sécurité suffisante pour éviter toute baisse de la ponte des oeufs en cas de diminution de nourriture plus importante que prévue à cause d'un mauvais fonctionnement du nourrisseur.

Dans les expériences et les tests sur le terrain, on a utilisé presque toutes les races principales. Dans neuf comparaisons séparées où on utilisait une ou plusieurs souches, on a obtenu une augmentation moyenne de production de 0,2% avec les bêtes limitées par rapport aux poules-témoins. Pendant la période où la limitation était effective, on a obtenu une amélioration de 6,5% sur l'efficacité alimentaire. La réduction du poids des oeufs n'était que de 0,6% par rapport aux poules-témoins. On a aussi observé une diminution de la mortalité de 0,5 à 5,8% par cycle de ponte.

Les principaux ennuis de cette limitation contrôlée viennent de ce qu'on commence parfois les restrictions trop tôt, de ce qu'elles sont trop importantes, de l'utilisation d'une ration stan-

dard et d'une mauvaise vérification des nourrisseurs automatiques. Enfin, il ne faut pas revenir périodiquement à une alimentation libre car alors les poules surconsommeront pendant un certain temps.

#### L'Alimentazione Limitata Abbassa I Costi

**Riassunto**—La strada più promettente per economizzare sul mangime per ovaiole sembra che sia l'alimentazione limitata, la quale offre la possibilità di ridurre il costo del mangime per un equivalente da 7 a 8 \$ per tonnellata senza nessuna perdita nella produzione. Nell'alimentazione limitata, viene ridotto solo l'assorbimento energetico dell'animale. E' perciò essenziale una razione con un appropriato bilancio nutritivo specificatamente designata per l'alimentazione limitata.

Vi sono due metodi da poter usare per limitare il consumo delle ovaiole—a peso e a tempo. In un programma a peso limitato, le galline vengono razionate in base a una certa percentuale del mangime consumato da un gruppo di animali alimentati a volontà. Usando un programma di limitazione del tempo, alle galline è permesso l'accesso al mangime unicamente da otto a dieci ore al giorno, normalmente in due intervalli d'alimentazione. Con la regolazione del tempo in cui il mangime è disponibile, la percentuale del razionamento può venire diminuita o aumentata. L'uno o l'altro di questi due programmi basilari di razionamento andranno bene.

In un tipico programma di razionamento una linea di gabbie dovrebbe venire alimentata a volontà. Queste vengono chiamate le "galline-controllo"

e viene determinata la quantità di mangime che questi animali consumano. Al resto degli animali viene poi data, su basi giornaliere, il 94% del consumo medio delle galline-controllo al giorno della precedente settimana.

E' stato determinato che questo livello di razionamento non causa nessuna perdita di produzione, e minimizza la leggera riduzione del formato delle uova che interviene con l'alimentazione limitata. Fornisce anche un sufficiente margine di sicurezza cosicché se dovessero verificarsi delle maggiori restrizioni a causa di una scadente conduzione degli alimentatori, la produzione delle uova non ne risentirà.

In studi di ricerca e in esperimenti sull'argomento, sono state usate quasi tutte le razze più importanti. In nove confronti separati nei quali una o più razze erano osservate, si è avuto un aumento medio della produzione dello 0,2% dagli animali razionati a paragone con le galline-controllo. Durante il periodo in cui era in atto la restrizione, è stato anche osservato un miglioramento dell'efficienza del mangime del 6,5%. La riduzione di peso delle uova ha registrato una media di un solo 0,6% a confronto con le galline-controllo. E' stato anche osservato un aumento della vitalità dallo 0,5 al 5,8% per ciclo di deposizione.

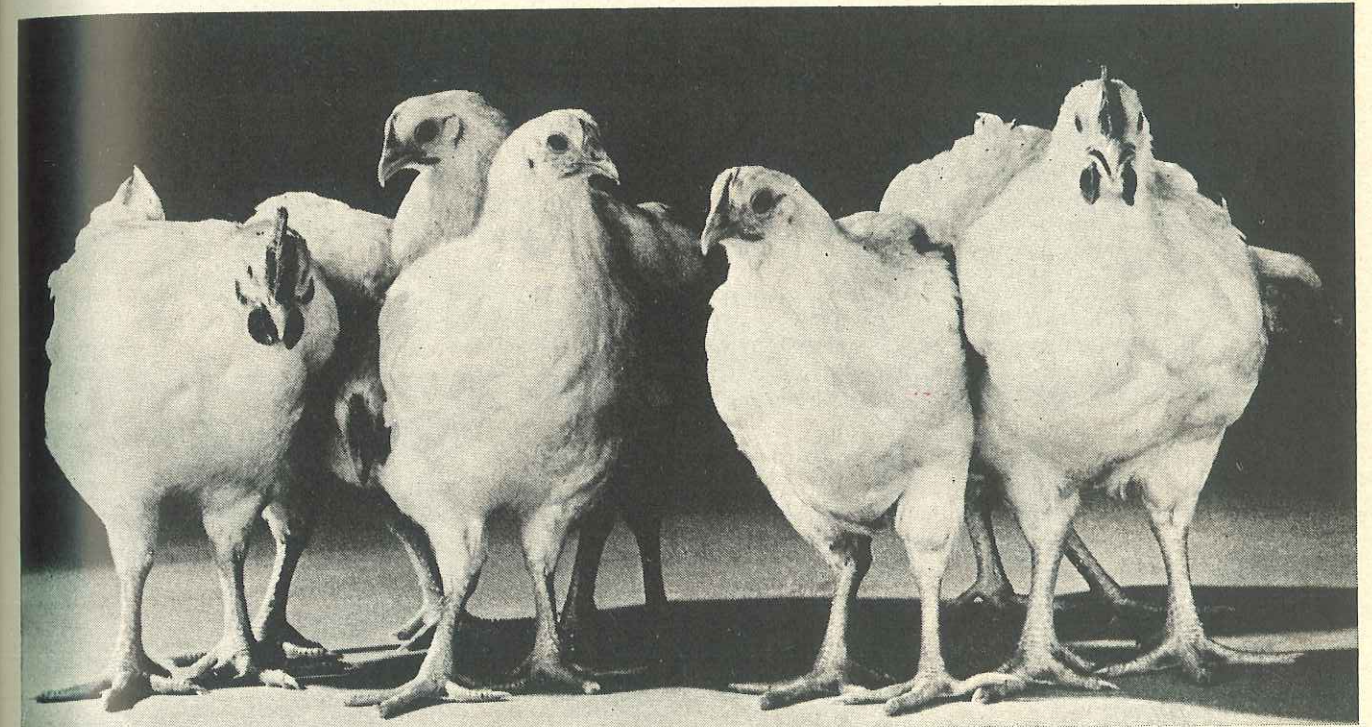
I principali errori riscontrati con l'alimentazione razionata sono il troppo precoce inizio della limitazione, l'eccessiva restrizione, l'uso di una razione standard e l'aver dimenticato di controllare gli alimentatori automatici. Inoltre, è errato ritornare periodicamente a una alimentazione a volontà poichè allora le ovaiole effettueranno per un periodo un super-consumo.



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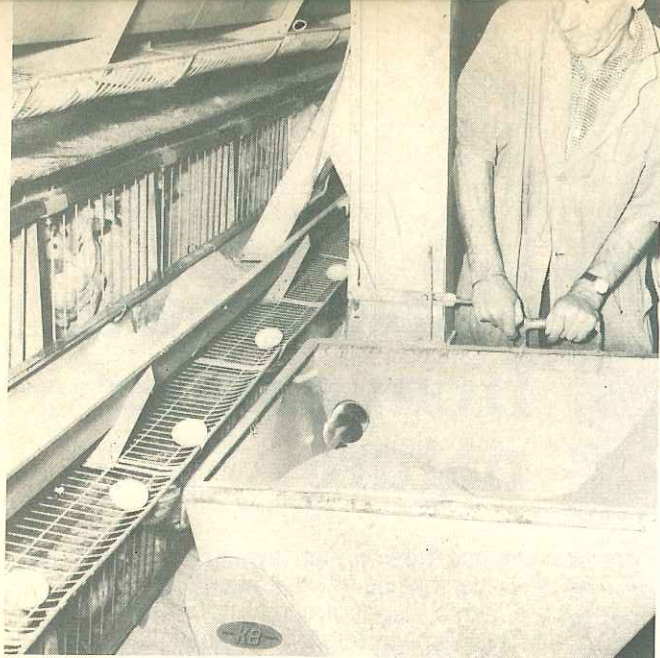
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*With cart feeding, the key to successful limited feeding is the operator. He must not run out of feed before he has reached the last hens in the house, nor have any food left when he has finished his round.*

adjust cart feeding rates to achieve the right limitation. Time feeding is an alternative worth considering.

In this programme, hens are allowed only a short time, usually in two feeding periods, to consume all the feed they can. By reducing sufficiently the time during which hens have feed in front of them, a restriction of intake will result. Again, there should be a group of check-hens so that a 94% limitation is made from a fully-fed group.

In this programme, it is necessary to weigh the feed delivered on a daily basis. This can be done with a platform or some other type of scales. The advantage of the time limitation is not that there is no weighing of feed, but that precision in delivering the feed evenly throughout the house is not required.

When time-limit feeding is to be initiated, cover the feed troughs for two hours at midday. Every other day, increase the time the trough is covered by half-an-hour, alternating the added half-hour between mornings and afternoons. When four hours without food have been reached, hold this level of limitation for one week and measure feed intake. Determine the percentage intake of the check-hens compared with the restricted hens.

#### Adjust As Necessary

Further, adjust by half-hour intervals, as described above, until a 94% limitation of the check-hens is achieved and maintained. Experience has shown that generally a total of ten hours feeding time divided evenly by the midday fast will give the desired limitation. However, the fast period can vary from five to nine hours depending upon production rates, environmental temperatures, and lighting schedules.

Most major poultry equipment suppliers have available now (or soon will have) mechanical means for limited feeding commercial layers. Most such units will be adaptable to the current systems of the same manufacturer. However, some modification of in-house equipment may be necessary. Example: to speed up the delivery within the system, etc.

Costs will vary, of course, particularly for modification of current equipment. However, with today's food prices,

the equipment in most cases could be paid for by the feed savings achieved in the first year. For specific details on equipment availability, costs, etc, contact equipment suppliers directly.

Some producers, particularly for time feeding, have devised their own mechanical systems for limiting feed intake. These involve mechanical means of raising or lowering covers on the feed troughs. Solid or wire covers are used. The welded wire covers of 1-cm mesh permit cart feeding with the cover closed, yet prohibit hens from eating.

An industrial control motor operated by a time switch pulls cables attached to the covers, opening them when hens should have access to feed. When the feeding period is over, the motor reverses and allows the covers to close.

#### Increase In Production

In Purina research studies and in field tests, nearly all the major breeds have been used. These have included both white egg strains and medium-weight brown egg layers. In nine separate comparisons in which one or more strains were involved, there was an average increase in production of 0.4% for the restricted birds compared with the check-hens.

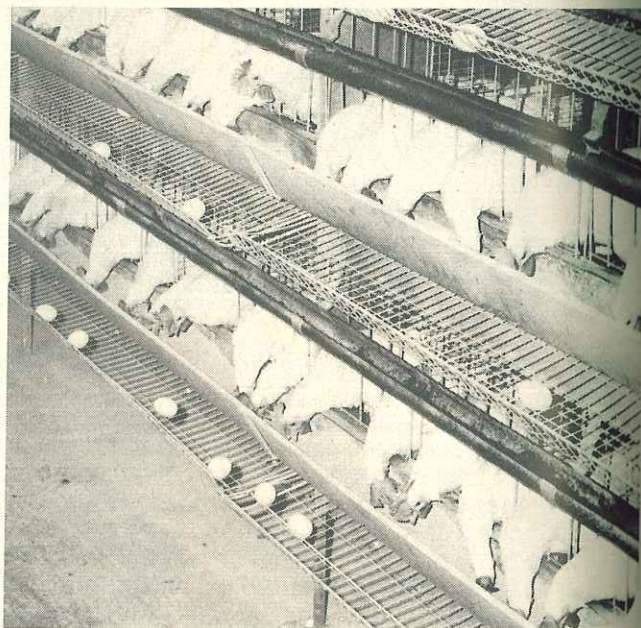
During the period when the limitation was in effect, an improvement of 6.5% in feed efficiency was also observed. Reduction in egg weight averaged only 0.6% in comparison with the check-hens. Increased livabilities of 0.5% to 5.8% per laying cycle have also been observed.

While some strains should be started on the limited feeding programme at a later age because of a smaller egg size, there has always been an economic advantage for each strain to be on a restricted intake regime.

Before reviewing some results, important points of a limited feeding programme should be covered. We have expressed these as some key "don'ts."

(1) Don't start restricting too early. Wait until most eggs are in the largest category. Also, reduce feed intake gradually, allowing one week to reach the 94% limitation.

(2) Don't over restrict or lowered egg production will result. Six per cent restriction is the goal. Seven or 8%



*As an alternative to limiting feed on a weight basis, layers can be rationed by allowing them only part of each day for feeding. This requires adequate feed and feeding space to be available.*

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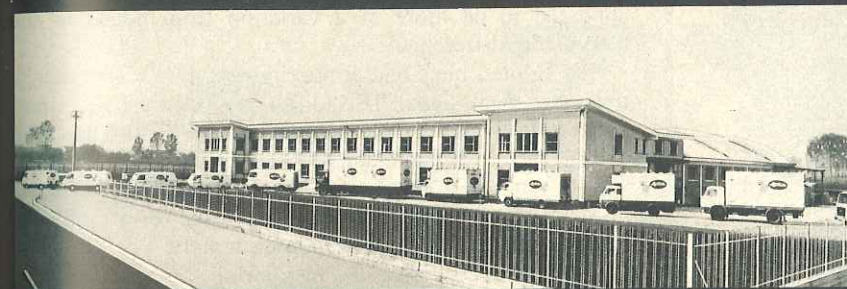
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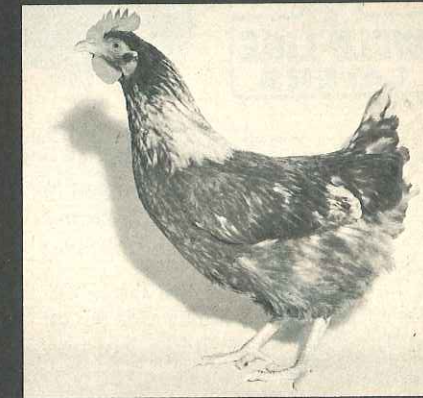


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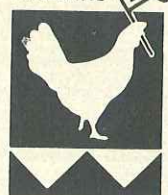


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may be satisfactory, but 10% is likely to be too severe.

(3) Don't limit on a standard ration. There are specific essential amino acids needs on a limited feeding programme. Amino acid shortages on standard rations will affect egg size and can also impair production.

(4) Don't fail to check mechanical feeders. Hens are to be without feed for part of the time; however, do not assume that because there is no feed everything is satisfactory. Check to see if the hens have feed when they should. Also periodically quantitate delivery.

(5) Don't fail to provide feed as scheduled. If on a time-feeding programme, be sure that the correct times are followed every day.

(6) Don't periodically switch to full feeding. Any time the limitation is removed from birds which were once restricted, they will over-consume for a period of one to two weeks and extremely high feed intakes can be encountered. Once limited feeding is initiated, do not feed birds ad lib unless there are symptoms of sickness in the flock.

Typical field results obtained with limited feeding are shown in Table 1. These are the results of a commercial operation which was card-fed, utilizing platform scales to weigh feed intakes.

### Livability Improved

The birds were 40 weeks of age when the test was started. The level of limitation was supposed to have been -6%, but was slightly greater, -7%. There was a slight advantage in hen-day production with the check-hens. This appeared to be more of a variation from house to house than a true difference.

The limited hens had approximately 1 1/2% less mortality than the check-hens. This difference seems true, since in every test livability has been improved by 0.5 to 5% per laying cycle. The number of eggs per hen housed is quite similar since this value takes into account the difference in production rate and livability. The key result, of course, is feed saving. There was approximately 112 gm of feed per dozen saved during the test period.

While we have noted in other experiments that there is a potential egg size loss, in this case the actual percentage of large category eggs was greater for the limited hens. Why? Apparently, in the way the eggs were graded at the plant, some of the jumbo eggs were graded as seconds. A slight reduction in egg weight put them in the normal size category.

What does this mean in dollars and cents? The value of the programme is shown in Table 2. The feed saving was 112 gm per dozen. However, remember a more highly fortified ration was used for the group on limited feeding. This ration cost approximately \$3 more per ton or 13.5 cents against 13.2 cents per kilo. The net feed cost per dozen of 24 cents compared with 23.2 cents is the measure of the economics of the programme—12.8 cents more income for the limited hens.

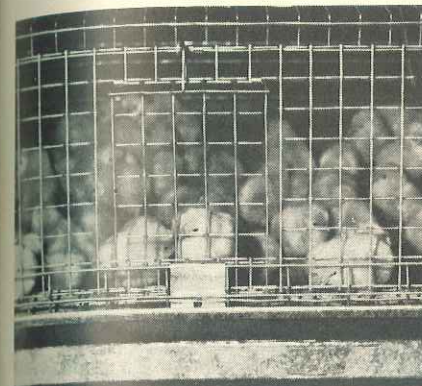
Not calculated into this amount is the cost of the added labour for weighing the feed. The profit is slightly reduced but still exceeds 12 cents per bird. And this figure is not adjustable for the 2.5% greater number of top grade eggs in the limited feeding programme.

### Time-Limit Feeding

Shown in Table 3 are results of a test conducted with the time-limit feeding programme. The hens were 40 weeks of age at the start of the test. The restricted hens had their feeder troughs covered by metal lids during the midday fast period. The time the feeders were covered during the

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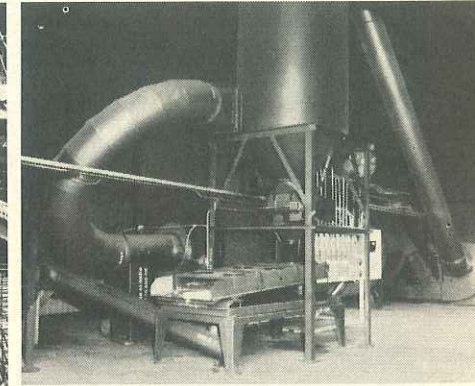
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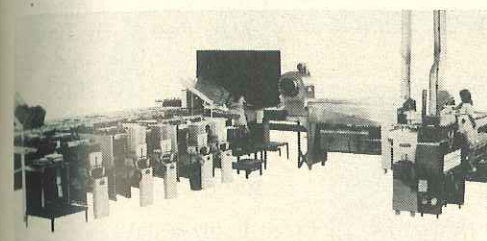
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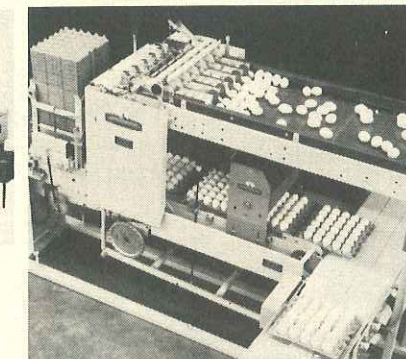
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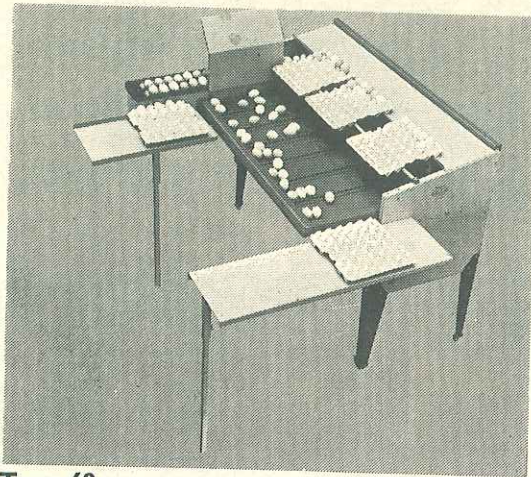
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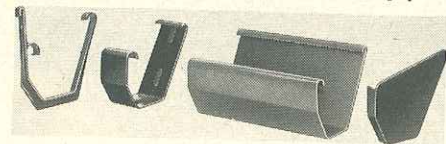
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**Table 1**

Limited Feeding Utilizing Feed Chart and Scales

	Check Hens	Limit-Feed
Limitation %	0	-7.0
Production HD %	67.9	67.2
Livability %	88.3	89.5
Eggs/HH (40 weeks +)	191	191
Feed/Dozen lbs.	4.00	3.77
Grade A Large	84.2	86.6

**Table 2**

Economics of Limited Feed Programme\*

	Check Hens	Limit-Feed Hens
Feed/Dozen lbs.	4.00	3.77
Feed Cost/Pound c	6.00	6.15
Feed Cost/Dozen c	24.0	23.2
Added Income/Bird c	-	12.8

\*Not calculated in returns was the 2.5% increase in Grade A large eggs from the hens on limited feeding.

**Table 3**

Limited Feeding Programme-Time Restriction (40-56 Weeks)

	Check Hens Fully Fed	Hens Limited By Time
Limitation %	0	-5.4
Production HD%	75.1	76.3
Egg Weight gm	58.0	57.5
Mortality %	4.2	2.5
Feed Efficiency (lbs/doz.)	3.53	3.33

16-week test period averaged seven hours a day.

Access to feed during the time the lights were on was approximately ten hours. While a 6% limitation was attempted, only 5.5% was achieved. There were no differences in production rate. Egg weight was slightly lower in the case of the limited hens. Mortality, again, was less amongst the limited hens. And, of course, the advantage observed in all the tests for improvement in feed efficiency was again in evidence.

In summary: while only two of some 15 field and research comparisons are shown, it is clear that limited feeding, if properly carried out, can result in substantial feed savings. However, both a sound programme and a special ration are required for this feeding technique to be successful.

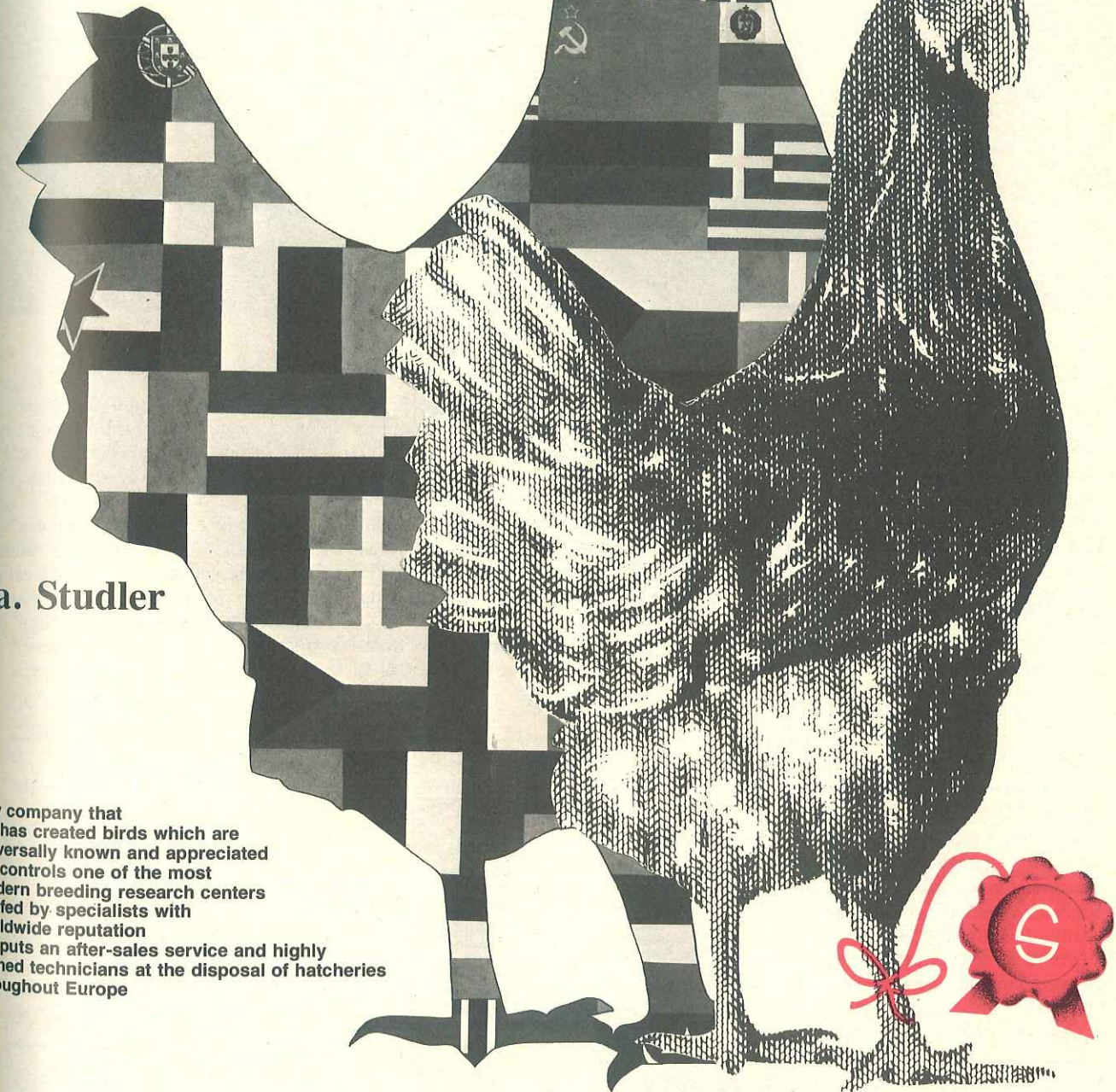
Reduced feeding time or restriction of feed by weight will both successfully limit intake by commercial layers. Equipment is now becoming available to limit feed mechanically. The programme has been tested with all major strains.

Top-class management is required, thus this programme is not for every producer. However, when one finds consistently 1 to 2% better livability, resulting in more eggs per hen housed, plus a 6% reduction in feed costs, it is obvious that this type of feeding programme cannot be ignored by the efficient producer who wants to maximise his returns.

—D. C. Snetsinger and R. A. Zimmerman

(The authors are scientists in the poultry research department of Ralston Purina Co in the USA)

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