

# Hatching Egg Hygiene

• The economic viability of the poultry industry hinges largely on the reproductive cycle of the breeding hen. Take the broiler sector, for instance. The multiplication rate, together with the ability of the embryo to develop from an early stage without the parent body, is a key factor swinging the balance of economy in favour of chicken meat production as opposed to other meats. If, however, man in his folly jeopardises the development of the embryo, then the chicken meat business is economically threatened by both pig and rabbit meat production.

In essence, hygiene of the potential hatching egg is of importance not only to the commercial hatchery but to the whole poultry industry. One of the greatest menaces facing hatcheries in the next decade will be the possibility of widespread infection of chicks resulting from the introduction of relatively few infected eggs. Infection spreads mainly during the hatching process, being carried round the hatcher by air circulation. Furthermore, infection can spread from hatcher to hatcher on operatives' hands and clothing.

A number of diseases are transmitted to the chick from the parents by true ovarian transmission. The control of such diseases depends upon the



Cleanliness in the nestbox is the first vital factor in the production of clean hatching eggs. Soiled litter must be replaced immediately—a task which is made easier if a sackful of litter is kept beside each nestbox.

**Table 1:**  
**Comparison of bacterial counts in two different types of nestbox litter at different stages of use.**

Stage of Use	Microbial Count per gm of Material Buckwheat Chaff	Wood Shavings
Unused	6 400	35 000
After 15 weeks	800 000	220 000 000
After 20 weeks	1 500 000	260 500 000
After 25 weeks	6 400 000	270 000 000
After 30 weeks	8 700 000	250 000 000
After 34 weeks	25 500 000	320 000 000

detection and removal of infected birds from the breeder flock. *Salmonella pullorum*, *Mycoplasma gallisepticum* and *Mycoplasma synoviae* are examples of such diseases.

## Embryonic Development Affected

Apart from these specific diseases, it has been found that many types of bacteria which inhabit the digestive tract of the fowl can interfere with the development of the embryo if they gain access to the embryonic fluids in sufficient numbers. Other pathogens may be present in the environment, also resulting in an interference with normal embryonic development.



A system in which eggs and nesting material move on a belt to the egg room produces a surprisingly low bacterial count. This may be due to the shiny, somewhat greasy nature of the buckwheat chaff used as the nesting material.

At laying it is thought that the shell surface of the egg is sterile. When the egg comes into contact with the outside environment, then shell contamination takes place. In the period immediately after laying, while the egg is still warm, the risk of contamination is markedly increased. As the egg cools, it is thought that bacteria penetrate by way of the shell pores. The environment into which the egg is laid thus has a direct bearing on the possible level of contamination. Under commercial hatching egg producing methods it is impossible to have sterile surroundings.

Experimental examination of eggs for contamination has shown the extent of the problem. Twenty-five eggs designated clean had an average contamination level of 350 000 microbes per shell, while 96 lightly soiled eggs had a mean count of 3 100 000 micro-organisms. By comparison, 36 eggs that were handled with gloves had a mean microbial shell count of 9500.

At present nearly all hatching eggs are produced on deep litter. This means that a nest box is the first point of contact the sterile egg has with the outside world. Cleanliness of the nest box is thus the first vital factor in the production of clean hatching eggs. Nest box material must be renewed frequently and any fouled nest cleaned immediately.

Of the materials available today for

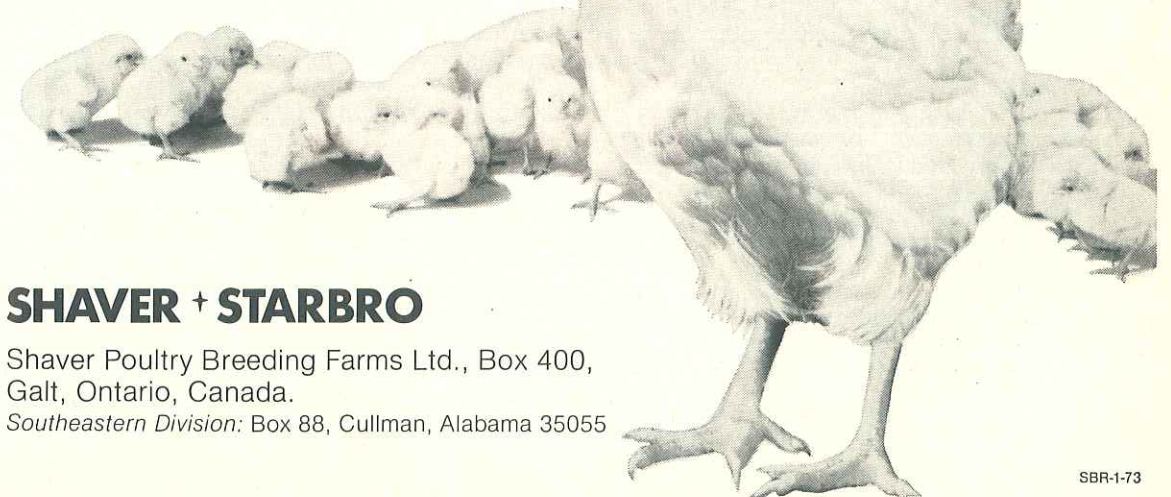
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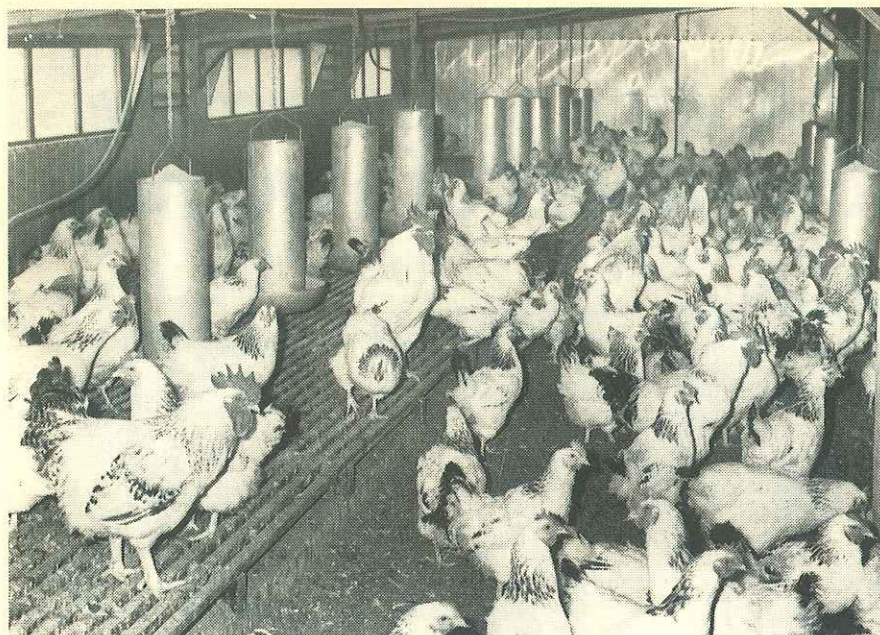
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A house with a manure pit under the roosting platform usually has cleaner floor litter. Thus less contamination occurs as a result of birds carrying fewer faecal bacteria into the nest on their feet.

#### Bruteierhygiene

**Zusammenfassung**—Hygienische Behandlung der für Brutzwecke vorgesehenen Eier ist nicht nur für die gewerbliche Mastbrüterei sondern auch für die gesamte Geflügelwirtschaft wichtig. Eine der größten Bedrohungen, denen sich die Brütereien im nächsten Jahrzehnt gegenübergestellt sehen werden, liegt in der Möglichkeit weitverbreiteter Kükeninfektion durch Mitfführen weniger, infizierter Eier. Die Infektion breitet sich in den Brutmaschinen durch Luftzirkulation und durch manuelles Umsetzen aus.

Viele Bakterien, die sich im Verdauungstrakt einer Henne befinden, können normale Embryonenentwicklung stören, wenn es ihnen gelingt, die Eischale zu durchdringen. Andere Bakterien befinden sich in den Nestern und auf dem Stallboden und bleiben an dem noch feuchten, frischgelegten Ei haften.

Um Bakterienverseuchung zu reduzieren, sollte man oft absammeln, für saubere Bruteierlagerung sorgen, manuelle Handhabung minimalisieren, Bodeneier aussondern und Desinfektionsmaßnahmen so schnell wie möglich durchführen. Als Behandlungsmethoden bieten sich Eintauchen in Desinfektionsflüssigkeit oder Begasung an. Beide Methoden haben Vor- und Nachteile.

#### L'Hygiène Des Oeufs A Couver

**Sommaire**—L'hygiène de l'oeuf à couver potentiel est importante non seulement pour le couvoir de poulets de chair commerciaux mais aussi pour toute l'industrie du poulet. Un des plus grands dangers auxquels auront à faire face les couvoirs dans la prochaine décennie, sera la possibilité d'une infection étendue des poussins résultant de l'introduction de quelques oeufs infectés. L'infection se répand dans l'incubateur transportée par la circulation d'air et elle peut passer de machine en machine sur les mains du responsable.

Beaucoup de bactéries trouvées dans le tube digestif d'une poule peuvent interférer avec le développement normal de l'embryon si elles réussissent à pénétrer dans la coquille de l'oeuf. D'autres bactéries se trouvent dans les pondeurs et sur le sol du poulailler. Elles adhèrent à la coquille humide de l'oeuf juste pondu.

Pour réduire la contamination, il faut un ramassage fréquent, un stockage dans un endroit propre, un minimum de manipulations, une mise à part des oeufs pondus sur le sol et le traitement avec un désinfectant aussi rapidement que possible. Il existe deux possibilités de traitement: l'immersion dans un liquide désinfectant ou une fumigation avec un gaz. Les deux méthodes ont leurs avantages et leurs inconvénients.

use in conventional nests, wood shavings are most suitable. Hay and straw should not be used since these are likely to harbour moulds, particularly *Aspergillus fumigatus* which, if carried on the egg, can quickly contaminate the entire hatchery, causing heavy mortality in chicks.

The increased use of automatic nests appears at first sight to be contrary to good nest management. (One of the most popular systems involves the use of buckwheat chaff, retaining the same nesting material during the life of an entire flock and probably longer). However, work carried out by Scientific Agribusiness Consultants International, in which wood shavings were compared with buckwheat chaff, shows an unexpected result. (See Table 1).

The comparatively low bacterial count of buckwheat chaff is probably due to its somewhat greasy texture, which possibly has a water repellent effect. Occasionally, eggs from auto-

#### Igiene Delle Uova Da Cova

**Riassunto**—L'igiene delle uova da cova potenziali è d'importanza non solo per l'incubatoio di broiler commerciali ma anche per tutta l'industria della pollicoltura. Una delle più grandi minacce che incontreranno gli incubatoi nella prossima decade sarà la possibilità di diffusione di infezioni dei polli derivante dalla introduzione di una quantità relativamente bassa di uova infette. L'infezione si diffonde nella incubatrice, essendo trasportata dalla circolazione d'aria, e può anche essere portata da una macchina all'altra dalle mani dell'operaio.

Molti batteri che risiedono nel tratto digerente di una gallina possono interferire con il normale sviluppo embrionale se sarà data loro la possibilità di penetrare nel guscio dell'uovo. Altri batteri sono situati nei nidi, e sul pavimento del capannone, e si attaccano al guscio umido di ogni uovo appena deposto.

Una riduzione della contaminazione richiede una frequente raccolta, pulizia nel magazzino, minimo maneggiamento, separazione delle uova deposte a terra, e trattamento con disinfettante prima possibile. I due sistemi validi di trattamento sono l'immersione in un disinfettante fluido o la fumigazione a gas. Entrambi i metodi hanno i loro vantaggi e svantaggi.

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matic nests present problems in hatcheries. Having become shiny in the buckwheat chaff, they are somewhat difficult to retain in setting trays. Droppings tend to become coated with the chaff and are removed from nests at the end of each collection.

#### Floor Litter Must Be Dry

Nests are contaminated not only by birds defecating in them but also by contaminated material brought in on their feet. The state of the litter is an important factor in this respect since in many houses it absorbs all the droppings.

The question often asked is—does a pitless house increase the contamination factor? Obviously the litter of a

Table 2:

**Total bacteria count per gram of floor litter in wet and moist conditions.**

Sample Condition	Bacterial Count
Wet (1)	249 000 000
Wet (2)	168 000 000
Moist	72 000 000

house without a manure pit has to take all the faecal matter. Table 2 shows contamination levels that have been ascertained during research.

Counts per gram demonstrate the massive bacterial burden of litter in pitless houses, and also the difference between wet (much higher counts) and moist litter. If for no other reason than egg hygiene, dry litter should be maintained in breeder houses.

It is not surprising that high counts are recorded in litter when the bacterial content of poultry droppings is examined. For example, faeces immediately after excretion can have a bacterial count varying from 5 million to 304 million per gram.

Not all these bacteria are pathogenic but a large proportion can cause spoilage. Therefore it is obvious that the potential hatching egg should be laid into conditions where a minimum amount of faecal matter is deposited. When an egg is laid in any other location than a clean nest box, it is immediately exposed to this gross level of contamination.

Floor litter is a favourite place for laying. Such eggs, usually referred to as "floor eggs", are exposed to high levels of contamination. Regardless of how quickly they are gathered, the bacterial burden is overwhelming. Recently, SACI compared the bacteri-

Table 3:

**Total bacterial counts per gram of shell in comparison of eggs laid in nests and on the floor.**

Sample of Eggs	Bacterial Count
(A) Floor Nest	1 520 000
(B) Floor Nest	50 000
(C) Floor Nest	9 000 000
(C) Floor Nest	120 000
(C) Floor Nest	7 200 000
(C) Floor Nest	900 000

al contamination of the shells of nest eggs and floor eggs, and the results are shown in Table 3.

#### Floor Eggs Hatch Poorly

The effect of shell contamination of floor eggs is significantly reflected in hatchability. It would appear that the bacterial invasion causes very early death of the developing embryo and these eggs are frequently mistaken as infertile. During a test period of three months in a commercial hatchery, the following differences between nest and floor eggs were recorded:—

	% Infertile	% Hatch
Nest Eggs	7.57	84.04
Floor Eggs	18.93	64.56

One aspect which cannot be measured is the overall bacterial contamination of the hatchery through the

introduction of floor eggs. Only if the hatchery is constantly monitored can any effect be measured.

The problem of floor eggs has been accepted by the industry as an unavoidable evil—but need it be accepted? It is not an exaggeration to state



Eggs laid on the floors are exposed to high levels of contamination. Popular floor laying sites (under the nestboxes for instance) should be barred to the birds.



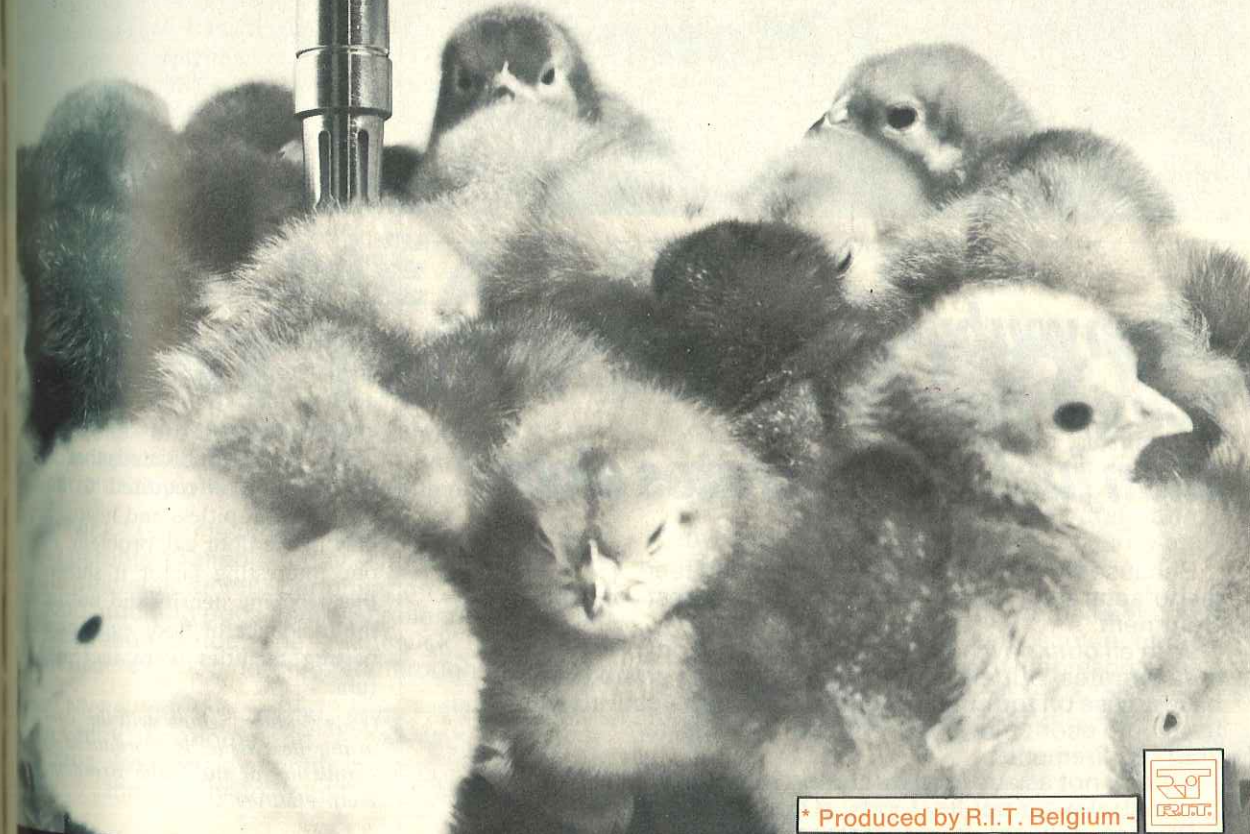
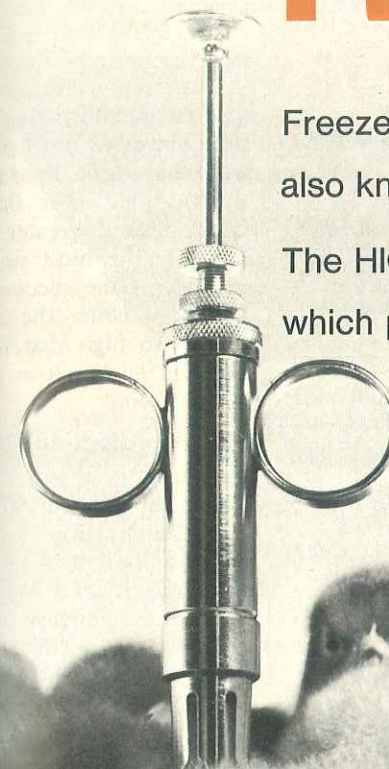
The most significant factors influencing floor laying and egg cleanliness are the number of nests provided and the frequency of collection.

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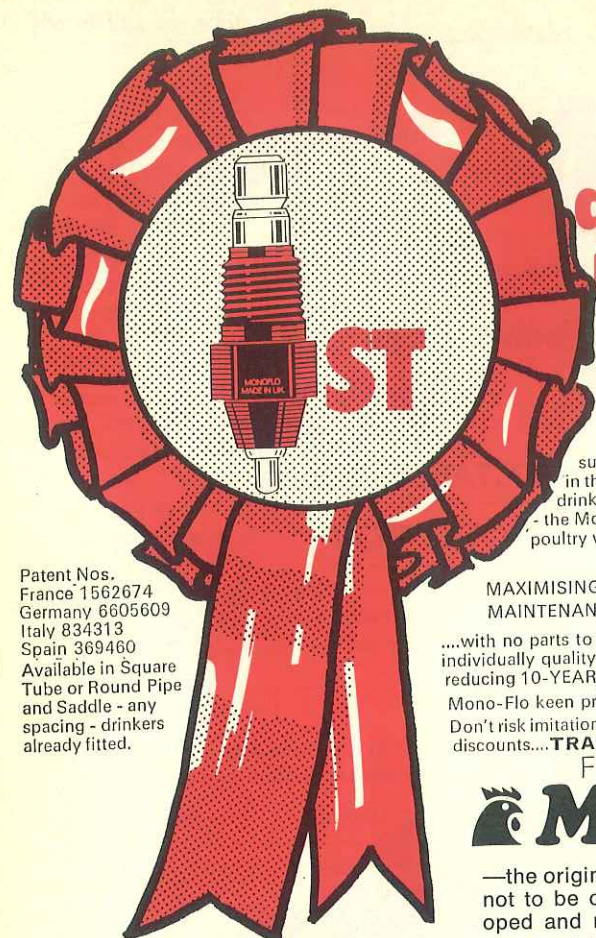
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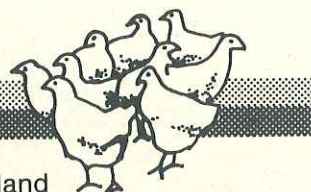
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that the levels accepted by the indus-  
try can be reduced by 5-8%. Bearing  
in mind that floor eggs hatch at  
around 20% less than nest eggs, the  
industry cannot afford not to aim for  
the minimum. If some farms can  
operate with fewer than 1% floor  
eggs as opposed to others with as  
many as 60% the reason for this dif-  
ferential must be found.

In a recent survey, the most signifi-  
cant factor influencing floor eggs was  
the number of birds per nest. Flocks  
with one nest to four birds had  
significantly fewer floor eggs than  
flocks with a greater ratio. This is  
probably the most significant factor  
relating to the success or failure of  
automatic nests. The cost of installa-  
tion is so high that fewer nests are  
installed, leading to an inevitable floor  
egg problem.

#### Factors Affecting Floor Laying

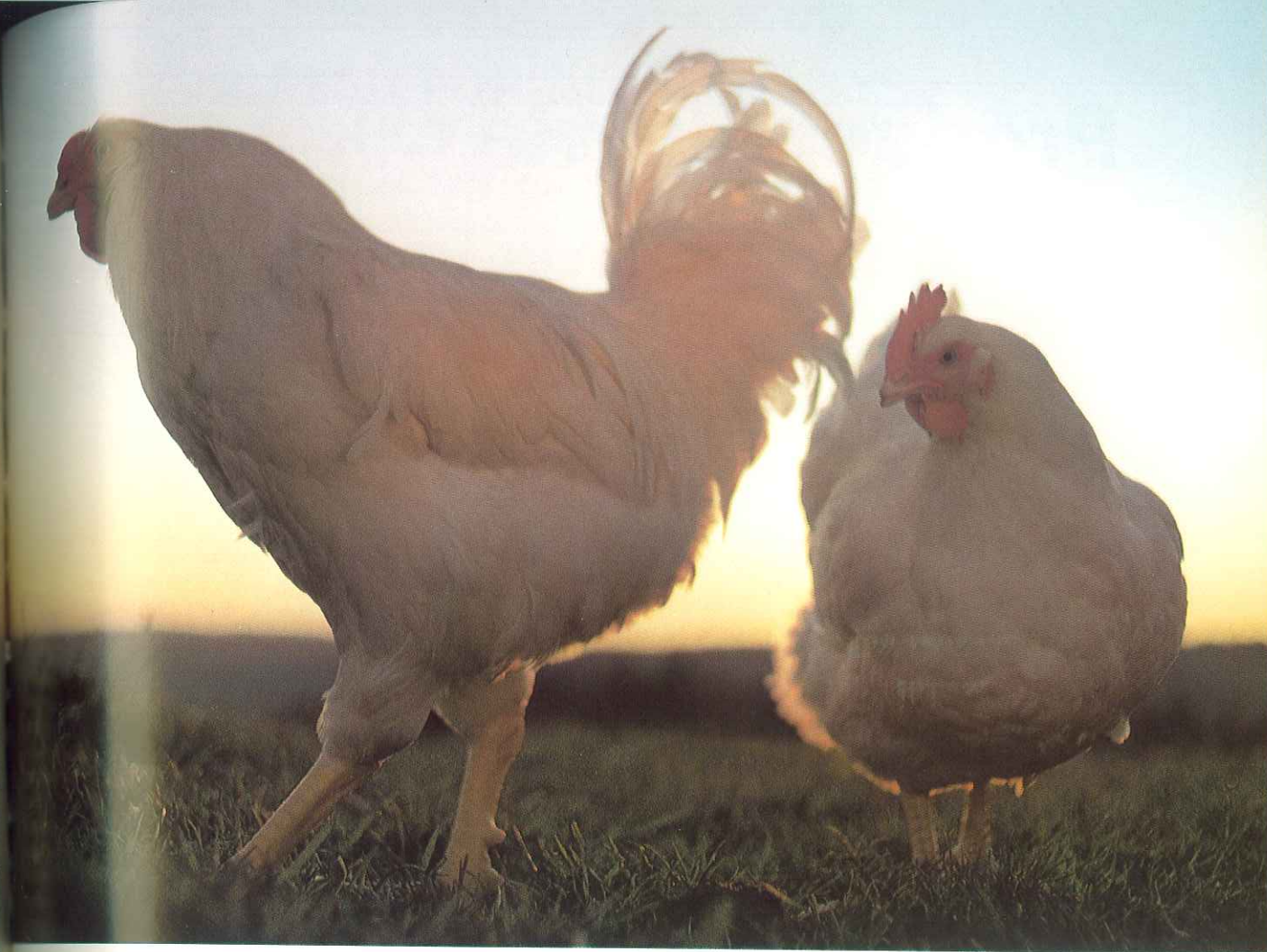
Size of nest was also significant.  
Nests smaller than 30 cm by 30 cm  
increased the proportion of floor eggs.  
Time of first opening the nests was  
again significant. When nests were  
opened no later than 17 weeks of age,  
the percentage of floor eggs was  
reduced. The re-littering of nest boxes  
was another factor, and is of great  
importance since it also has a major  
bearing on egg hygiene.

All these factors affect the choice of  
nest box by the bird. Clearly the  
problem of nest acceptability is psy-  
chological. The material used in the  
construction of the nest box did not  
appear to be significant in the survey,  
neither did the amount of light  
entering the box.

The survey indicated that further  
investigation is required to evaluate  
the part that pitiless and heated houses  
play in the floor egg problem. Finally,  
one interesting factor it showed was  
that stocking density did not increase  
the incidence of floor eggs, providing  
nesting facilities were increased pro-  
rata.

(This feature, which will be concluded  
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