



MANURE WHICH has been stored in a ground-level bunker is loaded into a rotary spreader by a tractor and scoop.

First of two articles

The Problem Of Cage Manure Disposal

SUMMARY: A thousand laying hens will pass over one ton of droppings every week of the year. So it is hardly surprising that manure disposal is the large-scale egg producer's biggest problem. It's a special headache for cage operators because droppings unmixed with litter are wet and sticky, which makes them difficult and unpleasant to handle.

How to arrive at a solution to this problem depends, basically, on whether or not the poultryman has pasture or arable land where the manure can be used as a fertilizer.

In this issue, Anthony Phelps discusses the choice of disposal methods open to the egg producer who can utilize manure on pasture or arable land, and outlines the various practical and economic factors which influence the choice. Next month he will summarize the outlets available to poultrymen who cannot dispose of manure on their own land.

● Where land is available to take the manure from large cage installations, it doesn't make economic sense to look for other ways to dispose of this by-product. Poultry droppings make a potent fertilizer, far richer than manure from other forms of livestock, as these analyses show:

	Nitrogen N	Phosphates P ₂ O ₅	Potash K ₂ O
Poultry	68.0	49.5	32.4
Pigs	45.2	33.3	27.7
Cows	21.2	8.9	26.5

(figures are in units per 1,000 Imperial gallons)

Allowing for the fact that some 35% of these nutrients are not immediately available for plant growth, Britain's Ministry of Agriculture evaluates poultry manure as being worth £1.17 s (U.S. \$5.16) per 1,000 Imperial gallons, compared with £1.6 s (\$3.63) for pig and 14 s (\$1.95) for cattle manure.

These figures are obtained by calculating how much artificial fertilizer would cost to provide the same quantities of essential nutrients. The calculations do not, however, take into account the value of humus and trace elements present in organic manures because they cannot be accurately costed.

Le problème de l'élimination des déjections en batteries

On admet que mille poudeuses produisent plus d'une tonne de fumier chaque semaine de l'année. Il n'est donc guère étonnant que l'enlèvement du fumier constitue le problème le plus gros et fortement diffusé du producteur d'oeufs. C'est un véritable casse-tête, particulièrement pour les exploitants de batteries, étant donné que les déjections non-mélangées à de la litière sont acqueuses et visqueuses, ce qui rend leur manipulation difficile et désagréable. Comment parvenir à une solution à ce problème dépend essentiellement de la disponibilité ou non de la part de l'aviculteur de prairie ou de terre arable, sur laquelle la pouline peut s'utiliser comme engrais. Dans ce numéro, Anthony Phelps discute le choix entre les différentes méthodes d'élimination s'offrant aux producteurs d'oeufs ayant la possibilité d'utiliser le fumier sur des prairies ou des terrains de culture et il esquisse les divers facteurs pratiques et économiques influençant ce choix. Le mois prochain, l'auteur va nous entretenir sommairement sur les débouchés disponibles aux aviculteurs ne pouvant pas se débarrasser de la pouline sur leur propre terrain.

Das Kotbeseitigungsproblem in der Batteriehaltung

Etwa tausend Legehennen produzieren über eine Tonne Mist jede Woche im Jahr. So ist es kaum zu verwundern, dass die Kotbeseitigung das grösste und in weitem Umfang auftretende Problem des Eierzeugers bildet. Besonders diejenigen, die ihre Tiere in Batterien halten, brechen sich hierüber den Kopf, weil nicht mit Einstreu vermischter Kot nass und klebrig und somit schwer und unangenehm in der Behandlung ist. Wie zu einer Lösung dieses Problems zu kommen, hängt wesentlich davon ab, ob der Geflügelhalter wohl oder nicht über Weide oder Ackerland verfügt, auf dem der Mist als Dünger Anwendung finden kann. In dieser Nummer bespricht Anthony Phelps die Auswahl von Beseitigungsmethoden, die dem Eierzeuger, welcher die Jauche auf Weide oder Ackerboden verwenden kann, zur Verfügung stehen und er legt die verschiedenen praktischen und wirtschaftlichen Faktoren dar, die diese Auswahl bestimmen. Im nächsten Monat wird er berichten über die Absatzmöglichkeiten, die den Geflügelhaltern, welche den Kot nicht auf eigenes Land los werden können, zur Verfügung stehen.

Il problema dell'evacuazione di pollina di batteria

La quantità di pollina prodotta da un migliaio di galline ovaiole ogni settimana dell'anno è di oltre una tonnellata. Dà appena meraviglia quindi che l'allontanamento delle deiezioni costituisca il principale e più diffuso problema dei produttori di uova. E' un vero e proprio grattacapo, specie per gli avicoltori di polli in batteria, in quanto il letame pollino non-mescolato alla lettiera si presenta acquoso e viscoso il che rende la manipolazione del medesimo faticosa e sgradevole. La maniera in cui arrivare ad una soluzione di questo problema dipende strettamente della disponibilità o meno da parte del pollicoltore di prato o di terra arabile su cui il liquame può trovare impiego quale concime. Su questo numero, Anthony Phelps discute la scelta tra i vari metodi d'evacuazione la quale s'offre al produttore di uova il quale può utilizzare la pollina per il pascolo o la terra arabile e l'A. espone sommariamente i vari fattori pratici ed economici influenzando questa scelta. Il prossimo mese, lo scrittore riepilogherà i vari sbocchi disponibili agli pollicoltori i quali non hanno la possibilità di disfarsi degli escrementi su proprio terreno.

Farmers who regularly use poultry manure know its potency from the response of their crops. An exaggeration, of course, but "when you apply it you have to jump back out of the way—fast," is how one enthusiast has described the effect of poultry manure on grassland.

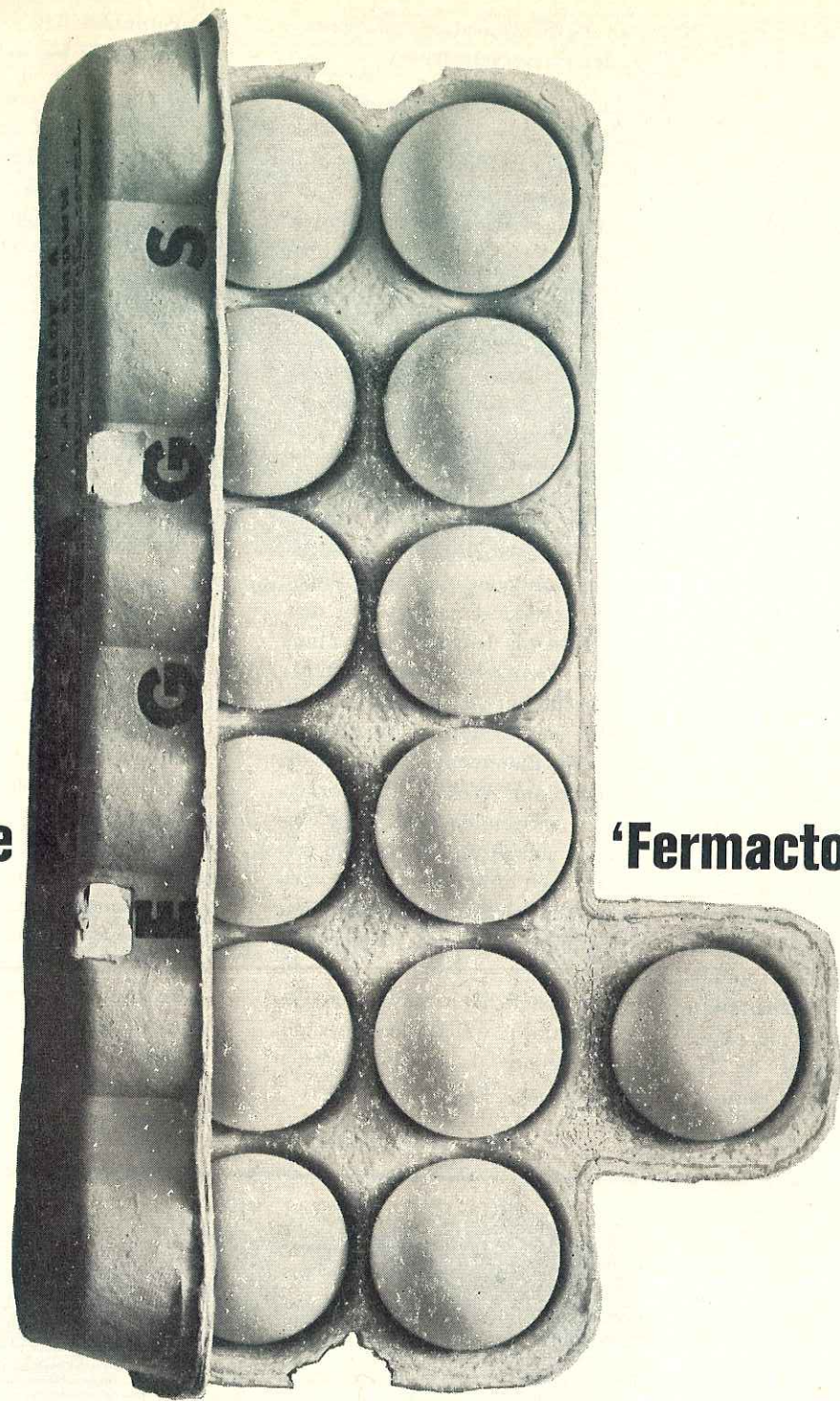
Directly Into Spreader. For cage operations with a daily or weekly output of manure (as opposed to flat-deck or deep-pit installations where it is allowed to accumulate for a year or more), the simplest method of disposal is to dump the manure straight into the spreading vehicle.

A number of conveyor systems



THERE IS A strong economic case for having the manure storage pit under the floor of the laying house. Droppings can then be scraped off the cage stacks to fall directly into the pit without any need for expensive mechanical conveyors. This indoor pit is being emptied with a vacuum tanker.

.....the



'Fermacto dozen'

Pay for 12—get one free! Poultrymen who include Borden's Fermacto in their lay mashes are quickly discovering this practice pays off in a baker's dozen (Fermacto Dozen). And better still, they get this bonus yield and pay less for mashes in the bargain.

That's right. Your mashes cost less! Here's how! The concentrated activity of Fermacto at a 1-2 pound usage level permits you to eliminate all sources of unknown factors and "insurance amounts" of vitamins from your lay mashes. This can save 50¢ and more per ton of feed. And Fermacto is backed by over 4 full years of layer tests that conclusively show its effectiveness in producing from 5 to 17 extra dozen eggs per ton of feed!

Send today for your free 72-page Fermacto "Diet Book." It's guaranteed to make you fat.

As an additional bonus, layers on feeds containing Fermacto gain faster, weigh more, and build up a nutrient reserve to help them over periods of stress.

Let us show you how Fermacto added to lay mashes can put you dollars ahead with lower mash costs and increased egg production. Be sure to ask about Borden's 300 LP. This new supplement is specifically designed to help you formulate a 13.5% protein laying mash at a saving of over \$1.50 per ton.

Write today for data about Fermacto, the only new nutritional supplement that has conclusively produced a baker's dozen (Fermacto Dozen) trial after trial. Borden Chemical Company, Animal Feed Supplements & Products Division, Norfolk, Va. 23501.



Better Products through Borden Research

For free information, circle 40 on postcard

POULTRY INTERNATIONAL—NOVEMBER, 1967

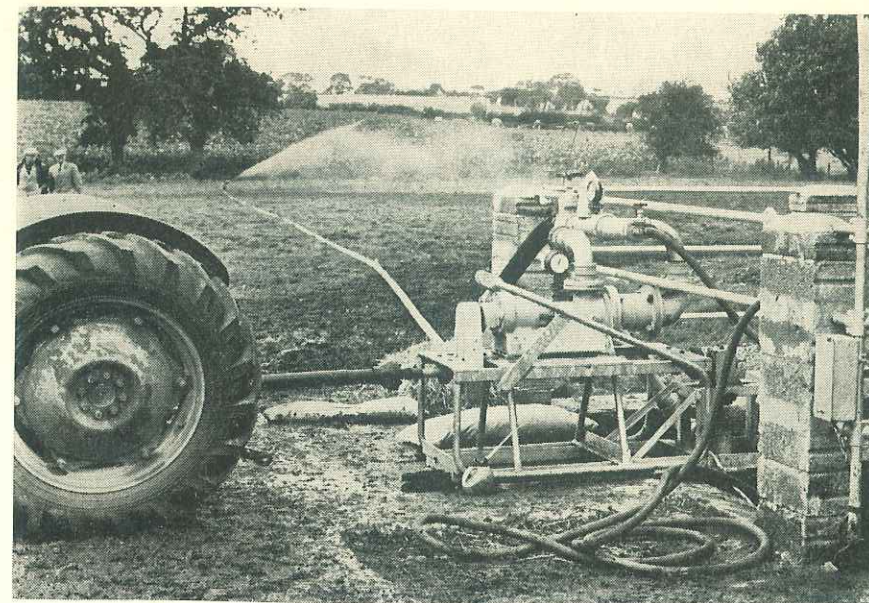
have been devised to move droppings underfloor from the end of the cage stacks directly to the spreader parked outside the laying house. This eliminates the very unpopular chore of carting manure about by the barrowload.

If a sloping pit is excavated outside the house, the spreader can be parked below the delivery end of the conveyor and loaded by gravity. If this is not possible and the spreader has to be parked above-ground, the end section of most mechanical conveyors can be angled upwards to elevate the manure to vehicle level.

The commonest type of spreader is a low-sided trailer with a movingbed floor and rotating paddles or flails at the back for flinging out the load. Latest models are designed for handling high-moisture strawless manure, but the backs of older types often need to be dammed with straw to prevent the slurry escaping *en route* to the fields. Machines with flails spread fiberless cage manure more efficiently than those with rigid paddles.

The best machine of all for this work is a rotaspreader. It consists of a horizontal cylindrical tank mounted on a trailer chassis. Inside a number of chain flails are linked to a central shaft operated by the power take-off on the tractor. When the shaft revolves, the chains spray the manure with a wide, even spread out of the side of the tank. The machine will handle manure which is almost completely liquified.

The drawback of this method of disposal is that it doesn't take long to fill a spreader from a large laying unit. And the poultryman who has to spread manure several times a week is at the mercy of wet weather. Much time can be wasted extricating bogged-down vehicles, and heavily laden ma-



MANURE DISPOSAL by organic irrigation equipment involves greater capital outlay than buying a vacuum tanker. But the additional expenditure is quickly recouped by a huge saving in labor costs. Irrigation also scores because it can be used when the ground is too wet for the use of wheeled vehicles.

chines do tremendous damage to pasture when the ground is wet.

Because of this disadvantage, many cage eggmen prefer to provide storage facilities for several weeks' output of manure. This enables them to spread as and when weather and ground conditions are favorable to the use of wheeled vehicles.

Manure Storage. Judged solely from the aspect of capital cost, the cheapest form of storage in many areas is a low-walled bunker built of brick or concrete block on three sides with a barrier of straw bales on the fourth. Emptying involves removing the bales, scooping out the manure with a tractor and fore-loader, and dumping it in a spreader.

An objection to this method is that it means one extra handling operation—transferring the manure from bunker to spreader—and thus has a high labor requirement. Of course, in countries where labor is cheap, this may not constitute a disadvantage.

Hydraulic Handling. In countries where labor costs are high, notably Britain and the

U.S.A., a lot of interest is being shown in hydraulic handling, a more streamlined system of disposal. Manure is diluted with water in the storage place and then moved by pumping.

Although the economics of storing manure above-ground in a structure like a tower silo are attractive and deserve more attention, most hydraulic handlers in Britain use underground storage pits. The pits are invariably concrete-lined and the majority are covered for safety and to prevent flies and offensive odors.

Poultrymen who have cut construction costs by installing open-topped pits say that flies and smells can be controlled by pouring oil over the contents. The oil floats on top and forms a seal. Poultrymen obtain used motor oil from garages, often given away free, and pump out the manure from the bottom of the pit to avoid spreading the surface oil.

The size of pit required will depend, of course, on the length of time the manure is to be stored. Britain's Ministry of Agriculture says that 100 hens will produce 6.2 Imperial gallons of manure daily. So a pit required to hold



THE DRAWBACKS of tanker spreading include the need for somebody to be in attendance while the tanker is operating, and limited performance, which combine to make the labor requirement more than four times as much as pump-and-pipeline disposal. But a tanker is more maneuverable and can be shared by neighboring farmers.



INSIDE THIS HOUSE, mechanical scrapers in under-floor channels convey the manure from the ends of the cage stacks to an elevator which loads a spreader parked underneath. This saves the cost of providing storage facilities but means that the manure has to be spread several times each week, whatever the weather and ground conditions.

the output from 2,000 hens for a month will need a capacity of $6.2 \times 20 \times 30 = 3,720$ Imperial gallons *plus* room for dilution water.

Many poultrymen in Britain have looked upon the digging and lining of storage pits as a simple do-it-yourself operation, and many have since regretted it. It is not generally realized that tremendous pressures are exerted on the walls of underground pits, especially large ones, and many home-built structures have collapsed. It is advisable, therefore, to have the job done by an experienced contractor.

Where should the storage pit be sited? To minimize the cost of conveying manure from the cages to the pit, the obvious answer is as near to the laying house as possible. In fact, there is a strong case for installing the pit under the floor of the house so droppings can be scraped straight off the ends of the cage stacks into the pit without any need for expensive mechanical conveyors.

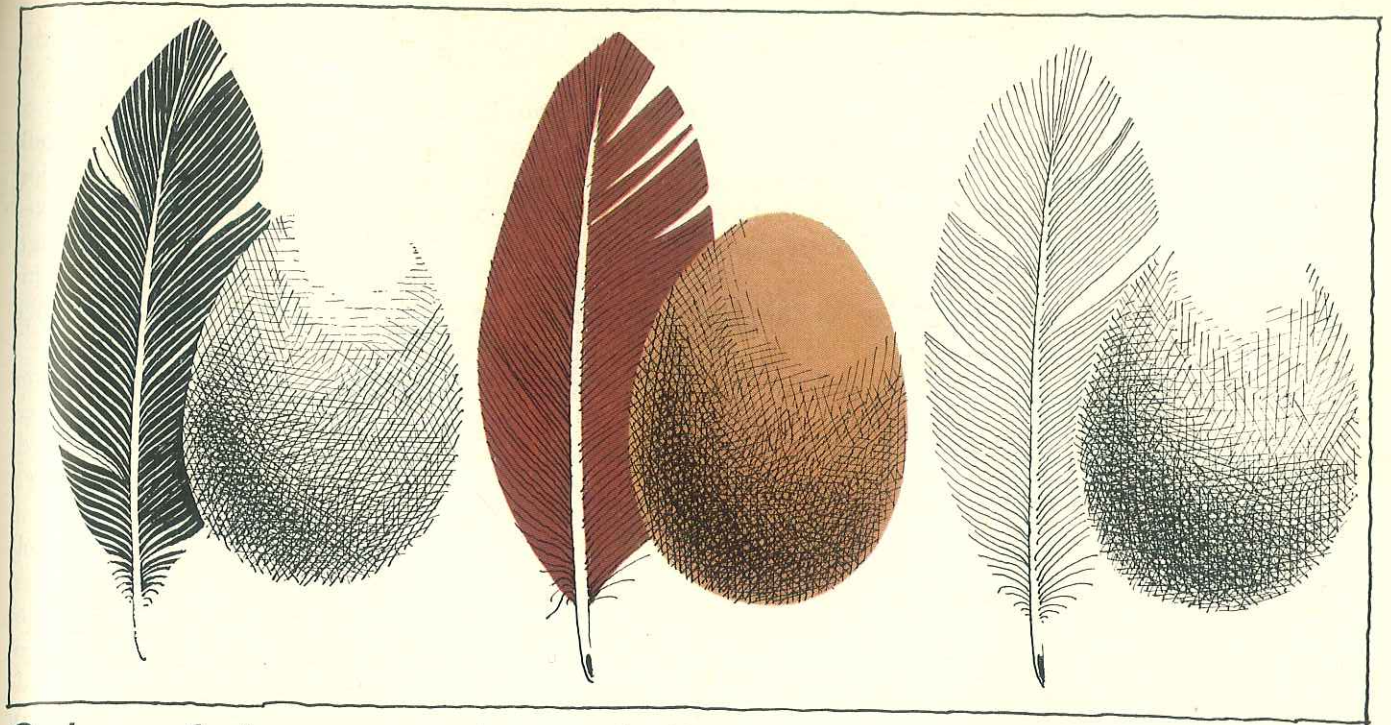
The cage operator who elects to handle manure hydraulically has a choice of two methods of spreading the effluent on his land. One is to use a wheeled, tractor-towed, vacuum-operated spreader tank. The other is to use an organic irrigation pipeline.

There are arguments for and against both methods, as summarized below:

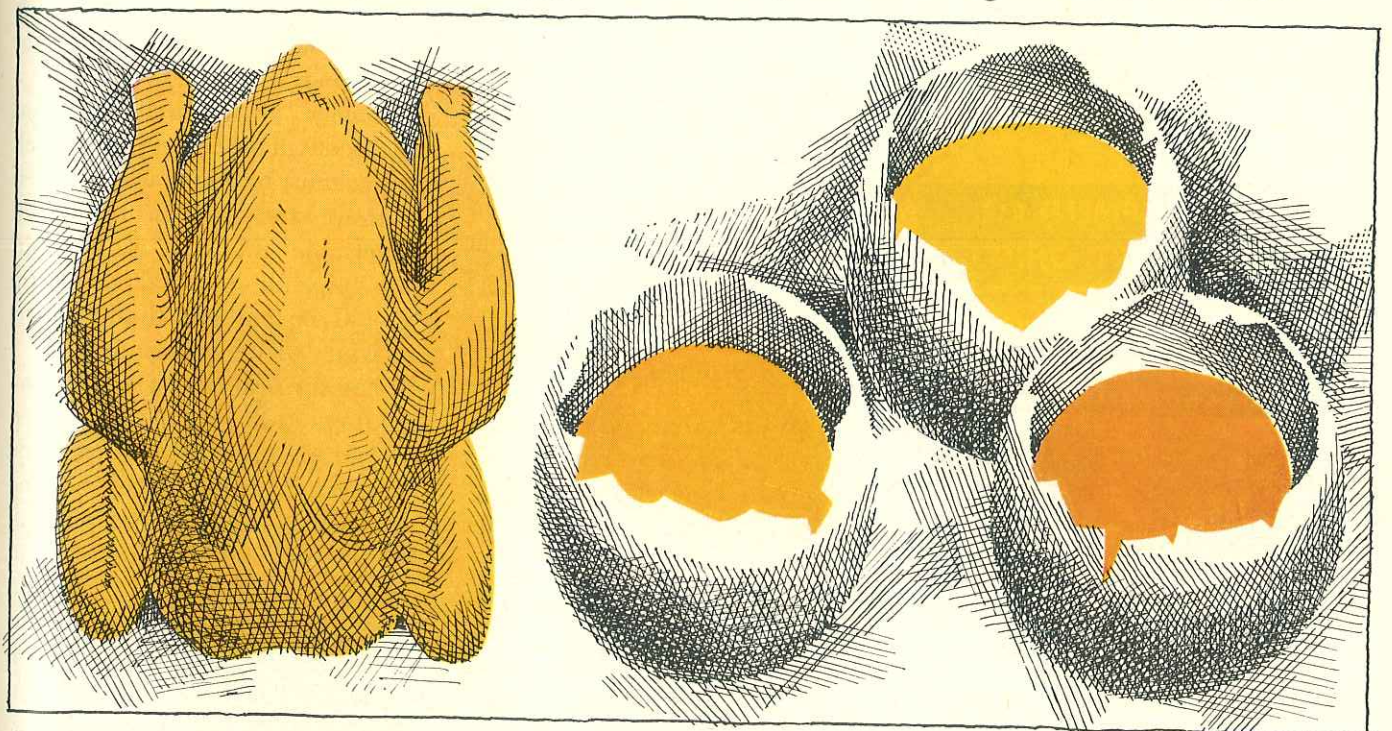
Distribution By Vacuum Tank

Advantages

1. It costs less than irrigation in terms of capital outlay, especially when small tankers are employed.
2. A tanker can reach remote and distant areas of a farm without additional equipment costs.
3. The machinery is simple and almost foolproof to operate, and



Colour of plumage and egg-shells depends on genetic factors



Pigmentation of skin and egg yolk depends on dietary carotenoids

«Carophyll» contains stabilised carotenoids and is easy to handle.

For broiler's all-mash: Add approx. 75 grams of «Carophyll» per ton of feed.

For layer's all-mash: Add approx. 15 grams of «Carophyll» per ton of feed.

CAROPHYLL

for pleasant pigmentation

F. Hoffmann-La Roche & Co. Ltd, Basle, Switzerland
Roche Companies and Agencies
in practically all Western countries.

For free information, circle 29 on postcard

LEY PIT SCRAPER BETTER ALL WAYS



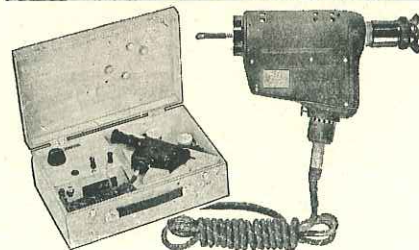
- Cleans two pits at one time
- Fits most popular tractors
- More adjustable—cleaner result
- Better built—lower maintenance
- Release from tractor—60 seconds
- Minimizes spread of disease.

This twin scraper backs up without manual steering—blade assembly easily stored—great time & labor saver. These Scrapers available now. Write for literature. Also ask about other cage house equipment.

**LEY EQUIPMENT CO.
VAN WERT, OHIO**

For free information, circle 27 on postcard

KEELER CHIXEXER Optical Chick Sexing Instrument



Sexing chicks with a Keeler Chixexer is the method used by some of the largest hatcheries and breeder organizations in U. S.

Its use is also spreading rapidly to countries all over the world.

Special training for three days will give 100% accuracy. It is the logical answer to a difficult problem that is becoming increasingly difficult. Join now with many of your fellow hatcherymen who use the Chixexer—it is the simple solution.

**SAFE • EFFICIENT
ACCURATE • ECONOMICAL**

**NEWTON CHICK SEXING CO.
P. O. Box 550 Newton, Iowa**

For free information, circle 28 on postcard

needs minimal maintenance and repairs.

4. A vacuum tanker can be shared between several neighboring poultry farmers because no individual owner will want to use it every day.

Disadvantages

1. The system can be put out of action by very wet ground conditions.

2. A tanker has a high labor requirement, needing attention all the time it is in action.

3. A tanker needs a tractor for transport.

4. A tanker has a very limited performance, which increases the labor cost of manure disposal.

Distribution By Irrigation Pipeline

Advantages

1. An irrigation pipeline has a low labor requirement because it can be operated continuously without attention.

2. It has a high rate of output.

3. It can operate in wet weather when wheeled transport dare not be allowed on the land.

Disadvantages

1. Capital outlay on equipment is higher than that required for a vacuum tank system and increases as more acres are used for disposal.

2. It creates more offensive odors at spreading than a tanker.

3. Effluent distribution in windy weather can be uneven and dangerously inaccurate.

4. Frost can play havoc with both pipeline and dispersal guns.

Making A Choice. On many poultry farms, the labor requirements of the two systems will be the factor which determines the choice between them. In a survey of 170 British farms employing hydraulic manure disposal, handling time with a vacuum tanker was found to average 134.5 man-minutes per 1,000 Imperial gal-

lans; with an irrigation set-up the overage was 29.7 man-minutes.

On balance, the economics of pump-and-pipeline disposal look more attractive than distribution by tanker. Although the tanker is cheaper to buy, its very high labor demand soon wipes out this saving, even at the lowest wage rates.

The problem of offensive odors when liquified manure is applied to the land may be short-lived. Recently, chemists have developed deodorants, consisting of blended combinations of non-toxic anti-oxidants and enzymes, which mask, even if they do not completely eliminate, the foul smell of decomposing organic matter. In soluble powder or liquid form, they are added to the contents of the storage pit (in minute quantities) prior to emptying.

Choice of hydraulic disposal method will determine how much water must be added to the stored manure and this, in turn, will determine the size of the pit. For pipeline disposal the ratio should be not less than 3 parts of water to 1 part manure.

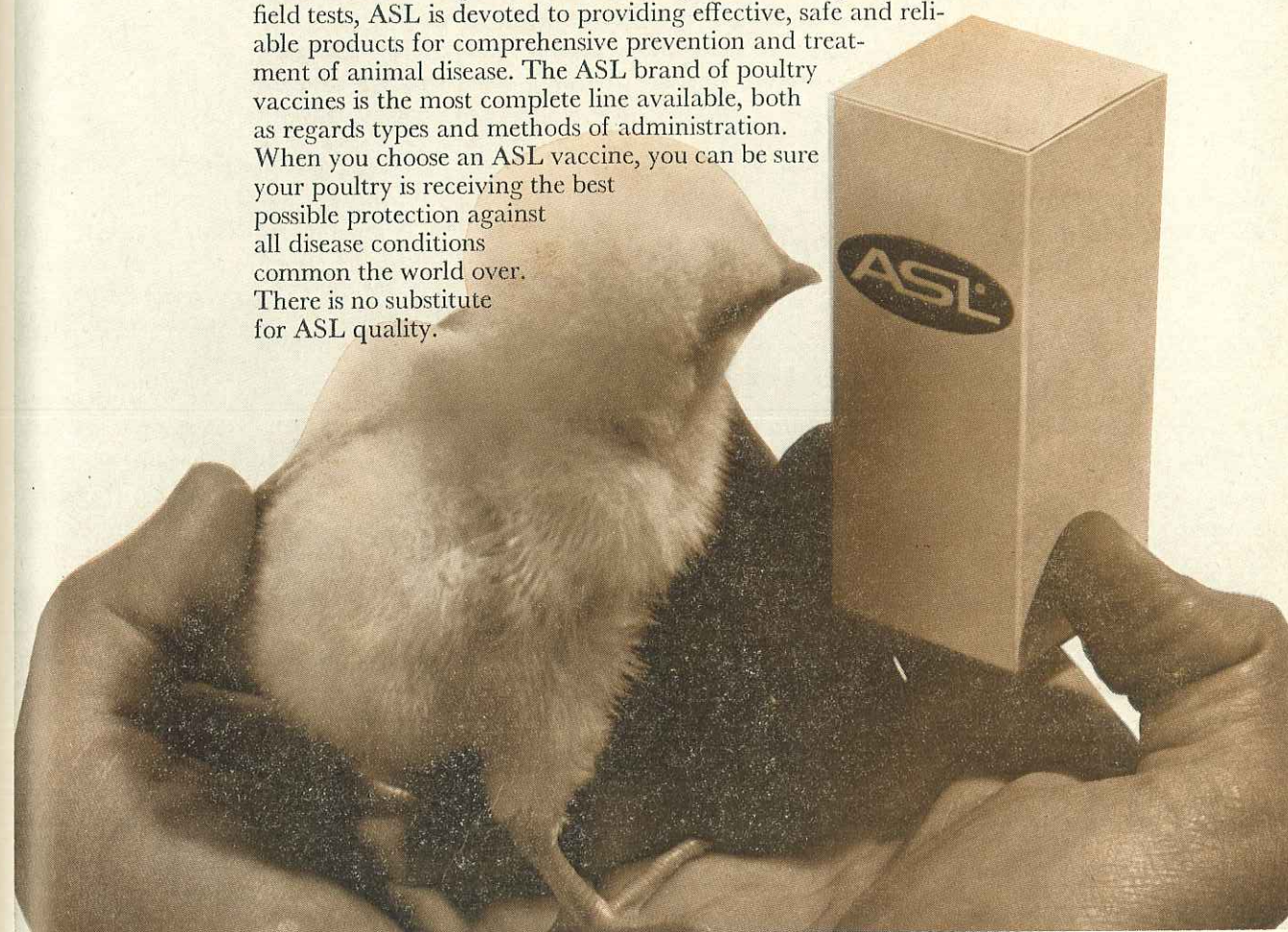
For distribution by tanker the dilution ratio should not exceed 1:1 or the operation will become completely uneconomic. Adding a lot of water into the pit will simply increase the time spent hauling and spreading. For this reason, it is important that rain-water should be excluded from tanker-emptied storage pits constructed outside the poultry house.

Choice of system will also influence the way in which droppings are moved from the cage stacks to a pit sited outside the house. With the high dilution ratio desirable for pump-and-pipeline disposal, water from a pressure-hose can be used to propel the manure along under-floor gutters. But with low-dilution tanker disposal, a mechanical conveyor must be employed.—

Anthony Phelps

there are many poultry vaccines to choose from—but one brand assures high quality

American Scientific Laboratories has been known for years as one of the world's leading producers of high-quality specialized animal health products. From intensive original research through the most rigorous scientific field tests, ASL is devoted to providing effective, safe and reliable products for comprehensive prevention and treatment of animal disease. The ASL brand of poultry vaccines is the most complete line available, both as regards types and methods of administration. When you choose an ASL vaccine, you can be sure your poultry is receiving the best possible protection against all disease conditions common the world over. There is no substitute for ASL quality.



POXVAC*TC. Mild fowl pox vaccine, the first of tissue-culture origin; contains a highly antigenic pox virus passed through tissue culture to produce a vaccine so mild that it can be used in day-old chicks, with minimal subsequent stress.

PIPOVAX*. Mild, safe pox vaccine made from a modified virus, unlike regular fowl pox vaccine, which contains a virulent virus and can cause the disease if used improperly. Also subjects birds to considerably less stress reaction, and is safe and effective in day-old chicks.

FOWL POX VACCINE. Regular type, for birds between 4 and 16 weeks of age (cannot be used in baby chicks). Stimulates a very

strong and durable immunity; revaccination is unnecessary except for turkeys being held for breeder purposes.

LT-IVAX*. Eye-Drop Vaccine; the first tracheitis vaccine containing a modified, rather than a virulent virus; therefore, avoids accidental causation of disease, and in addition provides both circulating immunity in the blood and—because it is administered in the eye—tissue immunity in sensitive respiratory areas.

NEWVAX*. Contains the mild, proven B₁ strain of Newcastle and produces effective dependable immunity without causing adverse symptoms of the disease. Can be given in drinking water or by the eye- or nasal-drop method.

BRONVAX*MR. Mild polyvalent bronchitis vaccine to protect against a wide variety of virus bronchitis infections; provides strong immunity combined with relatively mild reaction. Can be given in drinking water or by the eye- or nasal-drop method.

TWINVAX*MR. Combines the mild B₁ strain of Newcastle vaccine and the mild-reaction, polyvalent bronchitis vaccine to provide safe protection against Newcastle disease and a wide variety of bronchitis infections.

AMERICAN SCIENTIFIC LABORATORIES
A Division of Schering Corporation, U.S.A.
Bloomfield, New Jersey, U.S.A.



Note: American Scientific Laboratories invites inquiries from firms interested in representing its biologic and pharmaceutical products in any areas where ASL products are not yet available.

*TRADEMARKS

ASL-PV-E1