FLOCKMAN

POULTRY INTEGRATED MANAGEMENT SYSTEM

- MINI-FLOCKMAN -

Philosophy Strategy and Functionality

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Philosophy, Strategy and Functionality of *Mini-FLOCKMAN*

FLOCKMAN has been in existence for 20 years. The system has won several awards, (***FLOCKMAN***1986), and featured in a recent MAAF LINK project, "Integrated Management Systems for Poultry", supervised by the Silsoe Research Institute, Bedford, UK. This project enabled birds to be automatically steered along a pre-determined growth curve to reach the desired weight on the correct day (Stacey et al 2004).

BUT the system has proved to be too complex and expensive for most farmers, as it requires automatic feed and bird weighers, water meters and a computer.

So we have been working hard to produce a simple system that will have most of the advantages of ***FLOCKMAN***, but without feed and bird weighers, water meters or a computer.

The result is "***Mini-FLOCKMAN***" that requires no daily attention and is a fraction of the cost of ***FLOCKMAN***, whilst retaining most of the benefits.

The Benefits

1) Improvements in the Health and Welfare of the birds to meet new and impending Welfare standards from DEFRA and the European Union.
2) Birds on ***Mini-FLOCKMAN*** develop mature gizzards and crops as do wild birds. This produces better digestion and less water and nitrogen excretion. This results in dryer litter, and less ammonia and odour production with consequential big reductions in Black Hock or Hock burn. The environment is also more pleasant for the birds and also for the workers to work in.
3) Birds also have stronger legs, (we have measured higher drum-stick weights) and mortality is lower.
4) The birds' natural immune defence system appears to be substantially enhanced and are they are fitter and less fat.
5) Birds look healthier with cleaner feathers, brighter eyes, redder combs and wattles and they are more active, with big reductions in lameness and walking disorders.
6) We have found that late mortality of the larger birds due to problems such as Ascites and Sudden Death Syndrome is substantially reduced. This results in improvements in Feed Conversion Efficiency.
7) There is also evidence that variability of final liveweight into the factory is reduced, with fewer light weight birds and also fewer grossly over-weight fat birds.

How it works

Lights and feed are controlled by one small box with a keypad and a green back-lit display and several switches. So lights, feed pans and feed augers can be switched ON or OFF or put into AUTO for ***Mini-FLOCKMAN*** to work. A green neon light comes ON when all the switches are in the AUTO position. If one or more are not in the AUTO position, a red neon light shows a warning.

Before the birds arrive, ***Mini-FLOCKMAN*** needs some information.

It needs to know how many compound feeds are to be used during the life of the birds and for how many days each feed is to be fed. Also, whether the farmer wishes whole cereal to be fed to supplement the compound feeds. If this is so, a scale factor can be set up to increase or decrease the percentage whole cereal fed depending on the quality of the compound feeds and the farmer's experience.

There is an option for dimmable lights, non-dimmable lights or both to be used. The dimmable lights can be used just for the dimming up and dimming down function if the low-running-cost non dimmable lights are to be used on their own during the light periods. The dimming up and dimming down times can be set.

A main feature is the Feed/Light Profile. This sets up in advance for each day of the crop cycle, how many feeding periods there are to be for each day and when feed pans are activated. The length of time for dark periods is also pre-set. They can be set to change gradually from day to day if required. Each day does not have to be entered. You only set days when changes are wanted. ***Mini-FLOCKMAN*** calculates the days in between.

For farmers unfamiliar with the benefits of feeding and dark periods, several typical Feed/Light Profiles are retained in the ***Mini-FLOCKMAN*** memory and can be selected if required. Alternatively, for integrators and others with definite ideas about best lighting and feeding practice, there is an option to set up one or more Feed/Light Profiles for themselves. Once set up, they are held in memory for future crops.

All that now needs to be done is to select "Start Crop" on the day that the birds are housed. No other action is required during the life of the flock. "Stop Crop" is activated after the house is empty.

For the next crop, if all the settings are to be the same as the last crop, the only action required is "Start Crop" on the day that the next crop arrives.

All entries are password protected, so that unauthorised persons are unable to change settings. For extra security, the password can be changed if required.

Who can use *Mini-FLOCKMAN* ?

Mini-FLOCKMAN is designed for all poultry producers, even those producing Free Range poultry in groups of only a few hundred. It can work on a 12 volt DC battery as well as on mains supply, ranging from 90 volts to 250 volts AC. At the other extreme, integrated units with 25,000 to 50,000 birds per house will benefit greatly from better efficiency and help in meeting the increasing demands of legislation and the Supermarkets. Consumers are looking for more natural ways of producing poultry. Adopting feeding and lighting patterns more commonly used before the last war rather than in general use in intensive poultry houses for the last 50 years, is a proven way to enhance bird comfort and welfare. It is available in six languages for world-wide use.

The Indian Jungle Fowl (Gallus gallus) and digestive physiology.

This is the ancestor of the modern day chicken. It was domesticated some 5,000 to 10,000 years ago. This is a short time in evolutionary terms and the domestic fowl still retains many of their ancestors' biology, physiology and instincts.

Crop Development

One of my former colleagues was a bird-watcher and made a study of Gallus gallus. He found that they eat rapidly, just twice a day, in the cooler mornings and evenings so reducing the chances of predation and avoiding the mid-day heat. So they developed crops, which are the first part of the digestive system, designed to store food prior to digesting it later whilst resting. In the several hours that the food stays in the crop, it is soaked in a warm liquid. Plant fibre and cell walls swell and expand making the later digestive process easier and more complete.

Ad lib feeding practices, where food is available to birds 24 hours a day, are thought by some well meaning but un-informed welfarists, to be kinder to the birds. Some legislation also insists on this. In fact, the birds lose their crop activity because storage is no longer needed. So the pre-digestive function of the crop is also lost and digestive efficiency is reduced. This results in incomplete protein digestion and excessive excretion of nitrogen and water, which can lead to wet, sticky litter and the development of ammonia production. These are the classic conditions leading to the development of skin lesions on the feet, legs and hocks of the birds. These are known variously as litter burn, black hock, hock burn etc. This condition is seen frequently on the hocks of birds sold in the Supermarkets, even as Grade "A" birds.

Mini-FLOCKMAN can make dramatic reductions in these painful and scarring blemishes. Consumers are now aware of this condition and beginning to reject Supermarket birds that exhibit them.

Contrasting life style and behavioural patterns

Ad lib fed birds are also more lethargic and lead more boring and uninteresting lives than those on ***Mini-FLOCKMAN***. Because food is always in front of them, they can eat at any time. As with humans, some birds eat excessively and become grossly overweight and excessively fat. As a result they become lethargic and take less exercise than normal. Their legs become weak as a result of this. They are the "couch potatoes" of the bird community! This, in combination with the poorer litter conditions described earlier, often gives rise to poor walking gait and lameness.

With ***Mini-FLOCKMAN***, there are distinct and regular feeding times during the waking hours, just as feeding practice used to be pre-war. This results in predictable meal times that the birds anticipate. A behavioural pattern of feeding; resting; followed by activity such as litter scratching, dust batheing and group social behaviour; then the development of a healthy appetite; followed by the anticipation of the next feed. The sequence is then repeated. The pattern of behaviour of ***Mini-FLOCKMAN*** fed birds is dramatically different to those fed ad lib.

During the feeding process, the well known dominance hierarchy, also known as the "peck order", plays an important role. The dominant birds, at the top of the peck order, always get to the limited trough or pan space first as soon as the next mealtime starts. Those lower down the peck order, wait their turn because they soon learn that, in due course, their turn will come. So the dominant birds eat furiously and within 5 - 10 minutes, they fill their crops, become satisfied, and move away to rest.

The second tier of birds on the dominance hierarchy then occupy their places and in a further 5 – 10 minutes are replaced by those lower down the peck order. We have observed that as soon as the birds learn that they will all be able to fill their crops at each feeding event, they wait patiently without excessive squabbling.

After all the birds have filled their crops, ***Mini-FLOCKMAN*** stops the automatic feeding mechanism and does not start it again until the next feeding period is due. This results in there being several hours that all the feed pans are empty before the next feed. This is not a cause for concern because the birds' crops contain the food and this is slowly digested during the "pans empty" period.

However, it does mean that the greedy birds which, under ad lib feeding conditions, are constantly "snacking", are prevented from doing so. This therefore prevents them from becoming grossly over weight and excessively fat. This results in their better fitness, health and activity and also reduces the high rate of mortality seen among such birds. Not being able to "eat between meals" results in the birds developing a "healthy appetite" in preparation for the next feeding event.

This pattern of feeding encourages group social activity. During the "Pans empty" phase, one can commonly observe birds running as small flocks of several hundred up and down the passages between the feed pans and the water lines. Birds appear to be more alert. Such behaviour is not often seen among ad lib fed birds.

There are also benefits for the small birds at the bottom of the social hierarchy.

In modern poultry houses, poultry food is normally dispensed into shallow pans where up to 8 – 12 individual birds can feed simultaneously, depending on their age and size. There are usually 60 – 70 birds allocated per pan. This means that in ad lib feeding situations, when a small recessive bird wants to feed, there is often a larger bird of higher dominance already feeding. The larger bird sees off the smaller bird! So it is difficult for a small bird to get enough food during the 24-hour period for it to grow properly to its potential. So the smaller birds tend always to remain small compared to the rest of the flock.

However, with ***Mini-FLOCKMAN,*** such birds have only to wait at each mealtime until all the more dominant birds have filled their crops, become satisfied and are resting, for them to have the pans to themselves. They can then also fill *their* crops. So during each 24-hour period, they get more food than under ad lib conditions. This enables them to start to recover body weight and grow more nearly to their full potential.

With greedy birds growing slower and smaller birds growing faster, variation in bird weight into the factory is improved. This suits Supermarkets who like to have the final product that they sell as uniform as possible.

Gizzard Development

Observations of the Jungle Fowl show that their diet consists of small insects, and vegetable matter including hard seeds and grain of various plants and soil contamination. To deal with structured seeds, often with tough outer protective coats, evolution has provided them with gizzards.

These are powerful grinding organs into which food, stored in their crops, passes directly as the first stage of digestion proper. Special muscle fibres, unlike any others in the body, exert great pressure. The inner surface of the gizzard is highly keratinised and consists of a series of hard ridged surfaces, The muscular activity and grinding action of the gizzard, breaks down hard seeds and particulate matter, particularly if it has undergone several hours of soaking and swelling in their crops.

The exit from the gizzard is controlled by a strong sphincter muscle, which will allow only material to pass on to the rest of the digestive system when the particle size, as a result of the grinding, is small enough.

The strong muscular action of the gizzard causes all the digestive organs to be more mobile. This stimulates more hydrochloric acid to be produced and lowers the pH of the gut contents, which become less viscous. This enables easier penetration of digestive enzymes and the subsequent absorption of digested nutrients.

Some bacteria, such as Salmonella and E. coli are damaged by the more acid conditions. The lower pH therefore results in a more favourable micro flora balance in the gut which, again, assists digestive efficiency.

Modern Feeding Practice

Commercial poultry are currently fed pelletted compound feed. This consists of a mixture of cereals, such as wheat, maize etc. and protein rich seeds such as Soya bean, sunflower etc. Before steam pelletting, these are thoroughly mixed and hammer-milled to pass through a 3mm to 5mm sieve. When eaten, the compound feed breaks down to its hammer-milled particles. These are small enough to pass through the gizzard without stimulating it to grind, as there are no hard particles there to be reduced.

With modern birds fed entirely on compound feeds, their gizzards are therefore virtually redundant and largely inactive. In the early days of the compound feed industry, the pioneers successfully promoted the idea of the "balanced beakful". This was that every single beakful contained all the protein, energy, minerals and vitamins that the bird needed. So this encouraged farmers to sell their home grown cereals to compound feed manufacturers and then buy them back mixed with proteins, minerals and vitamins to feed to their own cattle, pigs or poultry.

Our study of the Jungle Fowl and memories of pre-war poultry feeding practices, led us to realise that evolution had engineered the birds' gizzards to be an effective grinding organ to cope with their natural diet. The gizzard not only grinds the whole seeds and cereals normally eaten by birds, but it also reduces plant protein material to smaller sizes than produced by the hammer mill. This exposes a much greater surface area for digestive enzymes lower down the gut on which to act. It also disrupts some cell walls, so exposing the cell contents to digestion. If cell walls remain intact, this can result in some cells passing right through the gut without their contents being digested at all. So with pelletted feeds the hammer-milled components are broken down further, so increasing the digestibility of all the nutrients in the complete diet.

FLOCKMAN has advocated the feeding of a proportion of whole cereals to poultry since the early 1990's. This was on the basis of: -

1) Improving the digestion of protein with the consequent reductions in nitrogen excretion, ammonia production and litter burn to the birds' hocks.

2) A reduction in water intake and excretion. Nitrogen excretion as Uric acid involves the de-amination of amino acid in the kidneys. This requires water to flush out. Excessive nitrogen excretion needs more water consumption and excretion, leading to wet litter. We have measured the water intake of birds fed with or without whole cereals in their diet and found less to be consumed by whole cereal fed birds. In particular, we noted that the normally accepted Water/Feed ratio of 2:1 (2 litres of water consumed in the poultry house per kg of compound feed fed) is reduced to 1.6-1.8 when whole cereal is fed.

3) A reduction in cost without loss of growth, leading to improved producer profit due to the fact that whole cereals are lower in cost than compound feed.

4) Less need for chemical coccidiostats in the feed. Australian work (Cumming 1992) had shown that the number of coccidial oocysts in the faeces of birds fed a proportion of whole cereal in their diet was substantially reduced. He showed that the gizzard actively damaged or destroyed most of the ingested oocysts, picked up by birds in the litter, during its active grinding process.

   We believe that it was the elimination of whole cereals in birds' diet during the early stages of the broiler industry that led to widespread outbreaks of coccidiosis in the 1950's and 60's. This, in turn, resulted in the growth of a new branch of pharmaceutical industry producing ever-efficient chemical coccidiostats. Gizzards are nature's way of enabling birds and coccidiosis to coexist together.

Affects of light and dark on poultry Health and Welfare

Over the last 50 years, less rest has been given to domestic poultry kept for meat production than pre-war. More recently the importance of dark periods each day has been recognised as assisting health and welfare. ***Mini-FLOCKMAN*** enables sophisticated lighting programmes to be used including dawn and dusk simulation.

The Jungle Fowl seeks sheltered dark parts of the Tropical Rain forest after its morning feed to escape the heat of the sun. It does not eat during this time but has a full crop of feed to live off, which it digests during the heat of the day. Later, when the heat of the day has subsided but when it is still light, it emerges from the dark parts of the forest to the lighter areas where it again browses for its evening feed, filling its crop again rapidly before the night sets in. It then roosts for the night to avoid predators.

Dark periods and Dawn/Dusk Dimming

Mini-FLOCKMAN simulates this by providing different intensities of light and dark periods during the 24 hours of the day. It uses a Dawn/Dusk Dimmer where light can be phased gradually to dark over a 20-30 minute period and vice-versa. It recognises the importance of completely dark periods for the health and welfare of the birds. There is evidence that such periods stimulate the immune defence system of the birds, enabling them better to resist bacterial and other infections. It also provides a darker period immediately before feeding. This not only provides the well-known “Pavlov Effect” but also provides a convenient time to refill all the feed pans while the birds are resting. When the lights gradually come on, the “early birds” get to the pans first even in the dim light. This avoids any sudden rush for the pans, which would occur if the pans were filled in full light.

It is interesting and informative to stand quietly in the poultry house just before the lights start to dim up and observe the birds’ behavioural pattern that emerges over the next few hours. It contrasts sharply to birds in other houses fed and managed in more conventional ways.

Summary

Mini-FLOCKMAN stimulates behavioural patterns more nearly associated with the Jungle Fowl and pre-war managed poultry. This contrasts to methods in use in general for the last 50 years, starting with the onset of industrialisation of the poultry industry. It incorporates methods of management and techniques developed within the more sophisticated and expensive ***FLOCKMAN*** system over the last 20 years. It now offers the benefits of better health and welfare for the birds and a more economic production system to the industry at low capital and management cost. The day to day input required from the producer is Zero. It is designed for world wide application.

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