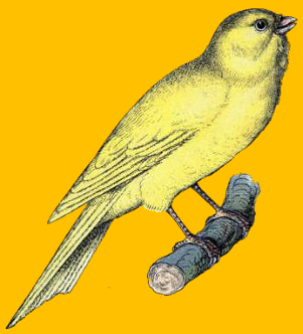
CANARY BREEDING TIPS and TRICKS

by **HERMAN OSMAN**



A TREATISE CONTAINING UNUSUAL AND EXTREMELY PRACTICAL INFORMATION ESSENTIAL TO THE SUCCESSFUL BREEDING OF CANARIES

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"A kind heart is a fountain of
gladness – causing everything in
its vicinity to freshen into
smiles."

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by HERMAN OSMAN

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C O N T E N T S

PARTII—NUTRITION

PART III—MISCELLANEOUS

INTRODUCTORY

What is a tip and what is a trick in canary breeding?
This question is difficult to answer. That which you have known for many years is neither. The original purpose of your author was to write a book on canary breeding that would only disclose matters not commonly known but as the writing progressed it became more and more difficult to decide what should be omitted to stay within the scope of the title of the book.
Several years ago, while attending a picnic of canary breeders, the writer had a discussion with a breeder who had been raising canaries 26 years and who was amazed to learn from the writer that the last egg layed, in every clutch is a bluish egg and yet the writer had learned this fact in the very first year that he raised canaries. This illustration is an extreme case to be sure but many other cases not so extreme could be cited. No doubt this book contains much that is known by experienced canary breeders and their forbearance is asked as to such matters.
No one is able to write a book on canary breeding that will not contain some matters with which other experienced breeders do not agree. This is especially true as to feeding routine. One writer in a canary magazine aptly stated “there are as many different leading routines as there are canary breeders/’ Most obviously not all feeding routines are correct ones nor even good ones. The vast majority of canary breeders cannot be considered highly skilled breeders because their annual average production per hen is no greater than that of novice breeders.

The mere fact that some well-known breeder raises a large quantity of birds annually is not indicative that he or she is a well-informed breeder. The number of hens bred, the amount of assistance and freedom from interference are very important factors. A breeder who retails a large number of birds during the breeding season that requires about one-half his time is unable to compete for production honors with one who sells most of his or her birds at wholesale.

A substantial part of this book dwells on the subject of foods. Its importance to success in canary breeding is not realized. A very serious effort was made to furnish accurate information on this subject. The sources of information were numerous and believed to be reliable.

EGGS

CHAPTER I
EGGS

How far in advance must copulation take place for an egg to be fertile ? This question is frequently asked. The average breeder is of the opinion the minimum time is four or five days. The writer has not sought to determine this fact, so solicited the views of several well-informed and experienced breeders. One of them considers the minimum time to be 48 hours, another 36 hours. A third one stated the English had made some tests to determine this fact and found that fertilization can take place in a minimum time of 24 hours.

Within the past two years, an article on this subject Appeared in an American bird magazine by a large and well-known breeder — name forgotten. The writer claimed that he had proved over and over again that a period of 24 hours is sufficient. It is most improbable that a well-known breeder would make such a positive statement unless he had definitely proved the fact.

“How long after copulation will the eggs be fertile is another question that is commonly asked. Information on this question was also sought from other breeders. Mrs. Lillian M. Otersen, of West Haven, Connecticut, advised of a case where one of her hens was too disagreeable with her mate to leave him in the cage, so he was removed. Copulation took place thrice after he was inserted in the cage. The hen built her nest three days after intercourse, but when no eggs appeared as expected and as it was early in the season, The hen was left in the cage to abide time temporarily. On the 12th day after the male was removed, the hen layed her first egg of a clutch of four. As all four eggs hatched, there was a maximum time of 15 days between copulation and the laying of the fourth egg. Mrs. Otersen assured the writer there was no possible error involved because the breeding tag was marked

showing the date of copulation and the date of removing the male, which were the same. Mrs. Otersen also related the experience of another breeder who obtained four fertile eggs 10 days after the male was removed from the cage. Even if the male had relations with the hen the day he was removed, there was a minimum of 14 days between intercourse and the laying of the fourth fertile egg.

Mr. Morgan Honnell of Miami, Florida, furnished the information of a poultry experiment by an English man, who obtained some fertile eggs 21 days after the rooster had been separated from the hen.

It is only natural that breeders should differ in routine matters. It can be said with certainty, however, that the majority of experienced breeders remove the eggs from the nest as layed until the last egg is layed, which is called the blue egg because its color is usually a much richer blue than the rest of the clutch.

There are a few breeders who do not remove the eggs from the nest on the theory it is contrary to nature ?s way. Their reason sounds good but it must be remembered that in the wild state nature functions perfectly, and such is not the case in an unnatural state in which the canary hen functions. In looking into the nests of such common birds as robins and bluebirds, you will not find young of different age and size. The eggs all hatch the same day. This very fact was observed in the nest of a robin in the writer's back yard this summer. It seems certain that the wild birds do not get their incubating temperature until they have finished laying the entire clutch. The same is not true of the canary hen. Some stay on the nest, if the egg is not removed, upon the laying of the first egg. The majority of canary hens do get their incubating temperature after laying the third egg. Freedom to roam and the necessity of searching for food probably accounts for the wild birds not getting their incubating

temperature until they have layed the last egg of a particular clutch. The canary hen confined to her small quarters with food just a single hop away from her is not mentally distracted by the pangs of hunger.

It is not at all improbable that the canary hen is a psychological victim too. With her nest continually in her immediate sight it is only natural for her to be stimulated into that in the immediate offing—the raising of a family, the instinct so deeply implanted in the female of all living creatures.

In view of what has been said, it is surprising how many canary hens will stay on the nest after laying the first egg. Very few stay on the nest full time because they lack the incubating temperature, but their staying on the nest part time is truly indicative of the psycho logical effect of what has been said.

Only limited experience is required to convince a canary breeder that a young born as much as two days later than the rest of the young in a nest of three or more young has a chance of surviving only with the un usual hen. With the average hen, its chances are poor.

In 18 years of breeding experience, the writer has had only one hen that had the intelligence to feed five young from one side of the nest, retain some food, and then hastily run to the other side of the nest to feed two young born three days later.

All of the foregoing is a prelude to the plan the writer has found the most practicable.

A young hen on the first nest of the season normally does not lay over four eggs. Remove the first two eggs, If the third egg is the blue egg, return the first two eggs to the nest. If it is not the blue egg, leave it in the nest. The fourth egg most likely is the blue egg. If so, return the first two eggs layed. If the fourth egg is not the blue egg, leave both eggs in the nest and return the first two eggs when the fifth egg is layed.

Aside from young hens on their first nest of the season, the following plan is advised. Remove the first four eggs from the nest as layed. If the fifth egg is the blue egg, set the hen. If it is not the blue egg, leave it in the nest. The sixth egg most likely is the blue egg, then return the first four eggs layed.

It is not serious if one young hatches a day earlier than the rest, but it is very serious if one young hatches a day later than three to five others.

It is really advantageous to have a hen hatch one young a day ahead of the rest. Some hens are timid, perhaps bilious, and perhaps untrustful of the male in the cage on the first day they have young. These same hens, though poor mothers the first day, very often are fine feeders after the first day. A hen does not have to feed very much the first day to keep only one young alive, but if she has five or six and feeds poorly, the chances are that some of the young will be lost.

If a hen has only one young the first day and feeds poorly or not at all, you have a chance of saving the rest of the clutch. You are put on your guard. You can give the fertile eggs to a hen with no fertile eggs, with only one or two fertile eggs, or to a hen with only one or two new born young. It is the avoidance of the high percentage of loss that distinguishes a good canary breeder from a poor one or a mediocre one.

The hatching of one young will also keep a hen from deserting her eggs. One day's difference in the hatching date very often is extremely important.

This subject is treated at considerable length be cause some very prominent writers for the bird magazines differ with the writer.

On the day eggs are due to hatch, you may find an egg in the nest one side of which or at least part of its area is flat. Pieces of the shell will be missing but the tough membrane inside the shell is intact. In appear-

ance it resembles a hard-boiled egg that was dropped on the floor. An egg of the described appearance has an imprisoned young who has been trying to pick its way out of the shell but whose efforts are doomed to failure. One would think that in a situation as described, a few drops of warm water placed on the exposed mem brane would be the perfect remedy. Strange to say, it is anything but a remedy in virtually all cases. If, after applying the water, you check the nest an hour or so later, you will find a bloody half-destroyed young in about three-fourths of the shell. The hen will not molest the egg in its appearance as described above, but as soon as the exposed membrane is wettened, the hen either out of curiosity or in its desire to help the young out of the shell will peck the egg at the slightest exposure of the chick's beak or head.

After wetting the exposed membrane, puncture it with the eye end of a needle at the beak of the chick whose location becomes evident as soon as the mem brane is wet. You see motion at the location of the beak. After puncturing the membrane, it is easy to continue to liberate the chick. If you use the sharp end of the needle or sharp tweezers, you will most likely draw blood and the young will bleed to death.

The longer you defer the performance of the operation, the weaker the chick will be. Laying the egg on a soft cloth while you are taking the necessary steps facilitates the operation.

If the young in the shell is a day or more overdue, extricating it from the shell is not worth the bother that subsequently follows. As an experiment, the writ er extricated a young two days overdue in an extremely large egg which had a small opening at the beak of the unborn chick. It was believed the egg contained two yolks, and the first opportunity for twins was at hand. There was only one chick in the egg and it was

the size of a well-fed chick two days old. It was fed hourly (as near as possible) forcibly with a medicine dropper, as explained elsewhere. It required almost two days of the forced feeding before the chick was strong enough to lift its head and open its mouth for food. The writer realized the chick was too near dead when born to warrant the bother, but the labor was expended for the sake of the experiment and to satisfy the writer's egotism.

Many breeders incorrectly assume that because some eggs in a clutch are infertile they are the ones that were layed too soon to become fertilized. For reasons entirely unknown to the writer, there are some eggs layed between the first one and the last one of a clutch that are infertile.

As a matter of sound practice, it is advisable to introduce the male into the cage at least 48 hours in advance of laying. A good practice to follow in stud breeding is to introduce the male when the hen has partially finished building her nest. The average hen does not lay within three days after her nest has been built.

Perhaps cracked eggs are hatchable. Another breeder told the writer she sealed a cracked egg with a white of a chicken egg and the egg hatched. Don't try wax like the writer did nor a similar substance that will get gummy from the temperature in the nest. If you do, you will find several eggs stuck together.

Eggs have a glazed protective coating to keep out the air. If you wash excreta off the eggs, they become unhatchable.

Some breeders follow the practice of removing the eggs as layed until the blue egg is layed and then set the hen in the evening. As eggs generally hatch within an hour or two of the time they are supposed to hatch (on the 14th day), this means the young will be without food for a period of eight hours or more. Even after

allowing for nature's cycle of rest and inaction, such young are off to a poor start compared to young born in the morning and strengthened by a day's feeding. Set your hens in the morning.

It is not necessary to cover the eggs nor keep them warm while holding them until the hen is set. It is safer to keep them where the temperature does not go be low 65 degrees.

The chick in the shell perforates the shell about ¾ the distance around the egg approximately midway between the ends of the egg, and then by muscular exertion breaks the shell into halves. The perforation being done from inside the shell gives rise to a slight ridge on the outside. You will occasionally find an egg without the ridge and a slight opening in the shell at the point of the beak. Such chicks will not emerge from the shell. Use the eye of a needle and press gently in ward on the shell, starting at the small opening. If you do this within a few hours after hatching time, the whole operation is very simple and successful. If you wait too long, the shell will become hard and dry inside and you cannot proceed as outlined.

Sometimes a young's head is stuck to the membrane inside the punctured egg and is unable to complete liberating itself from the shell. With tweezers you can puncture the butt end of the shell and help the young into this world. If you draw blood the young will die.

You can assist the stranded young by putting a drop of warm water with a tooth pick on its forehead. The latter seems simple but if you get water into its nostrils, it will suffocate.

Those eggs whose normal coloring extends from the butt end to the middle of the egg only and then becomes very pale are not fertile.

The eggs from clear yellows, whites and orange birds are generally un-speckled. If they are speckled, you can

be quite certain you will get variegated young out of them. This information is valuable perchance you have eggs from a non-setting hen that you want to give to another hen and yet retain the identity of the parents.

Normally the last egg of a clutch is blue and considerably bluer than the previous eggs. If a hen lays any eggs after the blue egg, which is quite rare, the eggs will be a pale greenish color.

Occasionally a hen lays all decidedly blue eggs and the last egg of such a clutch is either bluer or some what of a greenish color.

Don't fret if in handling an egg with your hands the egg is so fragile that it breaks in your hands. Such thin shelled eggs are on the anemic side and are not fertile.

The idea that you must remove an egg from a nest with a spoon belongs to old folks' lore. A good normal egg can be handled like a marble.

If eggs that bobbed vigorously in luke warm water do not hatch within 24 hours, and if when placed in the luke warm water again, on the following day the bobbing becomes faint, then the young are dying within the shell and obviously lack the strength to pick their way out. If you have time and some skill, your situation is not hopeless. Keep the eggs in luke warm water for about two minutes to soften the shell. With sharp tweezers puncture the butt end of the egg and carefully peel away the shell. If you draw blood, the young will die. After the young are born, they are very weak. Hand feed them, forcibly, if necessary, with a small medicine dropper every hour until they are strong enough to raise their heads for food. For the hand feeding use Pablum dissolved in luke warm water.

The foregoing procedure was resorted to by the writer successfully several times.

How long eggs can be held before being placed under a hen and still be hatchable is not definitely known. One

breeder told the author she had eggs hatch that she held two weeks from a non-setting hen.

It is not necessary to turn the eggs daily that are being held until the blue egg is layed, which is usually from four to six days. Eggs held beyond that period it is advisable to turn. The turning should be from end to end, not sideways. The turning can best be accomplished if the eggs are stored in a vessel of seed.

If you keep your breeding room warm with artificial heat, the shells become dry and too hard for the young to pick their way out. It is wise to have shallow pans of water evaporate in your breeding room. One wise breeder whose breeding room has a cement floor pours the water from the drinking vessels on the floor. This breeder does not complain about young dead in the shell.

It is not unusual for eggs to hatch several days late, in fact, it is quite common in areas where a big variation in temperature takes place and breeding operations are carried on without any artificial heat. The reason for eggs hatching later than the normal time is undoubtedly due to the hen, during the incubation period, staying off the eggs too long at a time either because of some disturbance which upset her mentally or by taking a lengthy bath. The writer has had several nests of eggs hatch as late as the 19th day, or five days beyond the normal period. The experienced breeder places the over-due eggs in a vessel of luke warm water two days after the normal hatching period. If there is life in the eggs likely will bob. If they bob vigorously, the eggs will hatch within the next 12 hours. If they bob faintly, the time of hatching is at least 24 hours away or the life inside the shell is ebbing.

Dummy eggs made of cement are inadvisable. Some hens virtually stand in the nest and strain themselves to lay an egg, especially a very large one or the first egg

of the season by a young hen. Eggs layed by such a hen strike the dummy egg with enough force to crack the shell. Dummy eggs made from alight substance such as plaster of paris are satisfactory. Infertile eggs marked with mercurochrome are also very satisfactory but their use is limited. They soon become completely dry on the inside and will be recognized by the hen as being worthless. It is common for the hens to remove such eggs from the nest. You can make your own dummy eggs by filling infertile eggs with plaster of paris.

In moderately large-scale breeding operations, it is the better policy not to bother candling the eggs. If a hen has five or six newly-born young and another hen due or overdue to hatch has no fertile eggs, transfer some of the young to the hen without fertile eggs. This is a wise policy for several reasons as follows:

A hen with infertile eggs is more likely to be fertile on her next clutch, if she raises a small nest of young, then if she is placed in an aviary and bred a week or ten days later.

By placing another hen in the cage to replace the hen with the infertile eggs you lose about as much time usually as it takes for the hen with the infertile eggs to lay a clutch of eggs after raising the few young.

CHAPTER II
HANDLING THE HENS

It is light and not heat that will bring your hens into breeding condition out of season or in a late Spring. Experiments conducted by Prof. Bisonette, of Trinity College, Connecticut, definitely proved this. By the use of artificial light he brought starlings and weasels into breeding condition in the middle of winter and by maintaining the outside temperature.

HANDLING THE HENS

In experimenting with colored lights, Prof. Bisonette discovered that red lights had an extremely stimulating effect, while white lights were stimulating but not nearly as much as red lights. Oddly enough yellow lights had the opposite effect and actually caused a shrinking of the testes of the males.

Sometimes a hen that is seemingly in grand condition will not feed her young. Sometimes the reason for this is that the hen fears to leave the nest perchance the male will destroy her young. Quite often, removing the male from the cage proves to be the simple solution.

Sometimes a hen that has been a very good mother most of the breeding season will late in the season suddenly disappoint you. You will find to your amazement that the young are due for banding but are too small to band. The hen sets on the young most of the time and feeds poorly. The feeding male in the cage would feed the young if the hen would get off the nest. Quite often the following succeeds: Place the young in a small tin or nest pan containing nestling material and stand the pan on the bottom of the cage. The hen will not set on the young in the new location and a feeding male will be able to and usually does take over. If you do not have a feeding male in the cage you must assist by hand feeding the young in the original nest. Transferring feathered young to another hen, as stated elsewhere, generally does not meet with success. Usually, a fine feeding hen that suddenly becomes a poor feeder is sick or is approaching the moult.

If you are the unmethodical type, your chances of success in the canary business are poor. Feeding time is feeding time and not an hour afterward. The news via telephone that the rich widow Mrs. Brown was seen with a college boy about 15 years her junior at some gay night club may be mighty interesting but does not warrant the feeding of your birds an hour after the regular time.

A sister of the writer related that twice when she went away on a three-day visit the egg production on her poultry farm dropped one-third. Her husband paid little attention to the clock. Many humans get headaches from irregularity. A spicy telephone conversation may cost a nest of birds worth $20.00 and upwards.

If you cause an extreme disturbance in the breeding cage by being awkward and slow in removing self-sup porting young or by removing the male, you very likely will upset the hen mentally if she is laying, and further laying ceases. If the hen's feet need cleaning, refrain from doing so until she has been setting at least two days.

Virtually every breeder develops the habit of serving nestling foods and greens by starting at the same place in the breeding room. Always serve the hens with young first. Most of them will start to partake of the new food immediately and will be filled up and ready to serve their young the moment you leave the breeding room. If you don't follow this advice, you will find the hens with young motionless in the bottom of the cage and staring at you like a sphinx while you are serving other cages.

The stools of the hens while setting are very abnormal in that they are extremely copious. This is due to their infrequency of leaving the nest. So long as the stools are solid and merely copious, there is nothing to worry about. When the stools are very soft and cover a large area with the white (urine) intermixed with the rest, the hen has a bowel disorder which will be aggravated by cleaning the excreta of the young from the nest. Seek to correct the disorder before the young are born. By far the most effective remedy discovered by the writer is a one-fourth tablet of aureomycin of 15 mg. strength dissolved in the average size drinking vessel. A fresh solution daily is advisable on hot days.

Normally the disorder is corrected in about three days.

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Hens that are not over four years old, and that do not come into breeding condition until late in the season, are not to be trusted. The majority of them were not in vigorous health when the breeding season started, and their chances of being good breeders are not good. Don't breed them if you have other hens available.

A hen that is a non-feeder or poor feeder on her first nest is not in good condition for breeding. If placed in a large flight for at least three weeks and given an abundance of rich-non-stimulating food, the chances are good that she will be a fairly good breeder the remainder of the season.

Don't waste your time with a hen that is a cannibal or plucks the feathers of the young as fast as they grow. Such hens will do the same thing the following year. If valuable, you can use them for egg layers.

Some hens are definitely monogamous. After mating them to one male for the first mating of the season they cannot be mated to other males later in that season. During the past breeding season, the writer had two hens with infertile eggs on the first nest. It was sought to mate them to different males on the second nest. In each instance the males were not placed in the breeding cage until the hens had started to build their nests. In both instances the hens discontinued building and remained on unfriendly terms with their intended new mates for three successive days. From experience, it was known that remedial measures had to be taken. The males were replaced by the males that were formerly mated to these hens. The unbelievable fact is that both hens within an hour resumed building their nests after their former mates were returned to the breeding cage.

You cannot force monogamous hens to accede to your wishes. Some hens with young not yet able to leave the nest go! a seemingly irresistible sex urge. They get upset and very flighty when they hear a male in the

sex appeasement to feed their young. Insert a male and leave him in the cage until the hen is appeased. As soon as appeased, she will go back to feeding the young and may even fight with the male. Remove the male in either case. Some hens get the sex craving for as long as six successive days, and it may be necessary to appease them each day.

If a hen does not feed her young the first day or two, returning the male to the cage may be helpful. Some hens will allow the male to feed the young when they feed them poorly or not at all themselves.

Every experienced breeder had a few hens in, his days that were ripe for intercourse, built nests, and yet absolutely refused to have sexual relations with any male. Such hens will battle unto death before submit ting to any male. The only way to handle such hens is to have them alone in a cage until their nests are partially built and then transfer them to the cage of a male temporarily. In their new environment such hens are less audacious and will usually submit to an insistent male. After several copulations have taken place, transfer the hen back to her cage.

Here is a tip taken bodily from the letter of a young breeder. The tip is odd and amusing:

“Occasionally, I’ve had mothers who spent much time on the perch besides their nests, neglecting to keep the babies warm enough or well fed. In these cases, I exercised a little discipline by removing all perches. Then they had to sit on the edge of the nest and they had to respond to the babies’ demands”.

Some hens are fearful of the male harming their young, and will not leave the nest because of the fear. It is common for some hens to resort to feeding as soon as the feared male is removed from the cage.

If a hen has layed two large clutches of eggs in the first two nests of the breeding season but lays only

three eggs for the third nest, you have plain evidence that the hen is either approaching exhaustion or is showing the approach of the annual moult. It is a poor policy to set such hens for the third nest of the season.

Late in the breeding season you will find some hens that appear drowsy setting on eggs. These hens will not raise their young and are approaching the annual moult. If you have hens with infertile eggs, do not dis card them. Give them the eggs from the drowsy looking hens even if their hatching date is not the same.

Take a chance. You are sure to lose otherwise.

If you remove the male from a mated pair while the hen is laying, you take the chances of upsetting her mentally, and if you do, she may discontinue laying. The partially formed eggs within the hen are dissolved. An egg not completely dissolved, almost pea sized, may lie layed. It is the best policy to let the male fly out of the open cage door after the hen has been setting two days.

Very often when a hen refuses to accept as a mate a male inserted in her cage, it is due to her having fallen in love with a male adjacent to her cage and using him to pacify her when she shows a strong urge for copulation is the quick solution.

If the male is returned to the breeding cage to assist in the feeding, the proper time to return him is at dusk when the hen is less inclined to fight with him. On the following morning, he sure to check that there is harmony in the cage, and if not, remove the male or the young will starve. Some hens will not tolerate the male in the cage out of fear the first few days they have young.

It is not very unusual for a hen to want to produce offspring but is unable to lay any eggs because she is past her reproduction period or is simply not in good condition. Such hens can be given eggs from hens that

will not set or were not very good feeders. A very smart plan is to use such hens late in the season and give them eggs from hens who have already raised two big nests of young.

Hens in very poor condition and hens chronically ill may show a strong inclination to breed. You solicit grief by breeding them. They will not raise their young perchance their eggs are fertile.

When a hen lays an egg in the nest a day or two before the young leave the nest and stays on the nest with the young even though the eggs are removed, your problem is not as serious as it seems. Simply put the young on the cage floor and remove the nest each morning as soon as the egg is layed. Be sure to return the nest to the cage late in the evening.

As a general rule males returned to the breeding cage will not take to assisting in the feeding after once the young have opened their eyes.

It is not unusual for a male to be a far better feeder than the hen. When the hen is a poor feeder, a good feeding male must await the opportunity to get a chance to feed the young because the hen will stay on the nest and cover the young when it is no longer necessary to do so. If you are in a desperate situation, try your luck by removing the hen. If the male appears unhappy without the hen in the cage, place her in a cage adjacent to the breeding cage.

It is not unusual for the hens to develop lumps of congealed excreta on the toes or claws in the breeding cage. This happens even in cages kept tolerably clean. The congealed mass is usually developed from the droppings on the edge of the nest.

Every experienced breeder knows the lumps can be easily removed by bathing the feet in warm water. Some of them are difficult to remove and these must not be pulled off with the fingers or the hens will be

injured and may stop feeding. With sharp tweezers break the lumps on the side of the toe and they can then be easily removed.

When you have a good feeding male in a cage with a hen who becomes a poor or very mediocre feeder when the young are partially feathered so that there is no need for the hen to keep the young covered, remove the hen from the cage and the male most likely will take over the feeding of the young. If he does, you most probably will agree that he was by far the best feeder you had that season. Such feeding males are extremely conscientious and virtually tireless.

Very often a hen is a poor feeder because she has bowel trouble. The past breeding season the writer found it necessary to supplement with hand feeding a very valuable nest of birds. One day he found a hen asleep on the perch and it was then that her abnormal stools were observed. A % tablet of aureomycin, 15 mg. strength, was placed in her drinking cup. A day later the hen was feeding again, and in three days she turned out to be one of the best feeding hens in the breeding room.

When a hen has foul and loose droppings, take some remedial steps. Minor disturbances can he corrected by some well-liked dry foods like wheat flakes, a breakfast cereal similar to oatmeal but made from wheat instead of oats.

All hens in fair health that have been well flighted throughout the year and who have privacy feed their young. The value of abundant flight has not been fully realized by writers of breeding treatises twenty or more years ago. Non-feeding hens today as ever are common and writers on the canary subject recommend that Glauber's salts he added to the drinking water a day before or on the day the eggs are due to hatch. Glauber's salts is nothing more than a milder physic than Epsom salts. The purpose of the physic is to

alleviate the hen from being supposedly bilious. A setting hen leaves the nest infrequently. Her stools are very copious. Whether she is actually bilious is unknown to the writer. It could be that the way of Mother Nature is defeated by confinement of the hen in a cage.

Ever if it is assumed that the hen is bilious, giving a physic is the old antiquated way and somewhat unreasonable. The physic will force the hen to leave the nest frequently contrary to her wishes, and if her incubating temperature is ebbing, the physic will hasten its termination and may even cause the hen to desert her eggs.

The writer does not give his hens due to hatch a physic and he rarely has a non-feeding hen. Hens that look drowsy rather than alert when due to hatch are given a liberal amount of head lettuce. The lettuce acts as a mild laxative and a hen will feed lettuce to her young if she will feed anything at all.

Restrict the use of the Glauber salts to birds that suddenly become ill.

Milk sop is also a physic and considered a more sat is factory one than Glauber salts.

A hen setting on eggs is invariably a very diligent creature. She leaves the nest infrequently and when she does, she eats in a big hurry and hastens back to the nest. Because of this, when you see a hen standing on the perches leisurely preening her feathers, you will knew she has deserted her eggs for some good reason.

She may have deserted the eggs because she lost her incubating temperature. This is common in early season breeding when a hen will set on her eggs for two or three days and then desert them. Such a hen is merely the victim of Mother Nature not yet functioning perfectly.

When a hen has been setting on her eggs for more than three days and then deserts them, the cause of

the desertion can usually be traced to something radically wrong which upsets her mentally. The upset may be traceable to some birds flying loose in the breeding room or to some simple matter like being without any water. A correction of the cause usually results in a lien going back to her nest. A failure to do so, however, is the problem to be considered. As stated previously, when the hen is leisurely preening her feathers, she has notified you by her action of her final decision in the matter. The average breeder gives the hen some greens or treat seed to distract her mind from the decision she has made, and hopes vainly that she will forget that decision and return to her nest when she has had her fill. In a small percentage of the cases, there is success.

If a hen has deserted her nest solely because she has been mentally upset, there is one trick that works in a surprisingly large number of cases. The trick is simple. It was discovered accidentally by the writer, like many other things. The trick is simply this—remove the nest for an hour and then return it with artificial eggs or infertile eggs you have on hand. The mere removal of the nest has a sobering psychological effect.

During the past breeding season, the necessity arose for applying the trick in two cases. In each case it worked perfectly.

When a hen deserts her eggs and you propose to apply what has been disclosed, the first thing to do is lo place the eggs immediately with a hen who is setting small clutch of eggs and whose eggs are different in appearance so that you will know them apart. The chances are you will want to return them to the hen who deserted. Do not waste your time trying to decide where to place the eggs advantageously. You can decide upon that matter later on if it becomes necessary.

The measure adopted for a hen who deserted her eggs day before hatching date was related to the writer by a

comparatively young breeder. She confined the hen to her nest by placing another nest over the top. She permitted the hen to leave the nest several times during the day for feeding. The eggs of the hen hatched the following morning, and the hen was proud of her young. Whether an ordinary wire nest was used
for the imprisonment is not remembered. It is believed the plan would be more likely to succeed if the view of the hen is entirely obstructed as by covering the top nest with a thin white cloth.

It is not unusual for a fine feeding pair to have a big squabble. Giving the pair something new like treat seed to take their minds off the squabble usually solves your problem.

When a fine breeding pair have frequent squabbles, it may be due to the male's insistence that the hen stay on the nest and let him convey all the food to her and the young. Under the circumstances, remove the male until the young have reached the age where the hen does no longer set on the young.

If there is a big squabble in the breeding cage, where there are young, remove the male temporarily for several hours and place him in a small cage. After an interval of several hours, the cause of the squabble maybe forgotten.

Very often a hen is a poor feeder the first day be cause she fears getting off the nest lest the male will harm her young. Remove the male and you may have found a wonderful solution.

It is simply normal for a breeder to keep on piling different foods into a breeding cage of a poor or non feeding hen with the idea that something will tempt her greatly and that she will change for the better. This breeder has done this for years, and no doubt will continue to do so to the end of his breeding career. It all amounts to wishful thinking. You can serve poor and

and non-feeding hens a veritable feast, but your chances of changing the bad situation are mighty poor. You may get some self-satisfaction in serving the feast, but really the proper thing to do is to try to figure out some solution such as transferring the young to some other hen. You nearly always will be forced to that solution in the end unless you have no abhorrence to hand feeding.

Hens that are afflicted with what is commonly called asthma'' invariably are poor breeders. They are usually thin and devoid of vigor. They may raise one or two young for you but will worry you because they are such poor feeders. It is possible too that a microorganism present in their bronchial tubes will be transmitted to the young. Don't breed such hens.

If a hen in the breeding cage lays irregularly as by skipping a day or two or more in the laying of the whole clutch, it means the rhythm of nature is not functioning properly, which is common in early season breeding, or she is not in top condition for breeding. It is unwise to set such hens. They may set on their eggs for a few days and then desert. If they do not desert, the eggs most likely are infertile, and even if fertile the

chances of such hens being good feeders are poor. The advisable thing to do is to place such hens back in the flight for at least two weeks.

If a hen's droppings become abnormal while she is setting -setting in size—she has developed digestive trouble which most likely was caused by contaminated food. Seek at once to cure her with the commonly known diarrhea remedies such as ordinary black tea as you would consume it. Unless this is done, the hen will lose her incubating temperature and desert her eggs.

When a hen has a strong urge for sexual appeasement, she will generally readily submit to any male inserted in her cage. It is not necessary to insert the male

that was formerly mated to her. After appeasement, the hen usually fights with a male not her former mate, and he should be removed immediately.

Shy hens are usually sold to novices. The practice is unfair and unwise besides. Generally, such hens are fine breeders. Such hens should be used in breeding cages where they get the least possible disturbance. Ailing hens become tame usually. Very often shy hens calm themselves in the breeding cage.

Off hand, it seems like a very wise idea to use fresh hens for the third round of the breeding season rather than to continue with the hens who have worked hard in raising two nests of young. The poorest of judgment is shown by breeding a hen for the third time of the season if she was a poor or mediocre feeder on her first two nests.

Using fresh hens for the third round of the season generally, only seems smart. Hens that are in excellent condition and showed a strong inclination to breed from the very beginning of the breeding season until the season is two-thirds or more over usually exhaust ed their egg laying capacity in the aviary. If placed in the breeding cage late in the season, they may not be able to lay any eggs. Hens that do not come into breeding condition (unless quite old hens) until late in the season, are a bad risk. Such hens have improved in health. How much they have improved can only be ascertained by breeding them.

Hens in vigorous health if kept in moderately clean aviaries properly built do not have real dirty scaly feet. They keep their feet clean. The very opposite is true of hens in ill health.

A hen that was in ill health may be restored to good health and then have very scaly feet. There are remedies advertised as superb for birds with scaly legs and feet. Printed testimonials attest to their effectiveness.

When a hen is approaching ripeness, it is too late to use a harsh remedy such as kerosene to remove the scales. If a hen is not yet ready for breeding and you want to get rid of the scales in a hurry, apply kerosene liberally for about three days once per day. As the kerosene leaves the feet and legs very dry, apply some thin oil about a minutes after you have applied the kerosene. Carbolated Vaseline applied every third day for two weeks is a very good remedy for removing the scales and killing the mites beneath them.

CHAPTER III

HANDLING THE MALES

A male used as a stud only can be used to fertilize Mie eggs of 20 or more hens if properly handled. Keep him in a small breeding cage and feed him oats, thistle mid egg food in addition to rape and canary. When you see by a hen's actions that she is in need of sexual appeasement let the male hop from his cage into the hen's rage. If you exhaust him catching him by hand in a large cage or with a net in an aviary, he will not have an inclination for copulation with a hen inviting inter course by her action.

Seemingly there is a cure for males that puncture or eat the eggs of the hen. One breeder told the writer he broke such a male of the vicious habit by inserting in the nest an infertile egg filled with plaster of paris. Within the first few days after the young are born, I ho veal of the hen is in a receptive condition for sexual relations with the male, and quite commonly the male will seek intercourse immediately after being placed back in his breeding cage. It is not necessary to worry that because of the intercourse that took place the hen will soon lie ready to lay again. The copulations that took place are not conducive to further reproduction. If the male persists to seek self-satisfaction, remove him from the breeding cage or you most likely will lose young.

Males that puncture or eat the hen's eggs should be used to fertilize eggs only, that is, used as studs. Insert them in the hen's cage when she is ripe for intercourse and remove them as soon as the hen appears sexually appeased.

Males in the breeding cage that do not feed the young should be removed. Their presence entails extra cleaning. Quite often a poor feeding hen improves when such males are removed.

If you are an old breeder and persist in the belief that if you mate a male to more than three hens you will overwork and ruin him, look at the economical side. By mating a male to 12 hens with average good breeding success you will get 60 young out of him in one season, or an average of five young per hen. By mating him to three hens only and with the same degree of success, you will get only 15 young and you must breed him four breeding seasons to get sixty young. If you are an experienced breeder, you know that during the four-year period a goodly percentage of breeding males die or lose the vigorous health necessary for successful breeding. It is definitely wise to get all the young and in vigorous health. If you kill a male from over-breeding in one season, the chances are you are ahead economically.

At a California Color Canary Show a large number of prizes including the main ones were won by a young breeder. He purchased one very choice and expensive male and bred him to as many hens as possible. A friend of this breeder told the writer that about 75 young were obtained from the male. You can readily see how much wiser it is to obtain 75 young from a male in one breeding season rather than take a chance of getting the same number of young over a period of years. A male in vigorous health during a breeding season may have gone to bird heaven by the time the next season arrives.

HANDLING THE MALES

It is the general belief that if a male is bred too more than three hens he is overworked and his physical welfare is jeopardized. Disregard that belief. At the chicken hatcheries, one rooster is used to fertilize the eggs of fifteen hens. The writer failed dismally in his effort to breed to death a roller male that was of superb quality but extremely mean to the hens and young. The sexual capacity of the male in the bird kingdom is generally not realized. Ten to fifteen acts of intercourse in a period of ten minutes are common. The writer observed twenty-nine acts of intercourse in a pair of canaries within a period of about fifteen minutes or less. The hen was not fully appeased until then and immediately thereafter was again interested in feeding her young.

It is definitely wise not to have the male in the breeding cage the first three days if the hen has young. It is essential that the hen learn as soon as she has young that it is her burden to feed them. If the male is in the rage when the young are born, too many hens will set on the nest and beg a unresponsive male to feed them instead of doing their duty.

When it is desired to use a male to assist feeding the young, it is inadvisable to insert him in the breeding cage the day the young are born. It is far better to insert him in the cage in the evening before the day they are born. Some males immediately after being transferred are very unhappy in their new environment and show it by their crying and flitting about in the cage, which is not conducive to the hen being on the job. By far the best plan is to return the male to the cage on the evening of the third day after the hen has assumed her motherly duty. After assuming her duty, she will not set on the nest and let her young starve while the male un-heeds her call to feed her as may happen if the male is inserted in the cage the day the young are born. In a past breeding season, the writer had a hen that fed poorly when her young were only six days old. For three excessively hot days the hen was

removed from the cage during the day and returned to the cage in the evening to cover the young. After that period, the male was left alone in the cage and did a fine job of raising the young. A male who has taken full charge of a nest of young will become very derelict in his duty and may even quit feeding entirely if there is a hen within his view that shows a strong inclination to mate.

Usually, a male that is a good feeder will not assist with the feeding if a hen ripe for mating is within his view and close by, if the hen does not have a male in the cage with her. If a male is put with such a hen, his interest is curbed and he will soon assist in the feeding. It took the writer a long time to learn this simple important matter.

CHAPTER IV
EGG BINDING

Egg binding is claimed to be due to a contraction of the abdominal muscles on cold mornings. It is most prevalent early in the breeding season when cold mornings are common. The writer boldly states the common belief is in error. The writer has had only one eggbound hen in about the last ten years. During the past breeding season, the temperature in his breeding rooms was frequently down to 55 degrees and there was not a single egg-bound hen.

Egg binding is almost entirely due to a failure of Strength in the abdominal muscles to expel the egg, and the necessary strength is lacking in hens that were kept in cages or small flights. Feeding of oily seeds, such as flax and thistle, does not solve the problem. A flight that extends from the floor to the ceiling does solve your problem in the main.

By far the most effective remedy for an egg-bound hen, is the drug ergot. A few drops placed inside the vent by a medicine dropper rarely fails to achieve quick results. The drug can only be obtained by a doc tor's prescription. As the drug deteriorates, it should

be purchased at a drug store doing a big business filling prescriptions. If purchased at a small, isolated drug store, there is a likelihood the drug will be in effective because of its deterioration.

A soft-shelled egg is less easily passed by the hen. Quite recently a hen extremely prostrated was brought to the writer. He was uncertain as to the egg's existence and therefore did not attempt to crush the egg within the hen but massaged the abdomen fore and aft of the probable egg with the fingers. Later in the day the owner of the bird called the writer, and stated the hen had layed a soft-shelled egg and looked very spry. The hen seemed like a very hopeless case.

If an egg-bound hen is not too prostrated, put her on the room floor and keep on disturbing her. If the hen puts forth an extreme effort to get away from the disturbance, she will lay the egg.

The old method of treating an egg-bound hen was to hold her over the neck of a steaming jug of hot water. A far simpler method is to place the hen on a Turkish towel over a hot water bag. The heat must be tested by the arm above the wrist or the hen will be tortured. The hen must be covered with a cloth or else she will fly from the bag as soon as she is somewhat relieved from pain. If the hen is not covered, you may find her flying around the room sometime afterward and you will find the broken egg on the floor.

If all methods to relieve an egg-bound hen fail, then break the egg within her by squeezing it between your thumb and index finger. The hen will then pass the broken egg in a short time and it is not necessary to insert oil in the vent to enable her to do so. About one out of ten hens die from the ordeal. Those that do not die usually of no value for breeding that breeding season. If hens are placed in breeding cages for a month or more before they are ripe for breeding, the chances of getting egg-bound hens are greatly increased.

CHAPTER V

NESTS

Sometimes a hen with six or seven eggs will shove one or two eggs out of the nest the first day she has gone to setting. She does this because she is uncomfortable due to the hole in the nest being too small. Make the hole larger with an electric light bulb and return unbroken eggs.

Most hens make nests with the bottom oval shaped like the butt end of an egg. It keeps the young huddled together for warmth when the hen is off the nest. When there are more than four young in the nest or when they are of different size, the ovalness is a disadvantage. The smaller young are in the bottom of the heap and generally are lost by starvation. Place a thin layer of nestling material like cotton on the bottom of the nest so that its shape becomes flat instead of oval. This gives all young an equal chance to receive food.

For cleanliness and to avoid unsightliness, many breeders give the hen new hand-made nests when the old ones are soiled. This is necessarily done when the nests are infested with mites. Some eccentric hens will not accept the new nests. Putting a thin layer of nest ling material over the excreta on the edge of the nest and in the trough of the nest works just as well. Mite powder placed beneath the new material solves the mite problem.

The matted breast feathers of the hen are not al ways indicative of loose bowels of the young. If the trough of the nest is too deep the young are unable to deposit their droppings over the edge of the trough or they are accumulated on the very edge of the trough where they readily soil the breast feathers of the hem A quick and simple remedy is to put nestling material in the bottom of the trough so as to decrease its depth.

N E S T S

Gunny sack cut into four-inch squares and then shredded is an excellent nestling material because it costs nothing and packs well. The objection to it is its color. The hens prefer a light material.

The gunny sack (jute) if bleached will become a cream color. Another breeder told the writer he saw the bleached material snow white in the home of a novice. Upon questioning the novice, he had learned her success was attained by performing the bleaching operation in a washing machine in operation. A chemist told the writer the bleaching process is far more effective in a solution in agitation which explains the achievement of the novice.

Another breeder told the writer the nestling mate rial when shredded knotted for her in the washing ma chine. Apparently, it is best to shred the material after bleaching it first.

Every experienced breeder knows that when a hen with young comes back into breeding condition the proper thing to do is to insert a hand-made nest in the cage and transfer the young thereto because the majority of hens insist upon building in the old soiled nest.

As a clean nest is indeed desirable, your problem is simply solved as follows:

Move the old nest containing the young to a different location and place the new hand-made nest in its place. Merely fill the new nest with the coarse material you are using but line the trough (hole in the nest) with a thin layer of cotton. Give the hen additional tufts of cotton to finish trimming the nest to her likes. It is extremely unusual for a hen not to accept such a new nest, furthermore she will finish trimming it to her liking in a remarkably short time.

Don't remove the poor nest of a hen while she is laying, nor before she has been setting for at least three days. If you do, you take the chances of her not going

to setting. Yon may even irritate her to the point where she will tear apart the nest yon made.

If you remove the nest of a laying hen with young from a cage and forget to return it that evening so that the hen can set on the nest during the night, she is likely to lay her egg on the floor the next morning an hour or two after daylight even though you returned the nest at daybreak. She may even forsake the nest entirely. The canary hen is a very eccentric creature. You must cater to her eccentricity if you want to succeed as a breeder.

When a hen with a nest container and nestling material deposits paper or white egg shell in the nest container she is telling you by her sign language that the nestling material, you have furnished is unsatisfactory to her. Fill her nest with the coarse material of undesirable color and leave a rather large deep hole in the center, then give her some soft white material. She will soon reward you for your understanding with something that will amaze you of her skill.

Cotton waste, even when cut into small tufts, is dangerous. It becomes entwined about the feet and toes of the birds. The writer had several near-tragedies when he used it. He found young secured in the nest by it and hens dangling from a single thread in the cage. Toes entwined with it become painful.

If a hen has young not yet out of the nest, never give her an additional nest unless the male is in the cage and feeding the young. If she is tearing paper and putting it in the nest with the young, satisfy her by giving her some soft white nestling material and let her stuff it in the nest with the young. No harm is done and the hen has peace of mind. When the young fly the nest, give her a clean hand-made nest.

It is not extremely uncommon for a hen to build her nest in the seed cup on the cage bottom floor in the

corner of the cage. This is usually due to the desired lack of privacy especially where the nest pan is hung on the front side of the cage. Remove the seed cup and hang a small linen cloth in front of the nest. This action usually works but not always. Some hens will proceed to build their nests on the cage bottom floor where the cup had been. For such a persistent hen the remedy is to place a large seed cup in the chosen location and let the hen have her way.

Once a hen lays in the seed cup it is too late to try to get her to accept a nest. Let her have her way, other wise that clutch of eggs will be lost. Merely place a good size tin containing a hand-made nest in the chosen location. The tins containing whole slices of pineapple, 4” in diameter and 2" high are ideal for such purposes.

Early in the breeding season it is common for a hen lo build and destroy a nest several times before she lays, however, after the season is in progress, a hen that fusses building a nest and gets nowhere needs special attention. Such a hen will lay her eggs on the cage bottom floor or in the bare nest pan. Make her a nest by using coarse material for the framework and leaving a deep sized hole in the center. Then give her soft, white material like tufts of cotton. Usually such hens will finish building the nest within two hours after you do this.

The average hen will do a much better job building in a small nest pan than in a very large one. However, small nest pans are very unsatisfactory for a hen with live lo seven young.

The writer followed by one breeder well known to the writer is to use a small nest pan originally and to substitute a larger hand-made nest at the time of banding the young. This practice has merit. It prevents the loss of young from falling out of the nest when the nest becomes too small to properly accommodate the young

young and tends greatly toward mite control. If you follow this practice, be sure to use the same kind of nestling material in the second nest. And avoid using a nest pan that is radically different.

Most manufactured nests are too small to accommodate more than four young. You can devise very satisfactory nest pans from the small kitchen strainers.

Merely fashion hooks to these strainers and use the metal part of the handle as a support to brace against the cage.

Nest pans like one-half of a coconut shell and large size tins such as are used for whole slices of canned pineapple will serve your purpose and avoid an outlay of cash. In case you propose to use such items as nest pans be sure to puncture a large number of air holes in the side of them, otherwise they become foul. In case you use a vaporizer for mite control you will find these nest pans unsatisfactory even if holes are punctured in their sides.

Nest pads which are made of felt and sold at pet shops are convenient but an unnecessary expense.

CHAPTER VI

MITES AND FEATHER LICE

Powdering the nest liberally with mite powder about three days after the hen was setting and then again on about the tenth day was the method generally followed by all informed breeders up to a few years ago. The various spray materials have proved far more effective and less burdensome.

The active ingredient of virtually all mite powders used is Pyrethrin. This product is made from a plant that grows in Africa and can be ground finer than com mon dust. A blight has destroyed most of the plants and obtaining a mite powder with this base is becoming increasingly difficult.

You take a big chance if you buy any insecticide for your birds that has an active ingredient other than Pyrethrin. A common substitute (by memory, sodium fluoride) is poisonous.

Hens have been seen to eat mite powder liberally sprayed on the eggs, so you can readily see the danger involved in using any kind of mite powder that is offered for sale.

Feather lice are less common than mites and seemingly annoy their hosts about like an ant on your hands.

They are no problem whatever if birds are given baths about once per week. The writer had birds for many years before he saw feather lice. They look like tiny splinters. Their presence can be ascertained by the irregular paths eaten across the wing and tail feathers.

They are easily seen on the breast feathers. The lice multiply rapidly in warm breeding rooms and as an extra precaution if you find lice on a hen to be placed in a breeding cage it is advisable to powder the hen with some good and well-known insecticide.

When you find mites in a nest you have two courses In follow. You can replace the nest with one made by hand of the same material or you can remove the young temporarily from the nest, insert mite powder liberally and then cover it with a layer of nestling material.

If you give the hen a new hand-made nest, do not discard the old nest until you see the hen has accepted it. She may not do so. It is not necessary to take either of the above steps if you have an electric vaporizer or use the vapor bomb mentioned below. The fumes from
these kill the mites in the nest.

Until recent years mites were a difficult problem in canary breeding. The electric vaporizer has disposed of this problem. It must be put to use every two weeks in hot weather. Quite recently a so-called bomb has made its appearance. Breeders using it report it a big success. The purpose here is to warn you against

possible tragedy. Those bombs containing D.D.T. will kill your birds. There is a bomb now being marketed by bird supply firms and positively claimed not to contain any D.D.T. The first time a local breeder used one of these bombs his birds started falling off the perches.

If you use any bombs, be sure to try them on a few practically worthless birds first. Do not take a chance of destroying your entire flock.

The solutions for use in the electric vaporizer do not seem to vary in effectiveness but they vary greatly in their degree of irritability.

If you are a large-scale breeder, it will pay you to make your own spray solution. Firms that specialize in retailing chemicals have concentrated preparations to be used in making solutions for ordinary sprayers or vaporizers. Be sure to try the solution on a few in valuable birds first or your sought economy may bring you disaster , and make certain too that your preparation is effective.

CHAPTER VII

HAND FEEDING

The hand feeding of baby birds is frowned upon by the busy breeders except for emergency purpose. Raising canaries by hand feeding the young born to a hen who feeds little or not at all is a long, weary and burdensome task. One who undertakes such a task will, in a year or two, give up raising canaries. The price paid in labor for raising canaries by hand feeding is totally out of proportion to the value of the canaries so raised except in very unusual cases. Usually, canaries raised by hand feeding are stunted in growth. Many die before the self-supporting stage

from lack of a proper diet. This chapter seeks to give such information as will not only facilitate the hand feeding of young but will also result in the young growing just as rapidly as if well fed by the parents.

The writer has not raised any young by hand feeding them from the date of birth. He has the same as oilier breeders hand fed young almost self-supporting and that would have been lost except for the hand feeding. He has also hand fed nests of young for several days until there was an opportune time to place them with foster mothers.

During the past breeding season there was a forty degree variation of temperature within the same week in the writer's breeding rooms. This caused many fine feeding hens to start on their annual moult. As a consequence, more hand feeding was done the past season than was done in many previous seasons combined. Some nests were hand fed that were not worth the labor but data for this book was considered worth the labor. It was especially sought to prove that hand fed young need not be stunted in growth but on the contrary could be fed such a diet that they would grow more rapidly than if fed by the parents.

The first experiment was with a green hen who had three young 15 days old. At that age the young had more feathers than when banded at ten days old but their size was the same. The hen had been setting on them almost all the time. To save them, they were hand fed four times daily but then the hen ceased feeding entirely.

On the first day of exclusive feeding by hand, a mixture of two-thirds dissolved egg yolk and one-third Pablum, in plus a little alfalfa meal was used. It was evident on the following day that the young did not progress, in fact looked all the worse. It was, therefore, necessary to concoct some food that would serve the

purpose, and much thought was given the matter. The food prepared in dry form was as follows:
One cup full of finely sifted Wonder Bird Mash. This mash was a free sample. The label stated it contained 24% protein and 5 ½ % fiber. The ingredients mentioned on the label specified a great variety of grains, minerals and vitamins plus antibiotic feed supplement, and that is why it was selected.
To the cup full of mash was added a level teaspoon full of very finely sifted sand, a half teaspoon full of Vionate and ¼ teaspoon full of Bacitracin mash.
At each feeding time, about 1/5 of an egg yolk was dissolved in warm water, and to this was added some of the mixture mentioned. It constituted roughly 2/3's of the prepared food.
The results of feeding this food were very perceptible in a single day, and after three days of the hand feeding it was evident the young would grow into maturity as rapidly as could be expected. The young were self-supporting on the 30th day, and this was remarkable considering they were retarded at least five days in their normal development. The three of them grew into nice big birds, in fact, one of them is above average in size which, however, may be mere coincidence.
The foregoing experiments convinced the writer that young can be raised by hand feeding to be self-supporting in the normal length of time and without being stunted in growth. It takes retarded birds some time to recover from their setback, and it is not unlikely that the young mentioned would have been self-supporting in less than the normal time (about 25 days) if the hand feeding had started before the retardation. It is the writer's belief that with the proper diet plus the Bacitracin mash, young can be raised entirely by hand feeding to the self-supporting stage in less than the normal time if the feeding is done by the parents, with the exception, however, where the food

Fed the young contains an antibiotic mash, as mentioned under the chapter of Growth Accelerators.
During the second half of May, during the past breeding season, an inspection of all nests was made one morning at 9:00, in accordance with the usual custom. Tragedy was met at the nest of an orange hen who was a grandmother on her first nest. She had four very valuable young, banded and well feathered, about 13 days old. One of the young was dead. The other three were very weak but able to swallow when hand fed. Because of a forty-degree variation in temperature in the breeding room about a week prior, the hen had been jolted into the annual moult. Two flight feathers were found in the cage.
The young were given to a yellow hen with five fertile eggs setting only eight days. Her eggs were given to a dimorphic hen with two fertile eggs due to hatch the same date.
It was known from experience that giving the young to the yellow hen had a chance of success, if not from the very beginning, at least after the young were hand fed for two or three days. The yellow hen fed a minor amount but not enough to keep the young alive. They were hand fed with a food consisting of about ½ dissolved egg yolk and ½ Charm Bird Mash. The mash contained too much coarse material to flow smoothly from the feeding spoon, so a cup full was sifted through a very fine wire nest. To this cup full of mash was added a level teaspoon full of Vionate and about ¼ teaspoon full of Bacitracin mash. Both of these are described elsewhere.
After three days of hand feeding, the hen ceased feeding entirely, probably because of frequent interference to feed her young. By this time the father of the birds was released from another cage where he did the brunt of the feeding and was placed in the cage. He was seen on the nest looking at the young whenever

the hen got off the nest, which was seldom. It was believed he would feed the young if the hen were removed from the cage. A chance was taken the fourth day—and within a few minutes after the hen was removed he fed the young which he raised by feeding as well as any hen.

During the three-day period of hand feeding, the young showed remarkable growth. They stood up to be fed as well as the best fed young fed by their mother. The inside of their mouths were a very deep red, the very best evidence of health and vigor. The feathering had greatly improved.

Because of the remarkable success in the three-day period of hand feeding, it was decided for the sake of the experiment to raise the young by hand feeding if the male did not take over the duties thrust upon the hen. There was an inclination to do this anyway and remove the male. Breeding operations were still burdensome at the time, and enough of the success of the experiment had been seen not to warrant assuming the additional work. It is honestly believed that if the hand feeding had continued, the young would have been self-supporting three or four days sooner than if their mother had raised them.

It is not unusual to find young so weak they cannot be hand fed because they are unable to swallow. Such young need not be destroyed as an act of mercy. They can be saved. Make a semi-liquid warm food consisting of one-half egg yolk and one-half Pablum—to keep the yolk from caking in the crop. With the smallest medicine dropper you can obtain filled with this food, thrust the open end of the medicine dropper gently past the Adam's Apple of the bird, then press the rubber until the crop is entirely full. Repeat this performance within an hour. After two or three such forced feedings, the young will stand up and open their mouths. Hold the head of the bird between your thumb

and index finger with the body resting in the palm of your hand. Keep the neck stretched while you are inserting the food. Unless a young is gaping (dying) you can save what appears to be hopelessly lost young.

The force feeding with the medicine dropper is neither dangerous nor difficult. The danger lies in using too much egg yolk in the semi-liquid used, A young so weak that it is unable to swallow cannot digest pure egg yolk. As the young increase in strength, the amount of egg yolk can be increased to two-thirds and the Pablum reduced to one-third.

The medicine dropper must be freed from air before it is placed in the throat of the young (past the Adam's Apple) and the bulb pressed, otherwise the crop will be filled with air.

Using the medicine dropper for forced feeding as mentioned here will save many losses. You will find young on the cage floor almost dead. You will find a young in a large nest about half dead from intentional or unintentional neglect. You may even find a whole nest of feathered young half dead either through sudden abandonment by the hen or as the result of some sudden disturbing situation as a foot injury or a fight with the male.

The very first thing to do is to give young of tender age warmth. Force feeding them when cold causes them to succumb in your hands.

In case you use a medicine dropper to feed the young, after you have filled it with food, press the bulb gently and rapidly several times but not with sufficient pressure to force the food from the dropper. By taking the prescribed action, you will cause much of the water in the food to settle to the nozzle end because it is lighter in weight than the body of the food. Release the water from the dropper before feeding the young.

The danger in forcibly feeding a young with a medicine dropper by injecting the dropper past the Adams Apple is not in physically injuring the bird, because the writer has done it many times without known injury to a single bird, but in over feeding. A chick that is so weak that it is unable to swallow will die if its crop is filled entirely with a hard-to-digest substance like egg yolk, especially if the young is only one to three days old. The danger of over-feeding is almost entirely overcome if the easily digestible Pablum is used.

A young forcibly fed as mentioned will appear completely prostrated and on the verge of death. How ever, practically none will die from what seemed like an ordeal. Be sure not to release the pressure on the bulb until you have removed the dropper from the throat. If you do, the food will be sucked back into the dropper out of the bird's crop.

When you seek to hand feed a bird and you find its crop is still full or partially so from the last regular feeding, you have evidence that the bird is too weak to digest the food you used last or the food is too difficult to digest. Until the crop empties in the normal time, use Pablum only, and thereafter for a while use at least part Pablum.

If you are doing any hand feeding, your food can be kept luke warm by standing the vessel containing it in another small vessel containing a shallow amount of water standing on the stove above the gas pilot light. If you do not have a gas stove, just as good results can be obtained by having the end of an electric light bulb against the vessel containing the water. If the bulb is placed in the water, it will burn out soon.

If you want to keep babies being hand fed warm, place them in a small box with a few small holes in the top. Lay a small thermometer near the nest of birds to

observe the temperature through a hole in the box and above the electric light bulb. When the young stretch their necks out over the nest they are much too warm. If you cover the young, a temperature of around 85° is best. Ovens containing a gas pilot light are commonly used to keep such young. The oven door must not be entirely closed because it gets too hot for the young.

When doing hand feeding whether with a spoon or some other blunt instrument and your food is quite thick, you will find that it will not cling to the instrument if you will dip it in water before you start feeding and even during feeding, if necessary. If your food is too wet or a semi-liquid for very young birds, drying the spoon first has the desired opposite effect.

Even the smallest medicine droppers offered for sale by the local drug stores have too large a nozzle to thrust past the Adam's Apple into the crop of a young too weak to swallow, especially if the young is a new born or only a few days old. The medicine droppers that fit into the stopper used for dispensing one ounce bottles of medicine are about as small as any that can be obtained, and are fairly well suited for the purpose. Your druggist will sell you and perhaps give you free of charge the medicine dropper mentioned if you will tell him what you intend to use it for.

You, of course, realize that the thinner your food is for hand feeding the less solids it contains, and consequently less nourishment. You cannot expect the young to grow on a concoction that is primarily water. If your food is loo thick, the feeding becomes difficult. You can feed a rather thick food that will not slide off the spoon if, when the young have their mouths open, you gently press your finger on the upper beak when the food is inserted so that you virtually force them to bite into the food. Use as thick a food as you possibly can. The young will grow much faster and you also greatly reduce the number of feeding times.

What is said above applies to young that are not mature enough to vigorously bite into anything that is placed in their mouths.

If you are forced to take over hand feeding of semimature young, you may have difficulty in feeding them because they are afraid and will not accept food from you. In such cases, you must resort to forced feeding. This can best be accomplished if you will hold the young in your hand with the head held firmly between your forefinger and thumb. When the youngster is thus held, you can force it to accept food by prying the beak open with a spoon. After a few forced feedings, the young will lose their fear and will gladly accept the food you offer them.

When hand feeding baby birds, develop the habit of sliding the bottom of the spoon or other similar instrument used on the top of the vessel containing the nestling food as you leave the vessel.

It is the food clinging to the bottom of the instrument that causes about 90% of the smearing of the beak and the running of soft food down the neck. If you do not have the food too soft nor the instrument too loaded, you will not have an untidy aftermath nor a nest soiled with nestling food dropped from the instrument.

The beaks of young smeared from hand feeding should be wiped clean with a soft wet cloth before returning the young to the mother. Sometimes a hen quits feeding her young when you hand feed them. It could be that the appearance of the smeared young is revolting to her and accounts for her action.

It is claimed that newly born young are able to live 24 hours without being fed. That may be true, but one thing is certain and that is that young born in the morning, if not given any food, are too weak to lift their heads to receive food by the afternoon of the same day.

HAND FEEDING

It is wise to check to see whether the young were fed about 4 hours after they are born. If not fed by that time, they should be hand fed as an emergency measure.
In the hand feeding of baby birds, a lot of time is saved, especially if the nestling food is made fresh at each feeding, if the vessel is first filled with hot water before inserting the food. A vessel warmed beforehand will not quickly draw all the heat out of the food. This comment is for the benefit of the men folks only.
Those who hand feed baby birds usually show poor judgment. Their nestling food generally consists of egg yolk and Pablum only, an improper diet. Quite recently an experienced breeder admitted to the writer she was never able to hand raise birds until she followed his advice to add a few drops of orange juice to supply the vitamin C normally obtained from fresh green food.
The writer observed that one young breeder was very successful raising birds by hand. His nestling food consisted of canned puree of spinach, egg yolk, Pablum, sifted sand and powdered cuttle bone.
A brother of the writer attempted to raise orphan pigeons by hand. He realized there was something lacking in their diet because their appearance indicated that. He added sand to the nestling food and in his words, “the improvement in three days was unbelievable’’. Sand is necessary to provide the silica of which the feathers are made.
It does not pay you to try to save by hand feeding a young greatly stunted in growth in the nest. Such a young usually dies shortly before it becomes self-supporting, and even if it lives to become self-supporting, it will remain a “runt”.
When a bird’s crop takes on the appearance of a balloon as a result of hand feeding, you have a crop inflated with gas from indigestion. Massage the crop gently and the gas will be emitted from the mouth.

not feed the bird immediately but about 15 minutes later. The indigestion was caused by improper food and something easily digestible, like Pablum, must be used for a while.

When you are hand feeding young, and especially if you have several nests of young to feed, it is an excellent idea to stand your food vessel in another shallow vessel containing warm water to keep the food warm. The oval-shaped Booth sardine can, has been found excellent for this purpose.

Most hand feeding is done with some instrument such as a tooth pick, a wedged match or lollypop stick, or a patented device that operates on the principle of a syringe. By far the most practicable instrument is the toy spoon used by little girls in play houses and sold at the ten cent stores by the dozen. Try one and you will be convinced. You will soon become skillful in the use of this spoon and when you do, you will hold the heads of two young together and feed two at a time.

The writer as a young breeder learned from Robert Stroud that young being raised by hand feeding would not survive unless they obtained some Vitamin C. The meat of crushed rape seed was recommended for that purpose. Quite recently a breeder with considerable experience thanked the writer for advising her years ago to add a few drops of orange juice to the food to be fed to the young. Prior to receiving the advice, she was a failure in hand feeding. Orange juice is a laxative. If you use it in hand feeding, use it sparingly.

Years ago, the writer had a young that was attacked by the male within an hour after it left the nest. The young was placed in a small cage containing only one perch. A piece of cooked carrot was pressed through the wire at the end of the perch. The color of the carrot attracted the young and out of curiosity it pecked at it. In doing so the young discovered it was food and immediately supported itself. It was not necessary to

hand feed this young a single time. This trick has been used successfully by the writer several times.

The medicine dropper is the instrument commonly used for hand feeding young. It serves this purpose very well for young of tender age when the food used is very soft or of semi-liquid form. When the young get older it is necessary to have the nestling food of more body and less water, otherwise the crops of the young will be empty in a short time after feeding. A nestling food not a semi-liquid does not work in an ordinary medicine dropper. A tablespoon is far better for serving such food.

The writer did see another breeder use a medicine dropper that was so large it served the purpose of feeding; food quite solid to young fully feathered. It is quite likely that this type of medicine dropper is used by veterinarian's. Your druggist, upon special order, can obtain such a medicine dropper for you.

A canary hen sometimes ceases feeding her young abruptly for reasons entirely unknown. She may set on them as if she loved them dearly and yet knowingly let them starve when she worked so hard to almost raise them to maturity. Such eccentric action cannot be fathomed by the human mind.

When a hen ceases feeding her young and the young Are too mature to transfer to another hen, the tendency of the average breeder is to finish raising the young by hand feeding. In order to facilitate the hand feeding, the nest of young is usually taken out of the cage and kept at a convenient place. It is a mistake to remove the nest of young from the cage. For equally incomprehensible reasons, a hen may start feeding her young again after a three-to-five-day interval in which she did not feed them a single time. There is always the chance that a hen will resume feeding, and you should endeavor to profit by that chance by leaving the young in the cage until you see the situation is entirely hopeless.

CHAPTER VIII

TRANSFERRING YOUNG

Transferring young very often involves invoking good judgment. The following example is an excellent illustration. One of the young in a nest of four green show-quality birds was born later than the rest. It was not growing and its loss in a few days seemed certain. A yellow hen in the breeding room had one light young of the same size. Transferring the young to her seemed like the logical thing to do to an inexperienced breeder. The writer from experience knew the yellow hen very likely would not feed the green young so radically different in color from her own young. That evening after feeding time, the yellow hen's one young was transferred to an orange hen, an excellent feeder with three young, and the yellow hen was given the green young which she raised. Her chances of not feeding her only young were poor. The related experience took place late in the breeding season. The orange hen to whom the yellow young was transferred was raising her first nest of the season.

When you have young in a nest of different ages, sometimes your problem is best solved by transferring the biggest and oldest youngster in the nest to some other hen. A baby born two days ahead of three other young in the nest gets about as much food as the other three combined, and in a period of about five days will be approximately three times as large as the other three. Transferring this oldest young to another small or medium sized nest of young is the advisable thing to do.

In a nest of five or six young your losses are normally greater than in a nest of two or three. By transferring some young as advised, your chances of loss are less.

TRANSFERRING YOUNG

A yellow roller hen bought for blood refreshment was a poor mother on her first nest. She was too fat and had insufficient flight. On her second nest she was a superb feeder of her one young. Two orange young were transferred to her nest. They were of the same size but a little older with more feather growth. The hen from whom the two young were taken was an excellent mother on her first nest. She was on the top shelf and no doubt was heading towards the moult, judging by her mediocre feeding. The young were transferred in the evening. An hour after daylight on the following morning the nest was checked. The hen's own young was well fed. The two transferred young had no food in their crops whatever. The crops of the two transferred young were only half filled by hand feeding. The yellow hen's one young was virtually stuffed by hand feeding with nestling food consisting of dissolved egg yolk plus some alfalfa meal. It was obvious it would not require food for an hour and most likely would not lift its head for food within that time. When a check was made an hour later, the two transferred young were fed. Getting the hen to once feed young transferred to her is the problem. Keeping her own young filled with food temporarily is the only trick that the writer has found leads to feeding transferred young when the hen is inclined not to do so.

Every breeder, whether a commercial breeder or a hobbyist, finds it necessary, at times, to transfer young from one hen to another. In commercial breeding operations, it does not pay to attend the breeding cage of a hen with only one or two young, and hens that are excellent feeders with only one or two young are therefore imposed upon. Some hens will not tolerate this imposition. Another breeder in this area had a hen that twice discontinued feeding entirely when young were transferred to her nest. This past breeding season the write had a, hen that raised four young on her first

nest. She was a superb mother. On her second nest

She had only two young and two young were transferred to her nest. The young transferred were the same age and color as the two young in the nest. On the following day there was unexpected tragedy—all young were found dead. The hen was placed in a flight with hens held in reserve for breeding. A week later she was again placed in the breeding cage and then raised another nest of five of her own young. Mark such hens with a special-colored leg band or a combination of bands. Avoid the same tragedy the second time.

The wisdom of a Solomon and the luck of Lucky Baldwin combined are sometimes required to solve a breeding room problem. Late this past breeding season a roller hen who had been a very good mother all sea son started to stay on the nest with her young. She fed less daily and it was evident she was approaching the moult and the young would be lost. What to do with her three young was a big problem. They were banded and feathered.

A purchased orange hen mentioned elsewhere, who had lost her first four young, was setting on infertile eggs for two days. The infertile eggs were given to her to hold her in reserve temporarily. Her eggs, expected to be fertile, were given to an unmated roller hen. The three feathered young were given to her. She immediately adopted them but would not feed them. A fine feeding male who had not been mated to her was inserted in her cage. In about ten minutes he was feeding both her and the young. A half hour later he and the hen were fighting so the hen was removed. After the hen was removed, he quit feeding and sang vigorously. He was removed from the cage and the orange hen returned at least two hours afterwards. Later that day, the orange hen started to feed and on the second day she fed the young better than her own former young which she starved, when feathered. She raised the young.

This case is related to show that reason is not alone the governing factor in solving many breeding room problems. You are urged to try something when in trouble. Some very erratic action, as the case cited, may turn out to be the perfect solution. This case also allows how wise it is to have a hen with infertile eggs in reserve.

The identity of young transferred to other hens before being banded can be retained by marking them with mercurochrome, colored ink, or indelible pencil beneath the wing.

Only about one out of five hens will accept new born young and feed them if given the young three or more days before the hatching date of their eggs. If they are overdue to hatch and given young, the chances of feeding them are quite good.

The following case nicely illustrates getting a hen to accept and feed young before hatching date of her own eggs:

Among the purchased orange hens mentioned elsewhere was a large beautiful pinkish (apricot) hen.

There, of course, was a good reason for including such a choice hen in a lot sold at a very moderate price. It was not expected that the hen would feed her young if bred, but she was bred with the idea a place for her young would be found somewhere in the breeding room. While the hen was setting, it was learned she was a “wheezer”. Then hen layed four eggs. The third egg was left in the nest when layed and the first two eggs were returned to the nest when the fourth egg was layed. The third egg hatched on the day it was due.

The other three eggs due to hatch a day later were fertile. At noon on the day the one young was born, the nest was checked. The young were weak and had not been fed at all. It was hand fed and given with the three fertile eggs to a fine feeding dimorphic hen

who had layed only three eggs on the third nest after raising two nests of young. The dimorphic hen did not feed this young, so it was given back to the orange hen and hand fed that day.

On the following morning the dimorphic hen hatched the three fertile eggs and fed them superbly, and the one young left with the orange hen was transferred to her nest, which she fed.

The principle illustrated above is to let at least one young hatch under a hen not yet due to hatch before you give her any young.

When once a young is partially or fully feathered, the chances of having it raised by a foster mother to the self-supporting stage are not good. The mere fact that the foster mother feeds it and the young seemingly is doing fine is not something to rejoice about. The hen definitely knows it is not her young and she may abandon it the very day it takes to the perches. Once such a young is on the perch and it persistently begs for food, you can be quite certain the foster mother is abandoning it. If you are anxious to save that young, you had better remove it from the cage and hand feed it or you will find it dead soon. When the wings of the young droop, you have a clear signal it is starving and getting weak.

Transferring of young is not a simple matter but on the contrary involves good judgment, knowledge of things likely to happen, and that elusive element called luck besides. A hen who raised five young of her own the first nest the past season did not have any fertile eggs on her second nest. When she was two days overdue to hatch, a new born young was given her to hold her in readiness for possible use two days later when many hens were due to hatch. Less than an hour later the young was found on the floor of the cage, and as the hen had not been disturbed, she most likely cast it out of the nest. She did not feed the young when placed back in the nest. “No luck” so commonly said by canary breeders, applied in this instance.

If you find it necessary to transfer young from one hen to another and if the young are over four days old, 1 lie proper time to make the transfer is in the evening us dusk approaches or when you turn off the bright lights and turn on the dim ones. Your chances of success are far better if you follow this advice. It is not improbable that every nest of young has a distinct odor mid after the transferred young is in the nest over night of the recipient mother it is very probable that it has taken on the odor of the new nest and lost the former odor. A cow smells its calf before it allows it to nurse, and that is why some farmers rub the milk of the mother around the calf's head which enhances the mother's chances of nursing it. Obviously, even the milk of (each cow has a distinctive odor.

Some hens will not raise young of an extremely different color. As for example, a green hen may not raise a white young and may even drag it out of the nest. Sometimes a breeder has a valuable nest of eggs from a hen that would not set or deserted her eggs. Giving these eggs to hens who will most likely raise the young involves a little trickery. The example given is self-explanatory.

The past season the writer had three eggs from an extremely valuable pair of green birds to place under other hens. Three orange hens were laying at the time. The eggs of the orange hens were removed as layed. When they layed the fourth egg, an egg from the green pair, was placed in the nest. The orange hens were set on the fifth egg. In each instance the green young hatched one day ahead of the orange young. As the green young were one day older than the orange young they easily obtained their share of the food, besides they were the first to win the motherly love which means much. The three green young were raised, but the very day two of them started to eat by themselves the mothers fought them. The motherly love gave way to color repugnancy.

When you transfer all the young of a hen merely because she is a poor feeder or because you aim to in crease your production by not permitting nest of one or two young, remove the nest from the cage from which the young are taken, but do not discard it. In case the hen to whom the young are transferred does not feed them, return the young in the nest to the hen from whom they were taken. A hen will go back to her nest and young hours after they were taken away from her. She is less likely to go back if only the young were removed and the bare nest left in the cage.

Sometimes a whole transfer is advisable. If a hen with only one young is a fine feeder and another hen with three or four young is not a good feeder, transfer the one young of the hen who is a good feeder to some other hen and transfer the whole nest of young of the poor feeding hen to her. A mere switch of young is sometimes the best plan if the young in the two nests are of different size, age or color.

Giving young to hens whose eggs are infertile and not yet due to hatch if they were fertile is always fraught with uncertainty. Some hens will shun their nest if a new born chick is placed in it. Others will be mighty proud of them and feed them immediately. If the young are not over three days old and a hen is over due to hatch, the chances of success are good.

If a hen has been setting only a few days and young over three days old are placed in her nest, the chances of immediate success are poor.

In the middle of May, during the past breeding season, an extreme variation of temperature within a week took place in the breeding room. The temperature was so low one evening that a small electric heater was placed in operation. About five days later the temperature in the breeding room for two successive days was slightly above ninety degrees. This extreme variation in temperature had the expected bad effect.

Hens that wore grand feeders started to stay on the nest with their young, even partially feathered young. They fed poorly and the young were merely kept alive. As the writer already had his quota of roller young, he tried to save red factor young by giving them to roller hens setting on eggs and some of which were not due to hatch for three days to a week. All of the roller hens mentioned accepted the semimature orange young which was better luck than expected. Some fed them a minor amount at first, like
they would new borns. Some did not feed them whatever. It was decided to hand feed them for at least two days because financially there was so much involved as to justify the additional labor.
Every hen who was given young fed them to some extent on the second day. At the end of the third day,
every single hen (about eight) fed the young just as
well as if they had raised them from the date of hatching. The roller hens used for the foster mothers in every instance were fresh hens brought into the breeding room from outside aviaries. The extreme variation in temperature did not affect them as it did the hens who already had raised some young.

CHAPTER IX
YOUNG IN THE CAGE

When the trough of the nest becomes soiled after the young are eight or more days old, this may mean the mother is either feeding inadequately or feeding food of insufficient nourishment. The young may be too weak to raise the posterior of their body high enough to deposit their droppings out and over the edge of the trough. In this instance, supplement the hen's feeding by hand feeding about four times per day, or seek to get the hen to feed some other food more nourishing. The immediate step is to place some
nestling material in the bottom of the trough of the nest so that the young will be able to deposit their excreta out of the trough of the nest in their weakened condition.

It is easy to overlook banding a nest of young when due in large scale breeding operations. Out of friend ship, another breeder sent this writer a box full of small stars cut from tin and painted many different colors. The stars are of different color on the two sides. The breeder who sent them no doubt uses the stars on the cages as signals or reminders. Bending over the corner of a red star slightly and hanging it on the cage door serves as a warning to the writer that the young are soon due for banding. When banding, the star is turned over to the other side and left on the cage door for several days. Devise some system such as this and you will unburden your mind to some extent.

The matted breast feathers of a hen are usually indicative of the young having very loose droppings that smear the nest. Hens with such matted feathers are incorrectly called “sweating hens’’ because they have no sweat glands. Diarrhea in the young is caused by improper food.

It is not unusual to find a young on the cage bottom several days before it is due to leave the nest. The young in its eagerness to obtain food fell out of the nest. When placed back in the nest it will usually scamper out in a hurry even before you get your hand out of the cage. When you place such a young back in the nest, thrust its head underneath the other young. This little trick usually works perfectly.

If you have difficulty banding a bird because of its size, you can stretch the band by using a punch that fits into the band.

If you are a day or two late in banding a bird, you can still succeed in banding it after placing the band over the three front toes and holding the back toe up against the leg you place a drop of thin oil on the ankle just above the band and then turn the band clockwise and counter-clockwise. If you keep turning the band in one direction only, you may break the leg of the bird.

YOUNG IN THE CAGE

A novice is nervous in banding a bird. The task is less arduous if the novice will sit on a chair at a table and have both arms rest on the table. If the bird is dropped through nervousness, it will not be killed from the fall if a Turkish towel is on the table.

The smart breeder before using the leg bands passes the string of bands over the edge of a candle flame. They become blackened which wears off soon. It is the luster of the bands that attracts and annoys the hen. When a hen removes the leg bands there is a chance of her breaking the leg of the young or dragging it out of the nest. If the band has been removed, look for it in the seed cup or under the paper on the floor of the cage. The hen will usually hide it.

It is not unusual to find a young dead within the first 48 hours after it is born and with its crop partially full. Such chicks are known as "Yolkers" in the poultry industry. Part of the yolk is within the born chick to sustain its life in the early stages. If the yolk is not assimilated, the chick dies from auto-intoxication. Its abdomen is a blackish-brown color.

It is not unusual to find a young in the nest with one or both legs extending to the side. The hen is blamed for this on the presumption that she sat on the young ponderously. That could be the cause but the real cause is usually due to one of two things, namely, (1) that the bottom of the nest is too flat and minor pressure of the hen forces the legs out from under the young; (2) in a very crowded nest the afflicted young at the time of feeding, was unable to get both legs under itself when the feeding ceased.

Breeders usually destroy a young so crippled because they do not know of any remedial measures. The crippled condition of the young is easily corrected. Place a piece of Scotch tape about ¾" wide around the body of the bird and underneath the end of the

wings. Have this piece of tape over-lap for good adhesion. Have the crippled leg inside this tape and have the tape tight enough so that the leg will he in normal position. Do not make the tape too tight. In two or three days the leg will stay in normal position depending on the size of the young.

Once a near mature young is out of the nest it rarely will stay in the nest if placed back. This is true even of a young that accidentally fell out of the nest about four days before its physical maturity. Such young generally, hide in a corner of the cage and sometimes are abandoned by the mother. A young by instinct will take to the perches. To guard against abandonment by the mother, place one perch in the cage as low as possible. If the perch is only an inch or two off the floor the immature young will take to this perch and the mother will be forced to hop alongside the young assuming you have only two perches in the cage. Under the circumstances, the chances of the mother abandoning such young are small.

Young that are self-supporting in the breeding cage may show great stupidity when removed and placed in a separate cage. They may stand on the perches, cry for food and be totally unaware that there is food on the cage bottom floor. When you get this situation, limit the cage to one perch only so that the young must hop to the floor of the cage where the food is located. They invariably hop from the perches to the vessels containing the food and will start to eat.

Young that are taken away from the mother prematurely for some necessary reason usually will support themselves when placed in a small cage not containing any perches. White flakes on the cage bottom floor such as wheat flakes and oatmeal (dry) will arouse their curiosity. They will peck at it and discover they can eat by themselves.

YOUNG IN THE CAGE

If the young cease growing when about eight days old, you are in trouble. The critical stage starts about the eighth day. Don't live on blind hopes. Do something. See if you can find some new foods that will incite the hen to better feeding. Your trouble may be that she is feeding starchy foods only, and the young are not growing for lack of proteins.

When the young have nestling diarrhea, change some of the nestling material daily and examine the abdomens of the young. The excreta that runs down into the nest sometimes seals the vent of the young and they die from auto-intoxication.

For the benefit of the novice only who looks upon banding of young as an ordeal, and who most reluctantly proceeds to perform this task, it is odd to state here that a person possessed of two arms and hands should feel sorry for himself with that kind of an attitude by learning it can and is being done by a one-armed breeder who lives in this area. How does he do
it ? He holds the band between his teeth and uses a mirror to guide his actions.

Once in a great while you will get a young that is mighty difficult to band because its big toe is rather short and it curls the other two toes no matter how you hold the foot. It is needless to have nervous exhaustion from such a case. Place several wrappings of silk
!thread around the three toes and your problem is solved.

When the young in the nest are around eight days old and look pasty, you can be certain the hen will not raise them. Unless you can transfer the young to some other hen, you must assist by hand feeding. Pasty looking young are not being fed sufficiently.

Very often a young out of the nest (a male) is severely attacked by the father and will hide in a corner and die. Force feed it by hand until it has recovered from the shock and beating. One or two hand feedings
usually suffices.

It is not uncommon for young out of the nest to act incapable of supporting themselves even though they are able to do so. The writer during the past breeding season observed two cases where young out of the nest the first day were eating mashed yams and carrots in a shallow flat vessel. The color undoubtedly attracted them and explains the unusual. In both cases the mothers were on the nest laying which forced the young to be on their own temporarily.

When a hen is laying and if the male in the cage is fighting one or more of the young which are males, remove the male instead of the young being attacked.

The young will be bewildered in a new cage. Their chances of finding and eating something as attractive in color as mashed carrots and yams are excellent. Generally, when a feeding male fights with a young, that young is self-supporting. Remove the male when there is doubt of the attacked young being self-sup porting.

Self-supporting young, when taken away from their mothers, must be placed in a flight cage for at least four days before being placed in large aviaries. If placed in large aviaries immediately after being taken away from the mother, they are bewildered and some will be lost. While in a flight cage, especially if the flight is somewhat crowded, the floor of the cage will be wet and badly soiled as a result of the consumption of soft food only, thus necessitating the cleaning of the cage several times daily. If the cage is not cleaned as the necessity arises, the tails and feet of the young be come extensively soiled with excreta. Place the food vessels on some elevated objects and then place a layer of an absorbent in the cage like shavings or sawdust. You save much labor at a busy time by doing this.

Young with nothing but soft food do develop loose bowels and perhaps this paves the way for going light.

A dry mash as well as the soft food should be served. Oatmeal will suffice for a dry mash.

CHAPTER X

FERTILITY AND INFERTILITY

All writers on the canary breeding subject with considerable experience are agreed that a single act of intercourse is sufficient for fertilization of an entire clutch of eggs. In practical operations permitting a single copulation or even as many as a dozen or more within the same day does not assure the breeder that fertilization has taken place. Abundant experience is behind this assertion. There of course must be some plausible reason for it.

Very few people know that in the human family there are only two days in the lunar month that conception can take place. During these two days there is an increase in temperature in the body of the woman and it is by this increase in temperature that the period is known. The mere fact that carnal relations are desired arid the desire appeased by indulgence does not mean that pregnancy will take place, in fact it will not take place unless the relations are within that two-day period.

The writer is convinced that there is a definite period with the canary hen when relations with the male will result in fertilization of the eggs, and that there are periods when even successive acts of intercourse in a short period are bereft of results. He has had cases where only two successive acts of intercourse resulted in all eggs being fertile, and he has had cases where there were many acts of intercourse within the same day and yet the eggs were infertile, although the hens eggs were fertile on both a previous and subsequent clutch of eggs fertilized by the same male.

The writer has had cases where it was necessary to return the male to the hen's cage three successive days in order to appease her so that she would continue to feed her young not yet out of the nest.

As the exact period of impregnation is not known and cannot be practically ascertained, the best plan to follow is to return the male to the hen's cage at least two successive days for several acts of intercourse.

You have nothing to lose if the hen submits on two or three successive days and you do have a chance to profit thereby. If the hen refuses to submit to the male on a succeeding day, you have at least done all within your power.

The vast majority of breeders do not realize that there is a difference in foods that cause a sex urge and those that cause fertility. The two are totally different.

The ignorance of the average breeder on the value of foods for fertility is clearly proven by the general practice followed by nearly all breeders. When the breeding season approaches, virtually all breeders hastily stimulate their birds into breeding condition by rich egg food, and hens who lay fertile eggs are placed in flights and fed an abundance of egg food so that they will again show a strong breeding inclination in about five days.If hens were allowed to come into breeding condition normally and without sex stimulation, there

would be far less infertility; and hens that lay infertile eggs should be fed foods conducive to fertility and without sex stimulation.

To clearly impress the reader of the weight of what has been stated, it is considered advisable to relate an analogous situation in the human family.

The writer knows of two cases, actually friends, where the husbands became chronic alcoholics and consumed very little food. The excessive sex stimulation caused by the alcohol led to the divorce court because the wives became subjected to intolerable situations.

The alcoholics died prematurely as physical wrecks. Their sex impulses were vastly greater than those of men leading normal lives including proper nutrition. No one will contend that alcohol has nutritional properties of any consequence, and any substance that wrecks the physical body cannot be considered as conductive to fertility. You undoubtedly know that alcoholism and bawdy houses are closely associated.

The writer is convinced that proper diet is the determiner of fertility and the hatchability of eggs that are fertile. There always will be cases, where seemingly properly fed birds will have abnormal infertility, and where birds actually neglected and improperly fed will have an abnormal amount of fertility. The case of the birds purchased from a surviving husband mentioned elsewhere are a good example. Those birds, probably frequently without water or with contaminated water that they would not drink, were given large quantities of fresh kale daily. Kale is rich in vitamins and mineral salts. These chemically complex substances most likely gave rise to a degree of fertility not normally obtainable from what most breeders would consider a satisfactory diet. Foods that have proven conducive to fertility are discussed under separate chapters.

Much can be learned from repeating what was told to the writer by a breeder with about 25 years of experience. Here it is:

> " After all these years I have just learned that having some hens with infertile eggs are a benefit rather than a detriment. I have some hens who are now raising their third nest of young without having layed a fertile egg. They really don't amount to much in the way of color and they are raising the young of some very choice orange hens who are poor feeders or don't feed at all. I am really better off than if the eggs had been fertile. Had they been

fertile, I would have raised the mediocre birds and lost the young from the hens I know will be tops. I am also using the hens with infertile eggs to raise young from hens with large nests, and you know you lose more in large nests than in medium sized nests of young".

One of the common causes of infertility is a soft or false moult near and prior to the breeding season. Such moults are usually induced by furnishing heat in unheated breeding rooms. Hens that have a soft moult as close as two months prior to the breeding season will not lay fertile eggs. They may appear to be in grand condition and may lay normal clutches of eggs but the eggs will not be fertile except perhaps late in the breeding season, depending on what they are fed.

For many years it was claimed infertility was caused by unusual vibration such as resulted from earthquakes and lightning. The claim was founded upon belief rather than fact. This belief has been to tally discredited.

Without a doubt, the problem of fertility in canary breeding is becoming a more baffling one year after year. As much as 18 years ago when the writer first started raising canaries, there was no problem of infertility among canary breeders. In those days the canary hens were fed little else but rape, canary, and hemp seeds during the winter months, plus greens. Since sterilization of hemp seed has become mandatory, most commercial canary breeders do not feed it, and this is attributable to two reasons as follows:

1. Writers for the bird magazines who profess to be informed on the subject of canary food claim the sterilization has destroyed most of the former food value of the seed.
2. Sterilization of the seed has resulted in hardening the hull. The average canary will not spend a great

deal of effort trying to remove the hull and will discard five to ten seeds in succession to find a seed that will hull in the expected time. As a consequence, because of the waste, the cost of feeding the seed is prohibitive for commercial breeding even if sterilization did not affect the nutritional value of the seed.

It is conceded by the breeders of 15 and more years ago that hemp seed without question gave them good fertility and that fertility became a problem as soon as the seed came to the market sterilized.

Robert Stroud, in his works, tells us that the two fine sources for the fertility vitamin are unsterilized hemp seed and sunflower seed. As of the date of this writing, the wholesale price of sunflower seed is around 20¢ per pound. Grinding the seed with an ordinary coffee grinder is quite a chore, and there is considerable waste. Only small breeders go to the trouble and expense of feeding the ground seed.

In a discussion of the subject of fertility at a bird club meeting, it was the consensus of opinion among the experienced breeders that about 40% infertility is normal. The figure represents a good guess only.

Observations in large canary breeding areas like the San Francisco Bay region reveal baffling inconsistencies. Two comparatively young breeders, intimately known by the writer, feed their birds about everything they like. A great many of the things they feed are akin to the desserts on the family table. One of the breeders the past breeding season had tremendous in fertility, the other had practically none.

A large-scale breeder in this area, who normally raises around 300 birds yearly without abnormally extending himself, did not have a single fertile egg in the first round of the season, yet he did not feed his birds any differently than in other years. This breeder does not have the slightest idea what caused the infertility.

CANARY BREEDING, TIPS AND TRICKS

Every old-time breeder will tell you he has had years of great infertility without the slightest idea of the cause.

There are young breeders who have had excellent fertility for a few succeeding years and they think their feeding routine is the reason for it. Judging from the experience of breeders of many years of experience, the time will come when they too will wonder why their exalted knowledge has failed them.

About three years ago, the writer attended a large meeting of canary breeders. The speaker for the occasion was an avian nutrition specialist. He appeared to be exceedingly well informed. In the course of his lecture, he pointed out that fertility comes from the amino acid called "Arginine" and that this is found in the oily seeds. Commencing in the Fall and continuing up to breeding time, the writer fed his breeders an unlimited amount of thistle, rape and radish seed—whose composition is quite similar to that of rape. Only canary, water grass seed, greens and some egg yolk were fed besides these seeds. On the following breeding season, the writer had a great deal more than the usual infertility.

This past breeding season the writer had only about 25% fertility in his deep orange hens, about 50% fertility in the dimorphic hens, and at least 95% fertility in the roller hens. These hens were together in the same aviary. Could there be any plausible theory for this ?

In correspondence with one of the large and well-known breeders in the U. S., the correspondent was extremely elated about the fertility in her breeders. She had no infertility whatever, which she attributed to the feeding of Vitamin B-12, the antibiotic feed supplement and her feeding routine in general. The B-12 and antibiotic feed supplement, no doubt, were contributing factors to the unheard-of degree of fertility. However,

However, the young breeder previously mentioned who fed his birds more desserts than substantial foods, claimed the same degree of fertility with the exception of a few hens he had purchased from an older and fairly well-informed breeder.

No credence whatever is placed by the writer in the theory that there are rays from electric lights that cause infertility in the breeding room. The writer's roller hens are bred in the same breeding room with the red factor hens, and their production of successive clutches of fertile eggs make the theory untenable.

Three months prior to the past breeding season the writer came into possession of about a dozen choice red factor hens as the result of the death of an outstanding red factor breeder. The survivor, the husband, through the press of his regular occupation, sadly neglected the birds. They were fed rape and canary seeds only, and kale. Their quarters were unclean and their water vessels were empty when the writer visited the surviving husband. The hens were terribly soiled—they apparently were never given baths. Some had clumps of excreta on their toes and most of them had feather mites galore. All of the purchased hens were given hand baths and placed in a separate aviary. An effort was made during the breeding season to obtain young from them. With few exceptions, all of them were fertile but only one raised a nest of young. Some of them did not feed their young even once.

Compare the above-described hens with the deep orange and dimorphic hens of the writer with poor fertility. The writer's hens lived in a state of royalty on a comparative basis. And it should be mentioned at that this juncture that the writer's hens when given fertile eggs from other hens were wonderful mothers. How can one explain all this? Most obviously sanitation and feeding according to accepted rules are not the sole criterion for fertility. All this is a reminder of the words spoken by the proprietor of a poultry market.

He finds fairly good birds at the most unsanitary poultry farms where only the cheapest grade of food is fed. He frequently finds only mediocre quality birds at poultry farms where sanitation and high-quality feed are prime considerations.

When visiting a pigeon show years ago, an exhibit of almost beakless pigeons was observed. In a chance conversation with a pigeon fancier observing the exhibit at the same time, it was learned that this particular breed of pigeons, because of their beaks, are unable to raise their young to maturity. When the young reach a certain age, the parents are no longer able to feed them and they are transferred to a common variety of pigeons whose own young are destroyed. This information was shocking to the writer and he suggested that it would be more humane to give the eggs of this particular breed to common pigeons in the first place rather than to deprive them of their young, which they undoubtedly loved, when half grown. The pigeon fancier stated this plan was impracticable because if deprived of their eggs they would soon lay again and their eggs would be infertile. What was stated about the infertility of the pigeon eggs no doubt hold true as to canaries. Hens used for egg laying only produce too many infertile eggs. Apparently, the fertility vitamin is not stored fast enough to give fertility to clutches of eggs layed about two weeks apart. Some experience in this respect has convinced the writer that the better plan to follow is to permit a hen of unusual value to set on every alternate clutch of eggs. By following this plan, as many as five clutches of fertile eggs can be obtained from one hen in a season. The food fed to her has an important bearing on the matter.

A companion breeder, a close friend, observed that another breeder in this area, who was not very well in formed on canaries, had practically no infertility and his hens layed clutches of six and seven eggs. Besides,

they were wonderful breeders and yet received only a limited amount of attention. The writer's friend learned the very successful breeder fed only canary, rape and whole ground wheat, purchased at the poultry supply dealers, during the winter months.

The writer's friend decided to feed his birds the ground wheat during the past winter, and this Spring he had remarkable success. During the 24 years he has been raising canaries he never had such fertility, such large clutches of eggs, and such fine feeding hens. He jus! ordered additional leg bands and expects to raise almost 100% more young than he is usually able to raise.

If infertility is your big problem, try the ground wheat.

The foregoing is a reminder of a novice who raised 43 young with three hens. Her conditioning food and one of her two nestling foods consisted of a finely cracked mixture of corn, wheat and fats fed to baby chickens.

The ground wheat purchased at poultry supply firms contains many coarse particles which are too coarse for canaries to consume. Sift this product and use the coarse part for a nestling food after soaking it overnight. You must accustom your hens to it prior to the breeding season, otherwise they may not consume it. Ground grain deteriorates in quality and quite rapidly Store your supply in a deep freeze or in the refrigerator. If a supplier is convenient, purchase a limited quantity at a time, about a month's supply.

The palatability of ground grain decreases likewise with age. It is wise to buy the whole grain, if your operations are on a small scale, and grind a fresh supply with an ordinary coffee grinder as needed.

In large cities finely ground whole wheat can be purchased at the health food stores in small quantities.

A friend of the writer, who was raised on a farm in the Mid-West, told the writer that it was customary when he was a youth for the farmers in his area to feed their chickens an abundance of wheat for several months prior to the hatching season. Experience taught these people evidently that wheat was the proper food to obtain good results. It is results that we canary breeders are seeking and without greatly burdening our minds about the complexity of diets.

Wheat germ oil is another thing that has come to the fore in recent years as a dire necessity for fertility in canary breeding. One good breeder told the writer she had the most infertility the year she fed wheat germ oil liberally. The writer heard a lecture by an avian nutrition specialist and one of the important things he said was that the producer of wheat germ oil told him after the oil is three days old, he starts to worry about its rapid deterioration. He further stated that the producer informed him he could prolong its value by heating it but nothing was said how long after heating it had any value.

Undeteriorated wheat germ oil, seemingly, is a breeding stimulant. Birds in the breeding cage who are fed this product will stay in breeding condition indefinitely and are loath to go into the annual moult at the regular moulting time. A very eccentric novice breeder in this city had one pair breeding continuously over a year and had some 30 young from them at the time the novice talked to the writer. The hen's egg laying capacity had become exhausted and she was given eggs from other hens.

CHAPTER XI

FOODS—GENERAL

It is a mighty long time since most of us attended elementary school. We vaguely recall that somewhere in school, about the fifth grade, we learned something about proteins, fats and carbohydrates. We are inclined to believe these matters were treated in the subject of physiology because we recall of being able to trace the blood through the circulatory system and it was in the same classroom where we learned something about foods. Today we remember as little of what we learned about foods as we do about the movement of the blood stream. However, our memory on foods is somewhat refreshed by hearing the conversation of one or two ladies at every social gathering in respect to a planned diet and decreasing the consumption of starches and sugars because the expanding hips are becoming of concern. Here we learned that starches and sugars are fatting and that is about the extent of our knowledge except that we know that meat and eggs contain protein, whatever that may be. The word “carbohydrates” is never heard so we assume they are not of much importance. Very few canary breeders, the main exception being those ladies who read more than the fiction in the women’s magazines, know anything worthwhile about foods. This writer, until comparatively recent times was in the class of those who know little about foods. One day, while taking a peek at the Ladies Home Journal while his wife was out shopping, he learned that this magazine contains an excellent monthly article on foods and modern practice in medicine.

Willi his curiosity aroused, and inspired by unsatisfactory health to delve into the food subject ,he learned a little more about foods than is commonly known by the average canary breeder.

Unbelievable as it may seem, some doctors, and doctors with a large practice and fine reputations, are ignorant of the results of prescribing improper diets. As proof of this, several cases can be cited but one highly illustrative case will suffice.

A friend in San Francisco was suffering from chronic diarrhea. He was treated by several well-known doctors over a period of five years. He was gradually becoming worse physically and was slowly losing the use of his legs. In desperation he visited a doctor in a small city about 125 miles distant in whom he had much faith. This doctor, after abundant study of his case, told him his visit was a fortunate one indeed, that he was approaching the climax of an improper diet and that he probably would have died in about a month as the result. This unfortunate friend had been on a starch diet for about five years. He was dying from lack of proteins instead of the diarrhea which had dormant periods.

Knowledge of the foregoing case induced the writer to change the course of treatment of two chronically ill birds that were brought to him. Both had loose bowels; they ate freely but spent most of the time on the bottom of the cage on account of being too weak to stay on the perches. Aureomycin, the proven remedy for loose bowels failed in both cases. Both birds consumed farina and hulled oats in abundance. It was believed the starches would constipate them. After three successive weeks of the mentioned drug and foods, there was not even slight improvement. The birds were then given a mixture consisting of one-third dissolved egg yolk and two-thirds Charm Bird Mash fortified with a small amount alfalfa meal and Vionate (described elsewhere). The particular bird mash was used because it contains 24% proteins from different foods and 5 ½ % fiber. The birds had canary, rape and radish seed in their seed cups. Leafy greens were given them in abundance daily.

In a period of one week, remark able improvement was evident. Highest hopes are entertained for complete restoration to health of both birds. Proper diet instead of drugs and starches are proving the correct remedy. Improper diet without question was the cause of the illness.
It is not intended to give the reader of this book an elementary course in foods. Because it is very probable that what appears in succeeding chapters will not be properly understood, a small amount of simple comment to serve as a refresher of memory is deemed advisable.
The general classification of foods is carbohydrates (starches and sugars), fats and proteins.
The term “carbohydrates” covers all simple sugars and substances which can be converted into simple sugars. They are the chief constituent of roots, tubers and seeds. Important sources are cereals, potatoes, rice, honey, sweet fruits and common table sugar.
Butter, tallow, lard and vegetable oils are examples of fats commonly known. May it suffice to say that the carbohydrates and fats serve the same purpose in the animal body as the gasoline and oil do in the automobile.
The subject of proteins is a complicated one. The average individual believes a protein is a protein and of the same value whether derived from fish, meat or vegetables. The average individual does not know that animal proteins are of far more value as a food for animals than vegetable proteins. The cheap grade of Poultry mashes contain mainly vegetable proteins while the expensive ones contain the maximum amount of animal proteins. A poultryman with much experience
greatly prefers a mash containing 15% animal protein to one containing 25% vegetable protein. You probably have noticed that the diet prescribed for

convalescents embraces valuable animal proteins such as milk, fish, meat and gelatin, and not just vegetables. The primary function of proteins is to build tissue and to replace worn out tissue. It must be borne in mind, however, that proteins are also of value as a source of energy. Certain animals who's primary food is meat, derive enough energy from the meat for their bodily requirements.

The important thing to know about proteins is that they are broken down in the digestive tract into what is known as "amino acids". There are 21 well recognized amino acids. About a half dozen of those are essential for sustaining life. Not a single one of them by itself will sustain life as proven by experiments.

The various kinds of amino acids are used for building and rebuilding different kinds of tissues and that is why we hear so much about a well-balanced diet in a discussion of foods.

This writer, in his articles for the bird magazines, has always stressed a variety of foods for the breeding cage. From what has been stated above, the reason for his views should be apparent. Canaries need a balanced diet and a canary breeder with experience and some powers of observation knows that troubles in the breeding room are primarily traceable not only to an improper diet in the breeding cage, but also to an improper diet prior to the breeding season. Articles in the bird magazines by well-informed writers during the past breeding season, have stated in the clearest of language that their success, greatly beyond expectations, was entirely attributable to their feeding routine.

The average large scale canary breeder has difficulty averaging four young per hen per season with much labor. Considering the number of eggs layed per hen per season and allowing for what should be a normal

amount of infertility, it is doubtful whether more than one young is raised for every four eggs layed. This is an appalling fact. The opinion of the writer, no doubt, will be disputed by some, but every experienced canary breeder will admit that during the course of his or her experience, he or she has had hens that raised as many as 15 or more young per season. Could it be that ignorance about the value of foods is the source of our trouble in canary breeding? The writer's answer to this question is "yes".

CHAPTER XII
EGG FOOD

The more you study the feeding methods of the vast majority of canary breeders, the more you realize that their methods belong to the horse and buggy days. Canary breeding in the main is carried on today as it was 75 years ago and as recommended in English text hooks written long ago.

During the second world war, the writer paid for live packages of seed to be mailed by a seed firm to English breeders because the cost of canary seed in England was prohibitive to the average English breeder A letter was written to each of the five recipients asking them to tell in detail their feeding routine as a concrete expression of gratitude. The answers received showed that the English breeders were even more obsolete in their feeding routine than their American brethren.

When the writer was a novice, he immediately joined A canary club, some of whose members had been raising birds for as long as 25 years. The feeding method was virtually the same for all of them. Crumbly, moist egg food was served two or three times per day. Greens were fed two or three times per day. Hulled oats (groats) was served in separate vessels in unlimited amount. All of them fed hemp seed.

Some soaked the seed before feeding, some ground it and others served it without going to the bother of either. A few of the breeders fed milk sop with poppy seed (maw) sprinkled over it.

The writer fed crumbly moist egg food three times daily as advised, using the whole egg. When the young were 12 to 15 days old, his hens had a strong inclination to breed again. They started to build in the nests with the young with paper torn from the bottom of the cage and some of them plucked the feathers from their young to use as nestling material. Some young were lost. Those that were raised owed their existence to feeding males because only the single mating method was used.

The plight of the writer was explained to a breeder with considerable experience. He was told he made his egg food too rich, meaning too much egg was added and not enough bread crumbs. When the advice was followed, the situation became worse. With less egg in the egg food the young grew poorly and the hens came into breeding condition even sooner than before. By following the advice, growth food was decreased and more energy food was added.

It was because of what was related that the writer realized crumbly moist egg food was a poor food for the breeding cage, and a search was made for superior substitutes. Cooked carrots, shredded wheat moistened with water, and bread moistened with water are three foods which were fed in addition to egg food, and a marked improvement took place.

Since the novice period, a great many foods have been experimented with as suitable for the breeding cage and these are mentioned elsewhere. Custard was mentioned as a suitable food in the bird magazines, but the men breeders in the bird club looked upon custard as a breeding cage food as nothing more than the exotic idea of some female.

EGG FOOD

During the 1950 breeding season a great many breeders in this area took to feeding custard. One or two very successful breeders fed it and that was an inspiration for other less successful breeders.

As a novice the writer fed custard a few times as a novelty. As it was an unaccustomed food the hens probably did not feed it. Results are not remembered. As custard was claimed to be a far more convenient food to feed and entailed far less work, the writer decided to give it a serious trial in 1950 and made a study of the relative merits of egg food made from grated boiled eggs and custard. It was soon learned that the custard form of egg food did save much labor, that it did not dehydrate nearly as quickly on warm days, and that the hens were unable to pick out the yolk as they did when the egg was grated, with the consequent result much of the egg food was thrown out of the egg food vessel and was wasted on the bottom of the cage.

What has been stated is only the lesser part of the lory. It pertains primarily to the economic side. Aside from that the story becomes far more important. The out of pocket expense to raise canaries is small compared to the value of labor expended at a very moderate hourly rate.

Some canary breeders do not use the white of the eggs. They are under the impression it has little or no food value. Here are the telling facts taken from a text on dietetics:

	Yolk	White	Whole Egg
Protein …….	15.7	12.3	13.4
Fat……..	33.3	0.2	10.5
Carbohydrates ….	…..	…..	…..
(a) Minerals……	0.67	0.03	0.25
(b) Water …….	50.0	80.0	(c)

(a) Calcium, phosphorous and iron only
(b) The amount varies
(c) Data was not available nor considered important

From the data given above, you can see that the egg white contains nearly 80% as much protein as the yolk, and your physician will tell you it is an extremely valuable protein. Scientifically prepared poultry feeds contain only about 10% fat. The yolk contains 33% fat.

By using the yolk only and by adding bread crumbs to it with its energy value so pronounced, is it any won der many breeders lose so many young because of the hens abandoning them due to their predominant interest in their next family ?

A novice breeder came to the writer's home well past the middle of the 1950 breeding season with her troubles. She had raised but a few young with 20 hens. The young were abandoned when about 15 days old. She fed fresh egg food from 15 to 20 times per day.

Because of what has been stated, a very prominent writer for a bird magazine, who has given nestling foods serious thought, told this writer in a personal letter she does not plan to feed any egg food commencing next year. A good and popular English writer for an American bird publication emphasizes the fact he has not fed any egg food for about 20 years. The sentiment of other writers against egg food is becoming more pronounced. In substance, we are now headed from one extreme to another, from the poorest kind of egg food to none at all. Considering that an egg is a near perfect food and generally relished by canaries, the trend is in the wrong direction. We should feed egg food in the breeding cages intelligently and for variety and not as the primary food.

In view of what has been stated, by far the best plan is to use the whole egg in the form of a custard. Be cause of the water content of the egg, it is not necessary to add a great deal of water. In custard form, you do not have the undesirable features of a hard-boiled egg, but instead you have the qualities of a soft-boiled egg so freely prescribed by physicians for invalids, convalescents and children. The dry mash you add to

the custard may add to or detract from its quality. The recipes handed out by enthusiastic novices and old breeders who cannot tell you the difference between a protein and a carbohydrate are of no value usually. They represent fancy or conceit rather than intelligence. Most of the intelligent breeders use about two-thirds Pablum and one-third bread crumbs as the dry material to be added to make egg food. Upon inquiry, it was learned that the main reason for using part bread crumbs is to overcome some of the stickiness that results when Pablum is used alone.

The food value of Pablum is well recognized. Men well trained in dietetics must have conceived its formula, otherwise it would long since have been discredited by the medical profession. The fact that it does not affect the palatability of the egg food to the critical canary palate is another of its commending features.

The cost of Pablum is however a matter to be considered in commercial canary breeding, and with the majority of canary breeders, raising canaries is done with a profit motive.

The writer, being a commercial breeder, decided to investigate the relative food value of bread and Pablum because two-day old bread can be bought at the chain bakeries for about one-seventh the cost of Pablum. The following data shows the relative composition:

	Pablum	Enrich Fresh	White Bread Dried
	%	%	%
Carbohydrates ….	69.9	52.3	73.8
Protein ……..	15.0	8.5	12.0
Fat ……..	3.0	2.0	2.9
Moisture …….	7.0	35.9	9.5
Minerals, Fiber and Ash .	5.1	1.3	1.8

The data on Pablum is shown on its container. The data on bread was obtained from “Diseases of Metabolism” by Duncan. A large loaf bread, weight 24 oz., after being oven dried weighed 17 oz.

From a comparison of the relative composition of bread and Pablum, as given above, it seems foolish, off hand, to pay seven times more for Pablum than for bread because the mathematical difference as shown above is not of much consequence. Those informed on the subject of foods know, however, that the quality of the proteins in Pablum is superior because there is a balance or proper ratio of different proteins which is so vital.

When a large variety of foods are fed in the breeding cages, the difference between Pablum and bread is of little consequence. Doctors do not prescribe eggs alone for convalescents. The diet prescribed consists of eggs, meat, fish, milk, a variety of vegetables, etc., to provide the different kinds of proteins. As the writer does feed a big variety of food in the breeding cages, he concluded the use of the much more expensive Pablum was unnecessary. This matter was discussed with the eminent Dr. C. B. Bennett of Berkeley, California.

When Dr. Bennett was told what else was fed in the breeding cages besides egg food, he stated without hesitation that aside from any commercial considerations whatever, the feeding of Pablum was unnecessary. In order that you will know on what Dr. Bennett's decision was based and also be informed of the writer's feeding routine, this is what Dr. Bennett was told:

Greens are fed an average of five times per day.

The kind of greens is varied the same day, usually two different greens being fed each day. The greens mainly fed are escarole, endive, romaine lettuce, Brussel's sprouts, the outer leaves of cabbage, rape seed plants, chick weed, broccoli and kale.

Cooked carrots and yams (in the same vessel) are fed about an hour after daylight. Egg food is fed at 10:30 A.M., soaked teazel at1:30 P.M., bread moistened with water at 4:30 P.M.

The seed cup in the cages contains a mixture of canary, rape and radish seed. In addition, a vessel of hulled oats is kept in the cages at all times.
The hens that do not feed egg food are given shredded wheat moistened with water. The hens that feed
both are given both foods.
This chapter seems unnecessarily long. Its importance, however, justifies its length. You will agree, no doubt, that egg food and canary raising are about as closely associated as horse and hay.

CHAPTER XIII

VITAMIN B-12 (A P F)

The importance of Vitamin B-12 in canary breeding as. of this date is not recognized. Only one article on the subject has appeared in a bird magazine and that was in the Fall of 1950. The article was really too comprehensive for the average reader to assimilate. The subject is involved and the more one investigates the subject the more the inclination arises to ask some informed individual some simple questions to get a clear understanding of the subject. Your author hopes to be able to state simply and clearly that which the average canary breeder should know.
Not so many years ago it was discovered that the barn yard chickens grew much faster than others. Those that scratched in the cow manure were obviously finding something in the way of food that not only appealed to their taste but also definitely improved their health. What the substance was even puzzled the imagination because the manure was regarded as nothing more than a waste product devoid of any nutrition.
Poultry experts observed that those poultrymen who Were too busy or neglected to keep clean litter (bedding) in the poultry houses and merely added

fresh litter to the surface were actually faring better than those who frequently replaced the litter. The chickens were seen to scratch diligently in the litter and they actually found something edible known not to be mash or grain.

The writer for many years has used steam cleaned pine shavings as bedding for the aviaries. Whenever the shavings are accumulated into a pile for convenience to cart away for replacement virtually every bird in the aviary will be seen on this pile eating ravenously and the food vessels are completely ignored. The writer supposed the birds were eating seeds that were wasted and he was fearful indeed that these seeds were moldy and that as a consequence there would be sick birds. In view of this belief, the shavings were carted away as rapidly as possible. It was observed that the birds showed greater activity on the piles of shavings during the rainy season when the bedding was very damp. If any illness resulted from what the birds consumed, it was not discernible.

Because of the related observations an effort was made to ascertain what the substance is that the chickens find in these odd places. Scientists found that a fermentation process took place in the manure and litter caused by a mold which gave rise to something of value. In the absence of not knowing what the mold product was, they named it “Animal Protein Factor which came to be called APF for abbreviation.

In more recent times science has broken down APF into Vitamin B-12 and its other unknown constituents it has termed antibiotic feed supplement. The miracle drugs, called antibiotics, are discussed in a succeeding chapter, so nothing need be said on that subject here.

It is of interest to add, however, that the substance aside from VitaminB-12 in APF is not a fully explored field. It is not unlikely that things of great value like B-12 will be isolated in the course of time.

VITAMIN B-12 (A P F)

Many of you may know of B-12 only as something physicians prescribe for anemia. It is indeed the latest and most valuable remedy for anemia at the present time. The medical profession now definitely knows that B-12 is one of the three great essentials for making blood and that it is usually the element lacking in individuals afflicted with anemia abundantly proven by response upon its use.

B-12 is now used for experimentation in many fields. In experiments with under-nourished children, results were phenomenal in some cases. In cases where the under-nourished did not respond, there was, nevertheless, increased physical vigor, alertness, better general behavior and a definite increase in appetite contrasted with indolent food habits before.

You, of course, are primarily interested in B-12 as a product for canary breeding. To date, there is only a limited amount of information available. There is no reason, however, why we should not profit from what has been learned in the poultry industry. All high grade poultry mashes now contain B-12.

Large scale infertility is common in canary breeding, and before B-12 was included in poultry mashes infertility evidently was just as big a problem as in canary breeding. Since B-12 is included in poultry mashes the hatchability of eggs has increased from 60% to 90%. Other breeders consulted by the writer confirm their belief that 40% infertility among canary breeders as a whole is not an exaggerated figure. It is infertility usually that explains why a well-informed old timer did so poorly in a particular season. It is quite probable that a very successful novice who had virtually no infertility merely happened to feed unknowingly foods that were quite rich in B-12. Abundant breeding knowledge without fertility will not out distance lack of breeding knowledge with fertility.

By strange coincidence, something this writer stated in one of his articles in a bird magazine, a correspondence developed with Mrs. Lillian Otersen of New Haven, Connecticut, a well-known and esteemed writer on the canary subject. It is not regarded as a breach of faith of things stated in private correspondence to relate the phenomenal success this breeder has had in the 1951 breeding season. When the breeding season was about two-thirds over, Mrs. Otersen informed the writer she had 350 banded young, had only lost three young that fell out of the nest, had no infertility and not a single non-feeding hen. Since then, Mrs. Otersen has stated in a bird magazine she has 475 banded young and is forced to discontinue breeding operations for lack of capacity to house more birds.

Every breeder has an outstanding successful breeding season some time during years of breeding, but Mrs. Otersen's success is really phenomenal and this she attributes to her feeding routine which includes B-12 and antibiotic feed supplement. Friends and acquaintances of Mrs. Otersen who have followed the same feeding routine have likewise had unbelievable breeding success, according to Mrs. Otersen.

Knowing that B-12 is the great essential for blood making and knowing that good rich blood is necessary for vigor and health, it is indeed understandable that those who have used B-12 in their feeding routine have had such abundant success. It is well known by those with breeding experience that thin canary hens with sharp protruding breast bones are worthless as breeders. It is not unreasonable to assume they are anemic. The mere fact that they were fed good rich food matters not. Fat humans quite commonly are anemic. Fat producing and blood producing are entirely different functions.

VitaminB-12 is produced commercially by a fermentation process by various firms. That which is

offered for sale to the poultry industry varies in strength from three milligrams to eighteen milligrams per pound. The stronger the product the less is required, and as palatability is an important factor in canary foods the products that contains the most milligrams per pound is preferable. In checking wholesale prices in this area, it was found that the 12 mgm. per pound product costs only two and one-half times more than the product containing 3 mgm. per pound, yet it is four times stronger.

The present-day tendency is to use some fish meal in poultry mashes which is strong in B-12 and antibiotic feed supplement. A substitute for the meal is termed fish solubles, which consists of the processed heads, tails and viscera formerly discarded as waste products at the fish packing plants. Meat meal is also used for the same purpose as fish meal and fish solubles but it contains only about half as much B-12 and antibiotic feed supplement which is known to contain valuable nutritional factors. Vegetable proteins contain a mere trace of the two mentioned products.

Now that we have a general idea of what this subject is all about, we come to the point of how to use it.

In poultry feeds the maximum amount of B-12 used per pound of feed is 4 mgm. As there are 453,600 milligrams to a pound the amount seems too insignificant to be of any value. The surprising thing is that one milligram per ton of feed has proven sufficient to increase the hatchability of eggs from 60% to 90%. Obviously, only a very minute amount is required for inclusion in canary nestling foods. Nothing is gained by adding liberal amount. As the product is not expensive nor known to be toxic, there is no reason to be seriously concerned about some very definite amount. An amount such as can be held on the top of a table knife should amply suffice for several pounds of nestling food.

The B-12 product obtained locally by the writer is of 6 mgm. strength. It is dark brown in color and

contains tiny specks that are cream color. It smells like yeast and resembles it in flavor.

When to use B-12 is no doubt the foremost question

in your mind. It is the writer's opinion that the ex ample set by the poultry industry should he followed and that is to feed it throughout the year. You are advised to add it to nestling foods and to any dry mashes your birds will consume providing, of course, that the prepared foods you buy do not contain it. You realize, no doubt, that it is more important to feed it outside the breeding season than during the breeding season. Unless your birds are in vigorous health when the breeding season starts, you are sure to have troubles galore in the breeding room, especially in the early part of the season. Since it is an established fact proven by the experiments on under nourished children that improved health follows from the use of B-12, it is most likely that many ailments common to canaries will he greatly reduced if it is included in their diet.

CHAPTER XIV

GROWTH ACCELERATORS

(Antibiotics)

During the recent past medical science has had re markable results in the treatment of ailments with drugs that have become known as the "miracle drugs because results have been obtained in their use that border on the miraculous. The miracle drugs at the date of this writing known to the writer are aureomycin, penicillin, streptomycin, chloromycetin, terramycin and bacitracin. The mentioned drugs are made by a fermentation process the same as beer. The residue remaining after the fermentation is akin to Brewer's yeast and is commonly known as mash.

The mashes remaining from the making of the miracle drugs; by recent Federal Government direction, are now named. for example, the mash remaining from
the manufacture of bacitracin is named“Baciferm-5”.
The miracle drugs are referred to scientifically as antibiotics. They are molds obtained from earth. A few years ago, there were less than 100 known antibiotics. At present more than 600 have been classified.
During the past few years, it was discovered that the miracle drug mashes formerly discarded are extremely valuable. From experimentation at agricultural colleges, it was learned that if a minor amount of the mush is added to the poultry feed—a fraction of one per cent by weight—that there is a tremendous stimulation in growth in the early stages.
An odd fact about these miracle drug mashes is that they are not considered a food. The reason for their beneficial effect is not suspected by the average person.
In common substance the explanation is as follows:
In every living animal detrimental micro-organisms are present in the intestinal tract, from which the nutrient is taken. These micro-organisms are subdued by mother nature in the normal functioning of life. If for some reason or other they are not subdued, the animal is. either stunted in growth or dies. The miracle drug mashes, in simple words, take the place of mother nature in keeping the intestinal tract free from the impeding micro-organisms, and as a consequence nutrition is readily absorbed and the animal grows abnormally.
The various kinds of miracle drugs are made by large chemical firms or their owned subsidiaries. As might be expected, the various firms and their authorized agencies claim their mashes are superior as a feed supplement. For example, they claim there are no toxic results from the use of their particular mash. From this, one might infer that toxicity does result from the use of other mashes. The amount of the drug

remaining in the mashes is a mere trace of it, and considering the very small quantity of mash used in feed, you can see that the particular sales point is not only of no consequence but actually deceiving to the uninformed.

By far the most reliable information is that furnished by parties totally disinterested in the commercial phases of these mashes. Extensive experiments were conducted by the Department of Poultry Husbandry of Washington State College to determine the relative merits of the various mashes. A report of these experiments was made by Dr. James McGinnis at the 1950 Cornell Nutritional Conference for feed manufacturers. A perusal of this report shows that the Bacitracin mash is much superior to all other mashes for poultry feed with one minor exception as to turkeys where penicillin mash showed a very slight superiority. All of the mashes are contributory to more rapid growth.

Their cost and availability in small amounts are other factors. They are sold at wholesale by firms who specialize in supplying feed manufacturers and these firms protect their patrons by refusing to sell to individuals who desire to prepare their own feed. Small quantities, such as are used by canary breeders can only be obtained as samples at present from the wholesalers.

To date, the mashes are being sold only in 100 pound sacks at a cost prohibitive to canary breeders. No doubt firms specializing in canary foods will soon market the various mashes in small amounts but necessarily at least double the wholesale price.

The mash remaining from the making of the drugs and used in poultry, swine and cattle feed is known in the feed trade as anti-biotic feed supplement.

The suggested feeding level of the Bacitracin mash is two pounds per ton of finished feed for chickens. Each pound contains five grams of the drug Bacitracin.

As there are 28.35 grams to an ounce, the amount of the drug per ton of feed is ten grams or a little more than one-third of an ounce. As a ton contains 32,000 ounces, the amount of the drug is approximately one part to 96,000 parts of feed. It is difficult to conceive that such a minute amount would be of any value, however, statistics prove it to be, and strange to say, experiments have proven that nothing is gained by adding ten times an amount that has proven to be adequate. On the basis of feed prepared for chickens, the amount of mash you would add to nestling feed would be 1/10 of 1% (by weight). To one pound (16 oz.) of ready-to-serve nestling food, you should add sixteen one-thousandths of a pound of the mash. Now such an amount is entirely incomprehensible to the average canary breeder. For all practical purposes, the quantity is equivalent to adding pepper to your oyster stew or some other common food which is usually seasoned with a minor amount of pepper.

Considering the small amount of mash that is necessary to use for effective results, the palatability of a nestling food is not affected. The one mash (Bacitracin) the writer has obtained as a sample has a very slight yeast-like odor and its taste is very similar to that of yeast.

No effort has been made to determine how large a quantify of mash, other than Bacitracin, should be used for nestling food. It seems, however, that the mashes from other miracle drugs such as penicillin and aureomvein contain approximately the same minor amounts of the drugs. In experiments reported by Prof. McGinnis as mentioned, it was noticed that the same quantity of the various kinds of mashes were used. In reading about experiments in periodicals, it was also observed that the same minor amount of other mashes was used. Those canary breeders who are going to use miracle drugs purchased at a drug store should be sure of their arithmetical ability.

arithmetical ability. For instance, a bottle of 25 tablets

of aureomycin of 15 mg. strength contains only 375 mg., a little more than 1/3 of a gram. You will need about three bottles to get one gram, and to get five grams, the approximate amount in a pound of mash, you will need fifteen bottles. The fifteen bottles in this area at this time cost about $30.00.

A very minor amount of the miracle drugs added to the diet of growing animals has shown a remarkable increase in growth. A few examples will be cited to give you a general idea why feature articles on this subject are becoming quite frequent.

In an experiment on four pups from a litter of eight bloodhounds, those fed the antibiotic averaged 64 pounds when 4 ½ months old, which is two pounds more than the normal weight when 6 months old.

Chickens and turkeys showed an average of 30% increase in growth during the first four weeks over the normal growth.

Pigs obtained their normal market weight two months earlier, which resulted in a big saving of feed.

Normally, there is a loss of about 5% from various causes, but with the feeding of antibiotics the death rate was almost zero.

In an experiment with trout, the same number having been placed in two different troughs, those which were given an antibiotic not only grew faster and were livelier, but their death rate was only 6% compared to those not given an antibiotic whose death rate was 28%.

The foregoing are merely common examples. Others that are extreme and seem incredible are omitted.

Our primary concern, of course, has to do with canaries. Two outstanding cases follow to prove that the same amazing results can be obtained with canaries as with other animals.

GROWTH ACCELERATOR

Early in the Spring of 1951, the writer mentioned in two of his articles in bird magazines what had been accomplished in the poultry industry by including antibiotics in the mashes and expressed the belief that similar growth results could be obtained in canary young if the antibiotics were included in the nestling foods. Mr. J. C. Slack, a druggist, (1316 - 333rd St. No., Birmingham, Alabama), was impressed with the idea. He decided to experiment with aureomycin. The drug (strength not mentioned) was diluted with milk sugar and sprinkled on the nestling food. The results were so impressive that an unsolicited letter dated June 24,1951 was sent to the writer disclosing extremely interesting facts. For brevity, it is stated that in five nests (14 young), the chicks took to the perches on an average of the sixteenth day and all were self-supporting when 21days old. Another nest of five young took to the perches when 14 days old but, no record was kept when they were self-supporting, which was most likely the nineteenth day. As the vast majority of canary young leave the nest when about 20 days old and became self-supporting when 25 days old, the results from feeding the aureomycin are obvious. Perhaps even better results could have been obtained by using a greater quantity of the drug.

The second outstanding example from the use of antibiotics is that detailed by the well-known canary authority, Helen Kneller who stated that the young led antibiotics grew so fast that she was unable to band them with the regular CB bands when six days old. A normal time for banding young not showing unusual grow is when they are nine days old.

The writer was unable to develop any factual information to add hereto. His breeding hens fed the nestling food with which it could be mixed too sparingly late in the breeding season when a supply of an antibiotic was obtained.

The belief has already been expressed that an abnormal growth may prove detrimental in the end and that we should not be governed by such examples as fowl and pigs who are destined to a short life. Greatly over-grown children are common. On the football team of every high school, you will find boys sixteen years of age more than six feet tall and weighing well over 200 pounds. If decidedly over-grown children are doomed to a short life, this is not common knowledge.

As time progresses, you will find differences of opinion expressed by writers in the bird magazines as to the beneficial effects from the use of antibiotics. As the feeding routine of most breeders varies greatly, such differing opinion must be expected because it has been conclusively proven that as the quality of the ration improves, the response from the supplementation with antibiotics decreases.

CHAPTER XV

NESTLING FOODS

There are quite a few commercial nestling foods on the market. The writer does not question their food value because they are prepared by avian nutrition specialists. For large scale commercial breeding operations, they are too expensive. Those containing oil, especially cod liver oil, deteriorate rapidly in warm weather. The writer as well as other breeders in his area have not found most of these commercial mashes palatable to the birds.

Poultry mashes are definitely disliked by canaries. They contain a strong and unpleasant odor. No matter how valuable a mash may be for poultry, you do not profit by forcing your birds by near starvation to eat a food they greatly dislike.

Radish seed is an excellent food to serve in the breeding cage and to the self-supporting young. The

writer has had hens who made the seed the main food for feeding the young. The Agriculture Department of the University of California informed the writer that radish seed is quite similar to rape seed, an admittedly fine food for canaries. Radish seed has a very thin hull and a large kernel. It is quickly hulled by the mother hen and by the young before they are able to hull rape seed.

Radish seed is too expensive at seed houses for use as a canary food. The seed left over from previous planting seasons is now sold by dealers in canary seed as nongerminating seed. The seed has an unusually long germinating life, and when sold as a canary food, has lost some of its original oil content which is of little consequence.

Salt is necessary for canaries. Add salt to your egg food in such quantity as you would for the human taste. Without salt your hens become exhausted too soon. Wild birds do not have ready access to salt but neither do they raise from three to four nests of young per season.

Soaked teazel seed is regarded by many breeders as an excellent food for the breeding cage. The writer tried it for the first time the past breeding season. About three-fourths of the hens were very fond of it. The seed was fed at1:00 P.M. primarily to add variety. An analysis of the seed showing its nutritional value could not be found.

Observations regarding this food soon destroyed the writer's enthusiasm for it except as a treat. At first each hen was given a serving large enough to last about two hours. During that two-hour period, some hens consumed little else which showed their extreme fondness for it. In checking, it was found that during that two-hour period the crops of the young of hens with three or more young, more than seven days old were virtually empty.

The inescapable conclusion was that the meat of the seed is too small to regard the seed as anything but a treat, but valuable to overcome the monotony of the sameness of food.

After reaching the foregoing conclusion, the writer sought something that would be a fine supplement for the one o'clock feeding period and that could be used for those hens that would not eat the seed. As an experiment,10 pounds of mixed finely cracked wheat, oats and corn were purchased at a nearby feed store for $1.00. The mixture had been sifted. It contained no flour or fine particles. After being soaked for seven hours, it was considered ready for serving.

When the cracked grain mentioned was first served, some hens showed a fondness for it and others did not even touch it. This was expected. As time progressed, most hens fed it.

The value of the cracked grain as a food is believed to be good. If you will read what is stated on the container of Pablum as to its composition you will find that 95% of the ingredients are made from the three grains.

After the meat has been extracted from the teazel seed, you will find a residue of at least 50% by volume. The last seed purchased by the writer from a wholesale house cost 31¢ per pound. The food consumed, there cost therefore, cost at least 62¢ per pound. The cracked grain costs 10¢ per pound and was offered for sale at $7.50 per hundred pounds. There is no residue or waste from the grain. These facts are important for those who raise canaries for profit. As an afterthought, it should be stated that the young of hens who immediately showed a fondness for the soaked cracked grain were checked. Their crops were not empty because their mothers were not spending most of their time on their feed vessels.

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It is proteins, not starches, that build the body of the young. If you insist upon serving such a poor nestling food as bread crumbs mixed with soaked teazel only, you must expect the young to grow poorly and even be stunted in size. Bread consists primarily of starch. You can greatly improve a poor nestling food by adding gelatin to it which is 87% protein. Gelatin purchased by the case consisting of 12 one-pound packages costs about 1/3 as much as if purchased by the package at a drug store. There are two grades of gelatin. The cheaper grade contains less protein. You do not save by buying the cheap grade. As the gelatin is colorless, odorless and virtually tasteless, it can be added to the egg food without fear the hens may not eat your usual food.

Dry foods such as mashes, farina and wheat flakes, do add variety of food in the breeding cage. If a hen spends most of her time at the vessel of one of these foods and has a large nest of young, the chances of raising all of the young are poor. The past few days one of the writer's hens with five young was spending too much of her time at the vessel containing the wheat flakes. Though the hen fed continuously, the crops of the young were empty. The vessel was removed and a liberal serving of shredded wheat moistened with water was given. Later in the day when a check was made the vessel was found completely empty and the crops of the young were full.

It is surprising how many hens will not even taste a new food other than seed placed in the breeding cage. If you place a new food in the breeding cage and it appears untouched, don't give up. Put a minor amount of this food in the cage daily and some day to your surprise you may find the hen has tasted it and liked it.

Some breeders feed soaked wheat in the breeding cage. The hens eat only the inner part and the most

valuable part is wasted. If you will use the finely cracked wheat fed to baby chickens, the hens will consume the entire grain.
Shredded wheat moistened with water is one of the cheapest and best nestling foods. It is made of the whole grain and having been baked its starch content is easily digested. Our bread is baked to enable us to digest the starch. You will not have to worry about nestling diarrhea nor infertile eggs in subsequent clutches when your hens feed this food. The proper way to prepare this food is to fill a small vessel with the dry food. Add water to vessel until the water is level with the food. Allow the vessel to stand for 15 minutes and then it will be ready to serve. If you will follow these directions the food will neither, be too dry nor too wet.
Shredded wheat breakage and sweepings are sold at some pet shops for puppy food at 10¢ per pound. The producing firm will be glad to sell you this waste at $5.00 per 100 pounds. After moistened with water the prepared food costs you less than 2¢ per pound.
Most breeders use at least part bread crumbs in making their egg food. The end slices are used for this purpose and very often saved throughout the year. Canaries will not eat the crust and dislike it in the egg food. Sift the bread crumbs in a coarse sieve, like a wire nest and much of the crust will be sifted out.
Be wary of novices who are handing out typed copies of nestling food recipes. They were merely lucky in obtaining well-conditioned breeding stock the first year in their venture. The chances are they will be collecting nestling food recipes on the following year.
Those who know it all the first year invariably give up the business in a few years.
Hulled oats, also called “oat groats”, is one of the most common foods fed in the breeding cages. Recommendations for its use are frequently found in the bird magazines and in books on breeding.

NESTLING FOODS

Its merits or demerits as a food are usually not mentioned. The fondness of the canary for this food cannot be

questioned, which, however, is beside the point as to whether it is a valuable food for feeding the young. Some hens are so extremely fond of this food that they will feed little else besides greens.

During the past breeding season, the writer had one hen that fed little else besides the oats and greens. She was a very diligent mother and raised three nests of young. She did not lay a single fertile egg and all of the fertile eggs given to her were from hens who were regarded valuable because of their color but whose condition was known to be below par. They were purchased hens mentioned elsewhere. The young of this hen grew slowly and left the nest when they were 22 days old, which is four days later than well fed and properly fed young.

During the breeding season, when several sacks of oats were delivered, tags giving the guaranteed analysis of the oats were secured to the sacks. The protein content was given at 12%, fat 6%, and carbohydrates 65.5%. The protein and carbohydrates content are quite similar to that of white bread.

A food containing only 12% vegetable protein is grossly inadequate for proper growth of the young, but as a matter of fact, the young do not obtain that much protein from the oats alone because the hen peels off the outer part of the grain which is the part that contains the greater percentage of the protein. The peeling also results in the loss of valuable minerals and vitamins.

As the whole grain contains 65.5% carbohydrates, it is obvious that this percentage is considerably increased in the part fed the young by the discarding of the peeled off part. The part consumed and fed to the

young by the hen is most definitely too much of an energy food. It explains why hens who primarily feed oats are troublesome. They come back into breeding condition before the young are able to leave the nest,

and it is not unusual for them to lay in the nest with the young.

You are advised not to feed an unlimited amount of oats. A good feeding hen will take to other foods when the supply of her favorite food becomes exhausted. You are advised to feed oats in limited quantities to add variety of food to the breeding cage. During hot weather, when moist nestling foods deteriorate over night, it is advisable to furnish such relatively non-deteriorating foods as oats late during the feeding period so that the hens will have unspoiled food to feed to their young early in the morning before you have an opportunity to serve them with fresh nestling food.

Dry mashes commercially prepared by avian nutrition specialists are advisable for the breeding cages as a safeguard in the event the wet mashes have soured or the supply becomes exhausted. In case your birds will not learn to like the commercially prepared mashes, try ground whole wheat offered for sale by the poultry feed stores. You will get a big surprise. Most birds are fond of it and it is comparatively very cheap.

When the hen or young develop loose bowels, a very effective remedy is the liberal serving of poppy seed (maw). Feed it in separate vessels. Do not add it to your nestling food because some hens dislike it. As soon as you see the condition is corrected, either feed the seed sparingly or not at all. Hens that are very fond of it will spend too much time hulling this very tiny seed when they should be consuming food that quickly fills their crops.

In canary breeding, the same as in many other things, it is wise to have an ace or a couple of aces in

NESTLING FOODS

The hole, as the common expression goes. There are several foods that nearly all hens are very fond of, and some hens will eat little else when these foods are available. Two of these foods are Wheat Hearts, a farina containing 20% toasted wheat germ, and quick cooking

wheat flakes which is similar to oatmeal except that it is made of wheat. These foods, fed dry, are not good nestling foods. Late in the breeding season some hens have tired of even the variety of foods fed. It is surprising how many hens feed like fresh hens when these two new foods are given them in abundance.

Very often new foods in the breeding cage are completely shunned by a hen because she has an extreme fondness for a particular food like hulled oats (groats) and consumes little else. After about 10 days a hen will usually start to tire of her favorite food and then will start to eat other foods like cooked carrots and yarns.

Poultrymen who feed their flocks only two or three times per day generally run their hands through the dry mash several times per day to make it appear a new serving was placed in the vessels. After they do this, the chickens will be seen to partake of the food as if it were something new. Canary hens react the same way to stirred up nestling food. It is a better plan, however, to feed different foods at different intervals to keep the hens interested.

Sometimes a hen with new born young will feed nothing but the regular seed and greens the first day or two, no matter how many different kinds of food are in the breeding cage. Get her out of this habit by removing all seed until you see she has taken to feeding the foods served.

Unless a hen wastes too much time at the seed cup there is nothing wrong in permitting her to have the usual mixture of canary and rape. Don't worry about the hen Feeding the hulls to the young as claimed. The

hens do not eat the hulls and feed them to the young except in rare cases.

Some hens will not feed the usual soft foods like egg food. Substitutes must be found for such hens. Cracked hemp and sunflower seed, soaked wheat, finely chopped peanuts or

walnuts, soaked buckwheat, dry rabbit barley, cooked carrots and yams, shredded wheat moistened with water, and wheat flakes (dry) are excellent things to try with such problem hens. Some hens are a problem but may become your best producers if you solve the problem.
White bread moistened with milk or water is a poor food for growth. The young will grow normally, however, if such hens are fed a great abundance of greens like kale, spinach, broccoli, Brussel's sprouts, etc.
Many breeders feed sprouted seeds and all hens are very fond of the sprouts of nearly all seeds. The best plan for sprouting seeds is the one conceived by a novice breeder in this area. The seeds to be sprouted are placed between wet gunny sacks on the basement floor after being soaked in a vessel of water for 24 hours. Another breeder is known to soak the seeds in a vessel of water for 24 hours, then rinses the seeds and stands the vessel upside down on a Turkish towel.
During very warm weather, the water in a vessel used for soaking seeds should be changed twice during the 24-hour period.
During the breeding season, on very warm days, nestling food of the crumbly moist type made from grated eggs and bread crumbs dries out in a few hours. When you serve egg food on very warm days put a minor amount of water in the vessel before you insert the food. By percolation, the water will seep into the food towards the top and the food will remain moist and palatable.

NESTLING FOODS

Some hens seemingly in grand condition sometimes are poor feeders simply because the foods served in the breeding cage are not to their liking. Every year the writer has had hens doing poorly. They preferred to hull seed for the young. If you find just one thing the hen is fond of, the hen may immediately become a good feeder. When most foods fail, white bread moistened

with water usually proves the find.
Oyster shell served in the breeding cages is dangerous. Oysters thrive in areas where sewers empty into the water. The shell from oysters on the Pacific Coast is soft, while that from the East Coast is hard and should be avoided. It is safer to use sterilized shells from chicken eggs.
The pullorum germ is carried inside the egg of the chicken. If you use the shells from chicken eggs, they must be boiled 20 minutes to insure sterilization.
By strange coincidence the writer learned that some breeders presumably are enriching their nestling foods by adding rice polish thereto. This must not be confused with the outer protective coating of the grain called “bran”. It is that part of the grain immediately beneath the bran and is sold at health food stores at been around 10¢ a per pound. The use of the rice has been kept a secret, presumably for good reasons.
The composition of the rice polish was unobtainable but that of the whole grain and the bran was obtained. The whole grain contains 7.8% protein, the bran 11% protein. As rice bran is not as devoid of nutritional properties as wheat bran is compared to the shorts (middlings), the rice polish most likely has a protein value somewhat comparable to the rice bran. It is doubted that its protein value is greater than that of white bread. Carbohydrates in the bran are 62%, which compares well with that of enriched white bread.

In view of what has been stated, the polish is not recommended by the writer. It is recognized that rice is a staple food for Asiatics. The protein deficiency of this staple is counteracted by the liberal consumption of fish and soybeans, both rich in valuable proteins.
One of the latest and most valuable discoveries by

the writer is the preparations now being marketed for changing the aroma and flavor of poultry feed which are generally not pleasant. Experiments are now being conducted with only one of them, an anise seed concentrate in powder form which has four times the aroma and flavor of ground anise seed. Birds that would not eat shredded wheat moistened with water showed an intense liking for it when only a minor amount of the concentrate was first added to the water.

The anise concentrate is being marketed in this area by a San Francisco firm. The minimum sale at the date of this writing is five pounds. A 5-lb. supply will last the average breeder a lifetime.

Late in the breeding season the birds have tired of the nestling food. By adding a minor amount of the anise concentrate powder or anise oil to the food you may have a seemingly new and extremely well liked product.

Some breeders in this area are adding yeast to their egg food. It is obtained at a health food store at a moderate cost. Superb growth and extra fine feather structure of the young is attributed by these breeders to the use of the yeast. As the mind of the writer is not closed to new ideas on nestling foods, he gave the matter investigation.

One of the things learned from a druggist is that the yeast purchased at a health food store is no different than any other yeast despite the fancy label on the yeast container. With this knowledge, the label on a

bottle of Brewer's yeast tablets was examined. The dosage prescribed for an adult was 12 tablets per day. These 12 tablets it is claimed provide 72% of the minimum daily requirement of Vitamin B-l, and 18% of Vitamin B-2. Vitamin B-l is primarily prescribed for nerves and B-2 as a digestive aid. Unless a breeder

feels that the nerves and digestion of his canary young are in need of aid, it no doubt would show wisdom for the breeder to consider consuming the yeast when operations are not faring too well, rather than feeding it to his birds.

Every year during the breeding season you will find recipes for nestling food in the bird magazines furnished by prominent breeders in their articles. They will extol the virtues of their nestling food and tell you they have been using it ever so successfully for 15 to 30 years.

The hens will feed in the breeding cage that to which they have become accustomed whether the food is a well-balanced concoction or not. The success of some prominent breeders is usually attributable to their skill in solving breeding room problems and not their nestling food. Then again, many prominent big-name breeders are not always skillful breeders. The writer knows virtually unknown breeders in isolated small towns who could teach a lot to those who are better writers than breeders, and this truth perhaps applies in full force to the author of this book.

While doing some research on foods, one of the interesting things that came to the attention of the writer was soy bean bread declared to contain 35% protein and 10% moisture. Compared to the composition of wheat flour bread (15% protein and 35% moisture) it appeared offhand as an excellent product to use for making nestling food. A loaf of so-called soy bean bread was purchased and a careful examination of the printing on the wrapper was made.

It was found that the vitamin content of the B-complex family was identical to that of wheat flour bread. It was also found that the bread contained various other ingredients including wheat flour. The texture and flavor of the bread were very similar to the usual white bread. The color was a very pale yellow.

A serious effort was made by telephone and by letter to obtain the composition of this bread from the

baker without any success. It is believed by the writer the name of the bread has selling significance only. Perhaps genuine soy bean bread can be purchased in your area, if so, it is worth experimenting with because soy bean protein is considered a very valuable vegetable protein. You are cautioned not to be misled by the name.
Soy bean meal because of its high protein content is included in all poultry mashes and, no doubt, a liberal amount of it is included in commercial canary mashes. Some breeders include it in their dry mixture which is used for making egg food. The meal is not entirely free from the liberal amount of oil in the bean, and as a consequence, there is a tendency towards rancidity and this tendency is greatly increased during warm weather.
If you desire to use the meal, it is to your advantage not to order a large quantity at a time and to store it in a manner conducive to its conservation. Mashes and bread stored in air-tight containers will deteriorate more rapidly.
The soy bean contains 40% protein. Sunflower seeds contain 52% protein, and as the seeds can be ground as needed, they are preferable. Cost, convenience in serving, time required for grinding, etc., are factors in volved in deciding whether to use these foods.

NESTLING FOODS

Certain foods like lettuce and soaked teazel, in the writer's opinion, are not of much value in the breeding cage, viewing these foods solely from the viewpoint of their food value for raising young. However, a canary hen, the same as you enjoy a food like cake once in a while, should be fed foods with discretion that con tribute to her contentment. The writer does serve foods as time permits for this very purpose. Now and then he will serve a piece of head lettuce or about a level teaspoonful of Phalaris or thistle seed. Don't laugh at this contentment theory. Do you know that cows, that are sprayed and free from annoyance from flies give more milk. There is plenty of advertising about contented cows.

Charcoal has always been considered as essential in the breeding cage. In quite recent times, it was learned that it is actually detrimental in that it prevents the assimilation of Vitamins B,E and K. As the U. S. Department of Agriculture is the authority for this in formation, there is no room for argument.

To properly boil eggs so that the white will be as tender and as digestible as the yolk, bring cold water containing the eggs to a boil and then immediately lower the temperature to a simmering point. Allow the eggs to simmer for 45 minutes.

Towards the end of the breeding season, when your hens have tired of a nestling food, you can get them to consume it quite liberally again by sweetening it. Sugar is an energy food and should not be added to the nestling food until late in the season when the hens are tiring from the hard work of the previous nests.

Even if you disagree with Robert Stroud that milk is a detrimental food for canaries, let us look at milksop from another viewpoint.

Cow's milk normally averages 87% water 3.3% protein, 4% fat, 5% carbohydrates, and 0.7% mineral matter. Its food value is therefore 13%.

Several slices of fresh white bread (not sandwich bread) were weighed and then enough water was added to make them moist enough to serve in the breeding cages for a period of 24 hours. After the 24-hours period, an inspection revealed the amount of water added was not excessive because some of the left-over bread was too dry to be consumed by the hens. The temperature during the period was ordinary room temperature. The amount of water added increased the weight of the bread 57%.

If milk instead of water, had been added, the amount of food value added to the bread would have been 57% of 13% or 7.4%, assuming, of course, that 13% more milk than water had been added. Is it worth the bother, of heating milk to add 7.4% to the bread's food value, especially considering that its protein and mineral content are so small, that the fat content is unneeded, and that you already have too much carbohydrates in your energized bread? The amount of protein and mineral you actually add is a little more than 2%.

Most canary breeders do not know that there is a considerable difference in the quality of oats (groats). One is called ''red oats ''because its hull is of a dull red color. It weighs around 26 lbs. per bushel. It is primarily grown in the State of California. The other kind is called "white oats" and the best quality weighs as much as 37 lbs. per bushel. The hull of the red oats is thicker and weighs more per bushel than the hull of the white oats. However, the hull alone does not account for the big difference in weight. The grain of the white oats is more solid and has more food value. This, explains why poultrymen will pay from 20% to 25% more for the white oats.

Early in May, during the breeding season, the writer switched from the use of fresh yams to canned yams because the fresh yams were of such poor quality. After the yams were served, it seemed wasteful to

discard the sugar syrup in the can which constituted about one-fifth of its contents. As the writer's hens consumed the egg food sparingly, presumably due to having tired of it, it was decided to use the yam juice in the egg food. This was done about 10:00 in the morning. By 2 :00 that afternoon nearly all of the egg food vessels were empty, yet on previous days at least one-half of the egg food was left over after a 24-hour period. No doubt the thick syrup contained much of the rich food value of the yams.

If you serve canned yams, use the left-over syrup.

As late as May the birds are beginning to tire. Sugar is an energy food. It is not advisable to use the syrup early in the breeding season. Over-energized hens are a big problem.

As the writer did not consider the canned yams cooked enough to serve in the breeding cages, he was in the habit of cooking them additionally. One morning this was forgotten and it was feeding time. As a measure of expediency, the yams were thoroughly mashed with a fork. After mashing, they appeared too dry so some of the syrup was added to the yams, and they then had the appearance of fluffy mashed potatoes. The yams were served quite early in the morning. At noon time most of the hens had consumed their serving, yet there usually was a fair amount of the serving left over by the end of the day at other times. Even hens that consumed their serving sparingly previously had depleted their serving. It is suggested you make this experiment with your birds.

Canaries will learn to relish both grated and cooked carrots. Don't peel the carrots before cooking. The car rot skins can be rubbed off in a hurry immediately after they get cold.

Carrots are consumed in greater quantity if they are cooked very tender. If they are overcooked in the

pressure cooker, they turn dark and the birds care less for them. Carrots on special sale are cold and fibrous. Feed fresh carrots or none at all.

Cooked carrots and yams are excellent foods to serve in the breeding cage. The yams are out of season about the middle of the breeding season. Canned yams serve your purpose just as well. They are convenient and not too expensive.

A yam is an improved kind of sweet potato. It is naturally sweeter and juicier. The canned yams are packed in syrup which makes them even more palatable. Canned sweet potatoes are much cheaper but are not liked nearly so well. Using them instead of the yams is false economy.

If you are forced by circumstances to buy canned sweet potatoes instead of yams, after cooking them additionally (in the can) mash them and add granulated sugar. After doing this the birds will consume them more liberally.

You will find that birds will consume a great deal more canned yams and sweet potatoes if they are cooked additionally (in the can) before being served. Neither are cooked quite enough directly out of the can.

It is surprising how many old breeders consider bread moistened with milk a good nestling food. The mere fact that this food must be liberally sprinkled with poppy seed to counteract the causing of loose bowels in itself arouses suspicion as to its value. Those who believe milk sop is a good nestling food should read the findings of Robert Stroud in his book (page 3) published in 1933 by The Canary Publishing Company. In substance, milk in a very harmful rather than a beneficial food. Dry bread moistened with water is relished by nearly all hens and is excellent to add to

variety of foods in the breeding cage. The writer had one hen raise 23 young on bread and greens alone before she lost a young.

Strange to say, bread of a fine texture and seemingly not completely baked like the present-day sandwich bread, when moistened with water, is much preferred by the breeders to bread of a coarse texture and not doughy when moistened with water. The bread that is spongy when moistened with water dries out completely in too short a period.

It is indeed wise to have hulled oats and some dry mash your birds are accustomed to in the breeding cage besides egg food. The egg food served in the morning is sour by the middle of the afternoon on hot days.

Without some edible food to feed the young you get unexpected losses.

CHAPTER XVI

MINERALS

The essentialness of minerals in the diet for successful canary breeding is not recognized by most breeders. Those who have given the subject of diet serious study recognize that unless canaries are supplied with the essential minerals, there is a lack of breeding inclination. A very interesting article on this subject by a University Professor appeared in the Saturday Evening Post and is mentioned on Page 16 of the October issue of American Cage Bird Magazine. The gist of the article is to the effect that rabbits fed on mineral deficient diet, had no inclination to breed but when fed on a mineral rich diet they became excellent breeders.

It is important to remember that the diet fed before and during the laying period has a tremendous bearing on the rearing of the young. The present-day physician is greatly concerned about the diet of a pregnant

woman because he knows that the health and vigor of her baby when born is to a large extent determined by the expectant mother's diet.

Since we are unable to tell whether the food we feed our canaries contain the essential minerals because it may have been produced in mineral deficient soil, supplying minerals by adding them to known foods is advisable.

The subject of minerals in the diet is extremely complicated. We canary breeders must depend upon those scientifically informed on this subject to furnish us with minerals in such combination as to be beneficial for our purpose.

For the purpose of what is stated later on, a general statement of essential minerals appears to be in order.

Five minerals particularly important in the diet of pets are calcium, phosphorus, iodine, and table salt (sodium chloride).

Calcium and phosphorus are the chief constituents of bones and teeth. A strong sturdy skeleton is required for vigor and health. This skeleton not only supports the body but also provides protection for the internal organs and constitutes a reservoir which is drawn upon during pregnancy and for nursing the young. It is necessary for the canary hen to have these for her eggs. A common result of a deficiency of these in mammals is bowed legs (soft bones). Another result of the deficiency in mammals is an inability to deliver the young.

The primary function of iodine is to aid normal metabolism— the continuous process by which living cells or tissues undergo chemical changes. You undoubtedly have heard that the entire body of an animal is completely replaced in a seven-year period.

Iron is essential to form hemoglobin, the coloring matter of the red blood corpuscles. It is the hemoglobin that carries oxygen to the tissues of the

body and removes the waste product (carbon dioxide). A common ailment from an iron deficiency is anemia.
Common table salt promotes the production of gastric juice and good digestion. Perhaps you were taught the same as the writer was taught as a novice to use unsalted crackers for your egg food. How many canary breeders add salt to their egg even today ?
There are other minerals such as potassium, sodium and manganese that are required but usually only in minor amounts. They are widely distributed in foods but the amounts required may not be adequately supplied by a varied diet.
From data furnished elsewhere, you have learned that the whole egg contains only one-quarter of one per cent mineral matter and that bread contains only slightly more than one per cent. Is it any wonder that young fed mainly on egg food consisting of egg and bread crumbs grow poorly and are weak when they leave the nest. The fact that young fed egg food made of eggs and Pablum grow faster and are much stronger, is not only due to* the quality of the proteins of the Pablum but also due to the fact that Pablum contains 4.20% mineral matter.
Minerals are now being marketed by many firms. The claims of some are extravagant. The primary selling point of all of them is that year after year crops are removed from the soil and that the soil has consequently become denuded of the essential minerals because they are not being replaced. We are concerned here that our canaries do get the essential minerals in abundance and without worrying our minds about it.
We can buy minerals but we must buy them with wisdom. Taking a chance with every pet supply firm who sells minerals is foolish. A dealer in commodities is primarily governed by their cost. Minerals that are

not refined to remove detrimental things, such as lead would naturally sell for less and at a much higher profit.

It was by strange coincidence that the writer learned that breeders of the expensive white foxes and minks use large quantities of a particular product, and that without that product or a similar one their operations most likely would be unprofitable. These breeders learned not only that many pet ailments are of nutritional origin, but that in order for their animals to reproduce and with a fair degree of prolificacy, that it is necessary that their breeding females have within them the substances required for building young of sturdy bodies and of vigorous health, and nursing them to maturity with milk containing the required nutrition. The nutrition of many pets is especially deficient in minerals and vitamins B-l(thiamine) and B-2 or G (riboflavin). Vitamins B-l and B-2 are essential for normal reproduction, for normal digestion, and the avoidance of common ailments. Wheat germ is known to be a very rich source of these and must be distinguished from wheat germ oil which is considered a potent sex stimulant. It was learned that the product extensively used and with great success by the fox and mink breeders is “Vionate”, a preparation marketed by one of America’s leading drug manufacturers. A very well-in formed druggist friend was consulted about it, and he had unlimited praise for the product. As a very close friend he most likely was not motivated by a small profit incentive that would accrue to him from the sales of an eight-ounce bottle at the price of 50¢. Considering that the prescribed dosage for a puppy or kitten is only ¼ to ½ teaspoonful per day, the druggist’s profit even in the course of time would not amount to very much.

A bottle of Vionate was obtained and used in the hand feeding cases mentioned under the chapter of "Hand Feeding". It is the writer's sincere belief that this product added to the nestling food used had an important bearing on the hand fed young growing into normal size young. Rather than blindly using any mineral offered for sale by a pet supply house, it seems the best of discretion commands us to use a product especially prepared by the veterinary division of a reputable manufacturing firm who most likely would protect its valued reputation. Offhand it would seem that Vionate is the lucky find for the breeding room. It contains 37% minerals and 63% defatted wheat germ. The 37% minerals consists of 26% Dicalcium Phosphate and 11% Calcium Carbonate. It is believed by the writer that this product is a valuable adjunct to the breeding room and a minor amount added to nestling foods most likely will have very beneficial results. The writer did not test the product's value in a scientific way and therefore is unable to express a positive view. He used the product as mentioned elsewhere and has good reason to regard it favorably.

Vionate is not the perfect product for canary breeding, even though it may appear to be that in the breeding of foxes, minks, dogs, cats, etc. Much has been written about food and minerals for canaries but the writer does not recall of ever reading anything whatever that goes to the very heart of the production problem in canaries—obtaining fertility and hatchability to a very high degree not as a matter of mere luck but consistently so. By scientific investigation in the poultry industry, it was learned that chickens and turkeys have an abnormally high requirement for manganese compared to other animals. The eggs of these creatures, contain a relatively large amount of manganese, and if this

element is not supplied artificially in their diet, their bodies are drained of it and they become very poor breeders. Their eggs are infertile to a large degree and there is very poor hatchability of those that are fertile.

It is most probable that other members of the bird kingdom, like canaries, have the same high requirement for manganese as chickens and turkeys. Ascertaining the probable requirement for canaries is seemingly a very complicated matter. It was learned upon investigation that in the poultry industry the manganese is supplied by adding one-half pound of manganese sulphate to a ton of finished feed. However, in poultry feeds, bone meal is included and it contains

manganese. Bone meal has an unpleasant odor. It is believed one reason why canaries will not consume poultry mashes is because of its odor and disliked flavor.

Manganese sulphate is now being marketed at a price of $15.00 per 100 lbs. The retail price at a chemical store would most likely not exceed 50¢ per lb.

A poultry expert at the University of California was consulted as to the amount of manganese sulphate to add to one pound of a dry canary mash. One-half of a level teaspoonful was suggested. This amount the expert claimed was very much excessive and very likely would have detrimental results. In view of this opinion it is recommended that you add it to your dry mashes or nestling foods in the same manner and to about the same degree as you would add salt to unsalted table food.

At a belated moment, when the data for this book had been sent to the printer, Dr.Grau of the University of California, had developed a practical method for the use of manganese sulphate by canary breeders. A tiny bottle containing an amount of the chemical to be used with ten pounds of dry canary mash was mailed to the

writer. The quantity in the tiny bottle was found to fill exactly the quarter teaspoon measuring device used in the kitchen by an exacting cook. Dr. Grau was motivated by his fear that canary breeders would use an excessive quantity, and that he would be indirectly responsible for the detrimental results that are sure to
follow when an excessive amount is used.
To get excellent dispersion of the chemical, mix a quarter teaspoonful with a half-pound of dry mash first and then mix this half pound with 9½ pounds of mash.

CHAPTER XVII

COD LIVER OIL

The average person believes no harm can result from an excessive intake of vitamins. This belief is incorrect especially as to Vitamins “A” and “D” found so abundantly in cod liver oil. An excessive intake of these
vitamins may be as dangerous as a deficient intake.
An article on the dangerous results of an excessive intake of Vitamins “A” and “D” appeared in the San Francisco Examiner dated September '2, 1951, written by Alton L. Blakeslee, the Associated Press science editor. The article, based on data taken from the Journal of the American Medical Association, reveals some shocking facts.
Results from the excessive intake of Vitamin “A mentioned were loss of eyebrows and eyelashes, falling hair, aches in bones and joints, soreness and cracks in the corners of the mouth, a dry, rough, and very itchy skin with some discolored patches, night sweats, loss of weight, irritability, loss of appetite, low grade fever, enlargement of the liver, blood changes and tenderness over the long bones of the body.
Poisoning from the excessive intake of Vitamin “D”, mentioned the following: Weakness, loss of weight,

nausea, diarrhea, stomach cramps, headaches, stupor, form of anemia, loss of minerals and bones and blood changes.

Everyone knows that we obtain the necessary vitamins from a well-balanced diet which, of course, includes green leafy vegetables.

Who knows whether canaries require Vitamins "A" and "D" in addition to those which are obtained from a diet that includes a variety of foods? It is most likely that feeding cod liver oil to canaries is fraught with danger and its use cannot be recommended. It is of course satisfactory to feed the cod liver oil, so rich in Vitamin "A", when one knows definitely how much Vitamin "A" a canary requires and how much the bird is obtaining from its other foods.

Canaries as a whole dislike cod liver oil as much as human beings do, and it is therefore unwise to add it to your egg food. A healthy canary does not require it any more than a healthy human being. Some of the biggest proponents of feeding cod liver oil that the writer knows would show wisdom in not feeding it to their birds and consume it themselves. It is now known that an excess of Vitamin A has serious effects years afterwards with humans who were supplied with it liberally in childhood. Cod liver oil gets rancid rapidly and egg food containing it becomes a putrid concoction in several hours on very hot days.

Since the foregoing was written, an article by Lillian Otersen appeared in the "American Cage Bird Magazine" in which she touched on this subject. The full paragraph is quoted:

"It has been proved that Vitamin A as obtained from carrots is a better product for our birds than the Vitamin A as obtained from fish livers. Vitamin A from fish livers can be toxic both to humans and birds if given in too large amounts, whereas the 'A ' from carrots will not".

CHAPTER XVIII

GREENS

Some breeders believe that once greens have been frozen they become detrimental for the breeding cage. A prominent breeder in this area, well known for his good alibis for failure in any phase of the canary industry, one year blamed his breeding failure on the feeding of lettuce that unbeknown to him had been frozen. If frozen foods were harmful, the ill effects would be manifested in human beings. In the Northern California climate there are some heavy frosts each winter, and occasionally there is a thin layer of ice on the aviary water vessels. If greens touched by frost are injurious to birds, it is difficult to conceive how the wild birds survive during the winter months when they must be forced to consume food touched by frost. The writer has served defrosted brussels sprouts to his birds without noticing any ill effects.

Swiss chard, collards and spinach are valuable greens so far as their food value is concerned. Serve them if your birds will eat them. The writer's birds prefer to go without greens rather than eat them. No doubt birds starved for greens are not so particular.

Most breeders grow their own rape seed greens. By accident the writer learned that rape seed greens growing where they get early morning sunshine only are far more tender. When your birds chew the rape seed stems instead of eating the leaves it means the leaves are tough and most likely unpalatable.

Greens purchased at markets have been sprayed with poisonous insecticides. Before serving, they should be soaked for at least an hour and then rinsed thoroughly.

Greens wither rapidly on hot days. They stay fresh longer if immersed in water several hours before serving.

While the greens are kept in the breeding room ready for use, keep them in a vessel covered with a wet cloth.

A few small very successful breeders the writer knows pluck the rape seed greens by the roots and serve them in a vessel of water in the form of a bouquet. In case you do this, be sure you place something like a rock or seed cup in the mouth of the vessel used, otherwise you may find a drowned bird in the breeding cage.

It is an odd fact that as the breeding season approaches the end most hens have lost their appetite for the usual breeding cage foods. Even new foods that tempted them for a while begin to lose favor. On the other hand the desire for greens is greatly increased, and if fed to the hens in unlimited amount, about twice as much greens are fed the young as were fed early in the season. In view of what has been said, you can save considerable loss of young if, in the latter part of the season, you do not allow your hens to be without unwithered greens at any time.

On extremely hot days when your hens are suffering from the heat, you will save loss of young by feeding greens that do not wither rapidly and are relished, such as head lettuce, even though you realize that lettuce is normally not a good green to feed.

Every canary breeder who has space available should have a patch of kale because it is a superb green for the breeding cages. The writer for the past three years tried unsuccessfully to raise his own kale. The soil cannot be blamed as another breeder who lives close by and with the same kind of soil grows huge kale stalks. The writer's kale stalks are only one-fourth full grown. No worms or bugs can be found. When this matter was related to the very successful grower of kale nearby, he was told that a moth nocturnal in

habits does the damage, and that the simple solution is to liberally spray the seeding two days after planting with ordinary fly spray.

A fine patch of kale was observed at a poultry ranch. Across the wire fence was a poor looking patch of kale of the neighbor going to seed. The writer remarked about this. The poultryman told the writer he gave the neighbor those kale plants, the excess of seeding he had bought. It was explained the neighbor did not plant his seeding until about a week later when the soil was too dry. A mere watering of the seedings immediately after planting did not compensate for planting when the soil was too dry. The right time to plant seedlings apparently is the important thing to know.

The curly leaf type of kale is preferable.

By far the best method to serve greens is to place them in a small device that is hung on the cage for holding nestling material. They can only be used, however, on manufactured cages or home-made cages with regular cage fronts. If you are unable to afford the purchase of the holding devices, you can easily make them out of three-eighth inch plywood. Make a device that looks like one-half of the letter "V" with hooks or bent-over nails attached to hang the device on the cage.

With few exceptions, all birds are very fond of lettuce. The writer does not agree with many breeders that romaine lettuce is a satisfactory green food. The vitamin tables disprove that. Lettuce is relished by the birds and feeding it for variety is recommended. On three successively very hot days when the birds were suffering from the heat, in order to keep the breeders interested and to curtail probable losses, the writer fed the breeders all the crisp romaine lettuce they cared to consume. At the end of the three-day period, the droppings of the young were so soft they were running

From the edge of the nest hack into the trough. After the three-day period, the hens were spoiled. They showed no liking for such common fare as kale and rape seed greens. Some hens will not feed certain greens, even greens that are generally relished by other hens. Be on the alert for such cases and feed such hens some other greens.

An abundance of greens is essential for breeding success. Those who do not feed greens the first three days and sparingly thereafter are antiquated in their methods.

Some breeders whose birds receive attention only before going to work in the morning and after returning late in the day feed a large piece of sweet apple to take the place of greens during the day. The writer knows a few very successful breeders who feed apple for the reason given.

Do not feed watery greens like lettuce and water cress for the late feeding. Instead, feed greens with more solids, like spinach and kale. Those young, filled with watery greens for the night, are less able to survive until the following morning.

On hot days it is wise to roll your greens like chicory leaves into something that looks like a fat cigar with a thin rubber band around the outside to keep it from unravelling. The inside layers of the greens will remain unwithered for a long time. The birds will eat out the unwithered greens. The greens are less easily soiled with the droppings by serving them in the form of a roll.

Do not feed greens the first thing in the morning. It is essential that your hens get food into the crops of the young as soon as possible. After about a half hour's feeding, greens should be served.

GREENS

A variety of greens is just as conducive to high pro
duction as a variety of nestling foods. Any greens that your hens will feed are satisfactory except that an abundance of watery greens, like lettuce and water cress will result in nestling diarrhea. Broccoli, spinach, kale, cabbage, chickweed, dandelion, milk weed, rape seed greens, endive and mustard greens are excellent. Brussels sprouts in season are a superb green but the heads are too hard and compact for liberal consumption. Slice the sprouts lengthwise and soak them in water for several hours. When you serve them press the leaves apart. Thusly done the greens last for many hours on warm days without withering.

It is unnecessary to wipe the water off greens that were soaked for freshness. It is really better to serve them wet. They last longer and wither soon enough.

When you put greens in a vessel of water to soak for refreshing, place a thick cloth like a Turkish towel on top. If you do this, the greens coating on the surface will be just as refreshed as those in the bottom of the vessel.

Mustard greens, according to the writer's investigation, are by far the most valuable greens in that they are rich in Vitamins A ,B-1, and C. The next most valuable greens are beet greens which are foremost in Vitamin A, contain no B-1 and only a minor amount of Vitamin C. Not all birds are fond of mustard greens and canaries must learn to like them before they are fed in the breeding cage. Beet greens wither very rapidly and canaries are not especially fond of them. Get your birds to develop a liking for both greens and serve the beet greens in the breeding cage in a shallow vessel containing a minor amount of water so that they will not wither.

Some breeders chop greens into small bits and add it to the nestling food. The writer fails to see any

advantage in this but does see objections. Unless other greens are fed, most hens will, in search of these greens, cast much of the nestling food out of the vessels, and if greens are fed otherwise, there is no necessity for adding it to the nestling food. The time and work involved for chopping greens into tiny bits should be avoided because breeding chores are burdensome enough without adding chores that can be avoided.

Canaries must become accustomed to some greens otherwise, they will not consume them. The writer found this to be true as to dandelion, mustard greens, collards, watercress, Swiss chard, and carrot tops. If not given any other greens for several days, the birds will learn to like them.

Disregard the common belief that you cannot feed such fibrous greens as cabbage to hens with tender young. The hens eat the green part between the big fibers. Even if the hens do feed some rather coarse fiber, the young will not show any ill effects. The hens feed their young coarse sand and they survive.

The pulp of the stems of some greens are greatly relished. Those relished the most are the stems of kale and broccoli. As a variety, feed these greens, especially on hot days when other greens wither rapidly. Either shave the greens to remove the tough outer covering or serve them by pressing them through the cage wires.

CHAPTER XIX

HEMP SEED

For many years readers of the bird magazines have been told by those who profess to know that the sterilized hemp seed offered for sale is of little or limited value because its nutritional qualities have been destroyed by heating the seed for sterilization. The writer of course, assumed those who made this statement knew what they were talking about.

HEMP SEED

He was very suspicious, however of the accuracy of the statements. Many human foods are subjected to heat before consumption and in some cases, this is necessary to render them digestible. Our bread is baked so that the starch in it becomes digestible. Then again there are foods like soybean meal, which are of little value unless first subjected to high heat. Heat is not always an adverse factor in nutrition. Hemp seed is supposed to be sterile. Soak it for 24 hours and see for yourself how large a percentage will sprout. Most obviously the seed is only subjected to a mild heat treatment, otherwise it would be completely sterile. In view of this, the matter was submitted to the Agriculture Department of the University of California for an authentic opinion.

The writer is in possession of a letter from the University of California dated June 12, 1951 and signed by Prof. C. R. Gran. Mr. Grau, with a knowledge of the facts as stated above, commences his letter as follows:

> "It would seem unlikely to us that the amount of heat given to the hemp seed you are using would have any damaging effect upon the nutritive value of the seed."

Mr. Grau also points out in his letter that the heat treatment used in preparing hemp seed meal is probably much greater than that for sterilizing the seed, and it does not harm the proteins significantly.

Hemp seed is definitely one of the finest of foods in the breeding cage and also for conditioning prior to the breeding season. Infertility was the unusual thing in the days when it was fed liberally during the winter months. Young fed an abundance of hemp seed by the mother are strong and vigorous. You need a net to catch them the day they leave the nest. Those fed on the poorly made egg food can be caught with the hands without much effort.

Hemp seed meal (the product after the oil is removed) contains 24% fiber. Because of the amount of fiber in the whole meat, the seed is a deterrent of nestling diarrhea. The hardening of the hull due to heating is easily overcome by soaking the seed 24 hours and then storing it in a sieve. Cover the seed with a wet cloth to keep it moist. Rinse the seed occasionally while it is stored. Grinding the seed requires time and results in some waste, but aside from that there is no objection. Unless the seed is soaked or ground, the birds will waste too much to justify feeding it, considering its cost.

Well flighted fertile, egg laying hens that are fat are the cream of your breeding hens. They are normally good for three nests of young. Hemp seed normally contains about 20% fat. In substance, you can fatten your hens and render them fertile and vigorous with hemp seed. Its cost is trifling compared to the loss from in fertility and physically weak hens. As a nestling food, it is tops.

The seed in which the embryo has been destroyed, will, of course not sprout, and when served in the breeding cage on hot days will soon be dry even if served directly from the soaking vessel to the breeding cage. When dry, the hull will still be hard even after soaking because of the disappearance of the oil in the hull from the heating for sterilization. To avoid waste of the unsprouted seeds, serve the seed in the breeding cages with a thin layer of water in the bottom of the vessel used. As a result of precolation, all seeds will stay covered with a thin film of water. The amount of water to use will depend on the size of the vessel, the quantity of seed served, and the temperature of the breeding room.

Seemingly sterilization changes the flavor of the seed to some extent. The writer's birds ate the seed

very sparingly at first, but after about 10 days they showed the same fondness for it as his birds did years ago before the seed was sterilized.

As pointed out elsewhere, one of the primary reasons for nestling diarrhea is lack of fiber in the diet. As hemp seed contains 23.8% crude fiber it is superb for feeding to the young because of its fiber content. But aside from this quality it contains 31% protein. By a comparison with other foods mentioned in this book, you will find it contains about twice as much protein.

CHAPTER XX

NUTS

In a drifting conversation with a brilliant young Doctor, the Doctor inquired as to what food was given the canary hen to feed her young. After answering the question, the Doctor asked "Why don't you feed pea nuts"? The Doctor then elaborated upon the unusual food value of peanuts.

Upon reflection that evening, it was recalled that Dr. C. B. Bennett in his book "The Nature of the Orange Canary" mentioned he moulted some birds on a colorless diet of peanut butter and crackers to observe the effect on the color. One so exceedingly well-informed on foods as Dr. Bennet would not subject his birds to an inadequate diet. It was, therefore, decided to experiment with peanut butter.

A small serving of peanut butter was given to eight hens with young. It was sought to determine whether the hens liked it before going to the bother of mixing grated cracker with it. About eight hours after the insertion of the peanut butter in the cages, a single beak mark of one hen was observed in a serving. The other seven hens did not touch it. The odor or appearance, or perhaps both, deterred the hens from tasting it.

About a month later, it was decided to try peanut hearts, and a liberal sample was obtained from the firm specializing in pigeon feed. The hearts are fed as a pigeon food. They constitute the embryo of the peanut. Their flavor is that of the peanut but inclines to the bitter side.

A vessel containing peanut hearts was served in every cage in one breeding room with some enthusiasm. Not a single hen showed a liking for them. Vessels containing the hearts were then served in the aviaries to the self-supporting ravenous young. They tasted the new food and then shunned it.

Perhaps ground fresh peanuts would meet the test of the critical canary palate, but their cost is prohibitive for commercial canary breeding.

The foregoing is related to save you time in experimentation and as evidence that what seemingly appears to be a very valuable and suitable food for canary hens in breeding is regrettably a failure as a nestling food from the viewpoint of palatability and cost.

A well-known breeder, Mr. E. H. Kerrison, Jr., of Camden, South Carolina, informed the writer his birds consume several hundred pounds per year of both chopped wild pecans and raw peanuts served in separate vessels. Most assuredly these foods must have proved beneficial otherwise such a well-informed in dividual as Mr. Kerrison would not feed them.

Nuts are not a common food to canaries and they do not readily consume them at first, but the same has been found to be true with sterilized hemp seed and ground sunflower seed. The nutritional value of most nuts is well recognized. If they are available to you free or at a moderate cost, you are advised to feed them. If you do feed them, they will add variety to your breeding cage foods and to maintain a variety they should not be added to a nestling food.

California (English.) walnuts were tried by a local breeder in the third year of his breeding career. This breeder had moved to a small walnut ranch about fifteen miles from Oakland. The undersized nuts were of minor value and it was decided to serve the meats in the breeding cage. Twenty out of twenty-two hens fed the chopped-up meats as main nestling food. The breeder's success bordered on the phenomenal. If you are able to obtain the nuts at a moderate price, you are advised to try them. There is no comparison in food value between the nuts and the egg food usually served.

CHAPTER XXI

EQUIPMENT—GENERAL

It is entirely incomprehensible why breeders, even those with lots of available space, use such small breeding cages. Large breeding cages are definitely conducive to higher production and save much cleaning.

There is no room to serve a variety of food in small breeding cages and even where only one or two kinds of food are served, they are frequently fouled by excreta. During May of the past breeding season, one of America's best-known breeders informed the writer she had over 300 banded young and had lost only three young. This breeder also informed the writer she serves seven different foods in the breeding cages. A big variety of foods cannot be served in small breeding cages, and hens limited to tiny quarters are indeed not as contented as those in spacious quarters where some exercise is possible. If you use tiny breeding cages, it will pay you to experiment with a few large ones. With small breeding cages you become a slave to cleaning.

During the past few years, more and more canary breeders are adopting the use of sun lamps. Many

small breeders who live in areas where the winter climate is severe keep their birds in basements and have need for artificial light. The sun lamps emit rays that are filtered out by the ordinary window glass and that are considered essential. The writer has not had any experience with these lamps but several breeders who use the lamps and with whom he has corresponded report greatly improved health and vigor in their birds and corresponding breeding success. Where there is a considerable variation of temperature such as hot days and cold nights, and this variation is common on the Pacific Coast, it is very unwise to have cage shelves as high as three feet from the ceiling. On hot days the hens on these top shelves suffer most from the heat, and if you open the windows from the top they become subjected to cold drafts from a sudden and unexpected change in temperature. As a consequence these hens approach the annual moult sooner than they would otherwise. They very likely will be poor mothers or let their young die on the second nest. Do not breed your most valuable hens on the top shelves.

Many breeding cages are home-made and most of them contain fronts made from hardware cloth (wire mesh). The cage fronts made by experts are far more practicable and inexpensive. Those cage fronts made of hardware cloth usually have a door that swings open sideways or that opens by lifting it up wards. By far the most practicable pan is to have a door that opens by pushing it inwards and cannot be opened on the outside by lifting it. A door slightly larger than the door opening does the trick. The other two kinds of doors mentioned are not only inconvenient but in spite of your effort will be left unhooked now and then when you are extremely busy or do your chores in necessary haste. Having the right kind of doors is an insurance against tragedy.

EQUIPMENT—GENERAL

Vessels in which greens are stored for ready use should be washed daily in warm weather. Such vessels develop a thin coat of slime and contaminate the greens which results in bowel disturbances. Vessels have been seen with a brownish discoloration indicating they were not subjected to scouring powder for a long time. The observations are the motive for this seemingly unnecessary paragraph.

Cleaning extremely soiled breeding cages is a big job. When a heavy rainfall appears in the offing, stand your cages out in the rain. The excreta that clings to the cages after rain can be washed off with the hose.

If your home-made cage doors swing upward from the outside, attach a three-ounce sinker used by fishermen to the bottom of the door. A heavy bolt will also serve the same purpose. After you do this, you do not have to hook and unhook the cage door many times daily, nor will you find any hens with young or eggs flying around the breeding room when you enter.

Those who grind seeds for their operations have difficulty finding the old-fashioned coffee grinder and search antique and second-hand stores in their area. If you live near a city or visit one where there is a considerable foreign population, you will find the large grinders the foreigners use in the hardware stores in the foreign settlements. They are ideally suited for grinding seeds.

Scraping perches with a knife to clean them is the long, hard way. Place the soiled perches in a vessel of water for about an hour and then rub off the accumulation with a rag easily and quickly.

By adding a liberal amount of a strong detergent to the water in which you soak your soiled nests, very little labor is required to clean them. A mere rinsing under the hot water faucet usually gives the results desired after an overnight soaking.

The sink was full of bird vessels when a lady visitor remarked “I am sure glad I don’t have to wash those dishes”. If the vessels are allowed to stand in very hot water containing a detergent for about ten minutes, a mere rinsing is all that is necessary. The vessels the lady remarked about after being soaked were rinsed in hot water and stored in about ten minutes.

Using a rag and fingers to clean out the corners of vessels is the slow and hard way. Use a small sized stubby paint brush about one inch wide and a half inch thick to wash out the vessels with corners. A mere rotary motion of the brush will thoroughly cleanse them.

About the most practical vessel to use for feeding soaked seed, cooked carrots and yams, are the large size coasters used to protect the floors from damage from the legs of beds, tables, etc. These coasters are inexpensive, very durable and easily cleaned.

If you want something very convenient and that will save you many steps, buy a small metal patio table. It contains a shelf about a foot below the table top and another one a few inches off the floor. The tables are on rubber rollers and as of this date cost less than $10.00. The table can be disassembled after the breeding season and conveniently stored.

If your cages are not uniform have an extra set of perches on hand to fit each cage. Except in small-scale breeding operations, you do not have time to scrape encrusted perches when necessary. Scraping the perches is the hard and long way of cleaning them anyway.

UNCLASSIFIED

CHAPTER XXII

Many old and experienced breeders deliberately give out false information and suppress essential in formation to keep you from becoming a formidable competitor in that area. Be cautious. Several years ago a novice breeder came to the home of the writer for information and advice. He was unable to raise any young from 20 pair of birds. Upon questioning the novice it was learned that he fed the parent birds nothing but the usual seed and greens. The seller of the breeding stock, answer to the novice's inquiry what to feed the parents with young, answered "lots of good seeds.''

The belief that newspaper on the bottom of the cage is bad because of the ink is erroneous. If the ink were poisonous, there would be no printers.

Canary breeding has its rough spots and sometimes tragedy and difficult problems appear in droves. Even the best-informed breeders have rough sailing now and then, I assure you. A ship anchored at port is not encountering any rough seas, but neither is it earning any money, in fact, it is losing money.

Breeding stock not in use should not be kept in the flights in the same room where breeding cages are in operation. Feeding males lose interest entirely in their task if hens ripe for mating can be seen or heard by them. Even fine feeding mothers without a male in the cage are apt to lose interest in their young when they have a strong urge for carnal relations and males in a flight are within their view.

It is not necessary to soak or grind rape seed to enable baby birds to hull it. They are able to hull it when four weeks old. The small rape seed (Wisconsin rape)

is hulled easier than the large size rape such as Dwarf

Essex commonly used.
Besides having a cuttlebone in the breeding cage, it is wise to feed egg shells from eggs that have been boiled at least 20 minutes to sterilize them. Soft shell eggs are quite rare when egg shells are fed.
It is not necessary to pulverize the egg shells. Merely crumble them with your hands. The birds will bite tiny segments out of the shells and swallow them with out difficulty.
From the works of Robert Stroud, we have learned that the diseases common to chickens are also common to canaries. One of the most important things in this book is to advise you not to touch anything else after you have handled the chicken eggs without washing your hands and the handle of the cooking vessel. If you do not heed this advice, you very likely will have an epidemic someday that will wipe out many years of progress. The writer has seen as many as 700 birds killed by an avian diphtheria epidemic in a period of a few weeks. This disease has several different names in the poultry industry.
The average young breeder believes it is wrong to mate together closely related birds such as father and daughter and that if this is done, the young will be cripples. This belief is incorrect. The writer was surprised to learn that very close inbreeding could be carried on without detrimental results for four generations. In both of his experiments, there were no physical or mental degenerates up to the fifth generation, but the fifth produced was devoid of vigor in one case and none of the birds lived over two years. In the other experiment, physical degeneration was not apparent but not a single hen out of about a dozen had

the ability or intelligence to build a nest and lay in it in a normal manner in the first year of breeding. In the

second year of breeding, these same hens showed no signs of mental deficiency. The subject of heredity is very complicated and its discussion is outside the scopeof this treatise.
Wheat germ oil is now being dispensed at the pet stores that is guaranteed not to become rancid within a year. No doubt its life is prolonged either by heating or by the addition of some preservative, or perhaps by both. To what extent its raw state value is conserved is unknown to the writer. Extravagant claims on the labels of present-day products are not to be taken too seriously.
It is better to breed too early than too late during a breeding season. You get more infertility if you start before the regular time, but your loss of young is far greater in late breeding than normally. It is far less disheartening to have the eggs infertile than to lose the young. You can stimulate early breeding but you cannot take effective measures against the approaching moult without using wheat germ oil which keeps the hens in breeding condition when they should be moulting later on.
The hatcheries candle their eggs on the third day and those shown to be infertile are sold for commercial use. These eggs can be purchased by prearrangement with the hatcheries at a big discount from the prevailing price of eggs. In case you arrange with a hatchery for the purchase of the infertile eggs, you are warned to be prepared for a disappointment. The hatcheries most likely will sell you eggs from the three-day candling period at first but later on you may be furnished eggs obtained from the second candling which is about the eighth day. These eggs are not very satisfactory and there will be a partially decomposed egg among them now and then.

After you smell a few of these eggs in the decomposition stage, you will be through with hatchery eggs.

Most states and large cities have laws concerning eggs that show blood within the shell in candling. The laws permit the sale of these showing only a trace of blood and they are sold for commercial use primarily to bakers. The laws generally provide that those showing more than a trace of blood must first be dipped in kerosene and then placed in the garbage can.

Wholesale egg firms are loathe to violate the laws regarding eggs called "the heavy bloods". These eggs are just as good for the egg food of canary breeders as other eggs. Their sale price to canary breeders is but a sixth or less of the regular cost of eggs. If you are a large-scale breeder, you can obtain a letter addressed to the wholesale egg firm from the proper authorities authorizing the firm to sell you the heavy bloods for your particular purpose.

The "heavy bloods" purchased from a wholesale house contain an average of one or two eggs per dozen that are partially decomposed. When you boil these eggs they crack open and the odor they give off will nauseate you, or worse. Before boiling the eggs place about a dozen at a time in a large vessel of water. The spoiled eggs will float on the surface.

Quite a large number of breeders known to the writer and the writer himself have tried to mate the African fire finch to the canary with the thought that perhaps a red canary could be created by following this path of hybridization. No one to the writer's knowledge met with success.

In November of 1950 a young Spaniard, foreign born came to the writer's home. He had only one year's breeding experience and sought much information on breeding. He had unorthodox ideas on canary breeding.

Even early in November he had a hen due to hatch whose eggs he had candled and found fertile. He used an electric clock to turn on the lights in the breeding room at 4:00 A.M.in November. The lights were turned off at 8:00 P.M. He claimed, and apparently, he was

correct, that the birds don't know the difference in sea sons when artificial lights are used.

This young Spaniard related that he tried to mate a yellow canary hen to a male African fire finch but had to separate the pair on the fourth day because the fire finch fought viciously with the hen, and most of the feathers on top of her head were gone.

After failure with the yellow hen, he tried a white canary hen. As the fire finch immediately showed his dislike for her and fought with her for several days, he conceived the thought that the failure of the mating was due to color repugnance. To overcome the probable cause of failure he painted the white hen with mercurochrome. The end of the story is that he obtained thirteen first cross hybrids from the mating.

Upon questioning, it was learned that the hybrid males obtained from the mating he described as pretty much like strawberry color. As the writer showed his suspicion of the truth of the facts related, the young Spaniard agreed to return the following Sunday and bring some of the hybrids with him as proof. He was also interested in trading some of the hybrids for orange birds. On the following Sunday there was a terrific storm, and as expected the young Spaniard did not make the 20-mile visit with his wife and few months old baby. On the succeeding Sunday the writer was forced to be away from home on a business matter.

It is indeed regretted that the name and address of the young Spaniard were not obtained on his first visit. He has not been seen or heard of since.

The above is related for what it may be worth. The young Spaniard impressed the writer as having respect for the truth.