A Broiler Growing and Management Program for the Yemen Arab Republic

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A BROILER GROWING AND MANAGEMENT PROGRAM for the YEMEN ARAB REPUBLIC

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<table>
<thead>
<tr>
<th>Acronym</th>
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<tr>
<td>USAID</td>
<td>United States Agency For International Development.</td>
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<td>MAF</td>
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<td>PETS</td>
<td>Poultry Extension &amp; Training Subproject</td>
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<td>YARG</td>
<td>Yemen Arab Republic Government</td>
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PREFACE

The Poultry Extension and Training Subproject (PETS) is one of several activities being carried out as part of the Yemen Agricultural Development Support Program (ADSP) (AID project 279-0052) under the prime contract between the Agency for International Development (AID) and the Consortium for International Development (CID) (Contract NE-C-1698). Oregon State University has served as the lead university for implementation of the PETS since its inception in 1982. The project is scheduled for five years in the Yemen Arab Republic.

One of the activities of this project was to assist Yemeni personnel on government-owned farms to more efficiently produce broiler chickens. From the experience gathered there, it became obvious that a training manual of some sort would be beneficial to other Yemeni who might become involved in the production of broiler chickens. The result is this extension-type publication that essentially leads the reader day-by-day through a production cycle of broiler birds.

This paper was written by Mr. T. Paul Heidloff, a poultry technician with the PETS. It was reviewed and critiqued by Dr. D. W. Francis, the team leader for the PETS at the time the paper was written, by Dr. D. H. Helfer, Director of the PETS, and by Mr. Abdulla Zabarah, Director General of Animal Resources of the Ministry of Agriculture and Fisheries in the Yemen Arab Republic. Mr. Abdul Malek Mudhish served as translator.

The authors wish to acknowledge the assistance of Mr. Faisal Mohamed Seif.

This report is available in English and Arabic from the Publications Officer, Office of International Agriculture, Oregon State University, Corvallis, Oregon 97331, USA.
INTRODUCTION

This program should be used as a guide in the rearing of broiler chickens. Conditions vary from farm to farm. A procedure that works well on one farm may not work on another. If more information is needed, contact your local MAF agricultural extension agent.

PREPARING FOR RECEIVING CHICKS

Two days prior to receiving chicks

1.) Clean thermometers and check the accuracy of the brooder and house thermometers by placing them side-by-side. All thermometers should be within one degree of each other. After checking the thermometers, place them 5-7 cm off the litter in two to three different locations in the house. Record the temperature daily in the morning and evening.

2.) Start the heaters or brooders to make sure they work properly. Set the thermostat at 32-33°C.

3.) If the house has automatic feeders, make them operational. If hand feeding, put the feed trays equally throughout the house for even feed distribution. Make sure the water lines from the reservoir are clean and all the automatic drinkers are working.

4.) Record keeping is very important. Provide a record form in the chicken house feed room on which data can be recorded. See the Broiler Information Sheet on page 24.

5.) Check and replace burned out light bulbs and wash dirty light bulbs. Avoid using light bulbs in the corners. This draws the chicks to the corners and may cause a pile-up. Do not use too much light. Over-lighting will make the birds nervous and may cause feather picking and cannibalism.

6.) If using a disinfectant pan, plan to change the water and disinfectant daily.

One day prior to receiving chicks

1.) Fill the feed trough. If using automatic feeders, raise the baffle to the highest level.

2.) Place feed trays in the house. Use one feed tray per 50 chicks. (Hence, 5,000 chicks require 100 feed trays, 10,000 chicks require 200 feed
2

trays.) Use the large feed trays because the chicks outgrow the smaller trays too fast. Place about 60% of the trays next to the feed track. Place the rest of the trays near the walls, corners, and middle of the house. Make sure all areas of the house have adequate feed. Fill the trays two-thirds full and avoid spillage. Use care at all times so feed is not spilled and wasted as it increases the cost of production.

3.) Place small drinkers in the house. Use one drinker per 50 chicks. If using vitamins, mix vitamins and water as indicated by the manufacturer. If using molasses or sugar, use 15 grams per 50 liters of water. Place these drinkers at an equal distance from each other throughout the house. Dehydration is the primary cause of early chick mortality. Make sure the chicks always have clean, fresh water.

**Water and Waterers**

Water must be of good quality. The reservoir must be large enough to supply a reserve in case of emergencies. Table 1 provides a guide to water consumption. Clean the reservoir and water lines after every brood. The chicks should start out with small drinkers, one per 50 chicks. All the automatic drinkers should be working when the chicks arrive. Use one automatic drinker per 100 chickens. The automatic drinkers should be as low as possible, but not too low to cause a runover. Raise the drinkers as the birds grow. The top lip of the drinker should be level with the average bird's back.

It is also important to clean the drinkers properly. The procedure is as follows: use two buckets—one to receive the dirty water as you clean the drinker with a bucket and a sponge, and one with clean water and soap or disinfectant to rinse the drinker. Soap or disinfectant is effective; clean water without soap is not good enough. The drinkers should be cleaned twice a day—the first thing in the morning and early in the evening. Many disease problems can be eliminated by keeping the drinkers clean.

**Feed and Feeders**

Always look for the presence of mold when buying feed. Cut open some bags and observe the feed. Are there large or small clumps in the feed? Some may be black. Does it smell different (moldy)? Is the inside of the bag black? If some of the feed is moldy, do not buy any of it. Moldy feed may have toxins which are harmful to poultry. Your chickens may get very sick. Beware of someone selling feed for a low price as it may be moldy. Try to buy a complete feed, one that will be good for baby chicks as well as birds that are 5-6 weeks old. This complete feed should be a mash. If the feed is not available, use a starter feed (mash) for 3-4 weeks and then switch to a grower feed (mash or crumbles). A mash consists of small particles of ground feed suitable for chicks. Crumbles are slightly larger; they are good for growing birds. Pelleted feed, which is larger than crumbles, is generally too big for chicks. The feed should be stored on wooden pallets 15-20 cm above the floor.
and away from the wall to allow air to circulate under and around the feed. This will keep the feed dry and help prevent mold.

If you are hand feeding, sweep the area clean on either side of the feed track. If using feed trays, make sure that the area is clean. By using this method, the fresh feed will not get mixed into the litter. Always feed as much as the birds will eat, but do not fill the trays or track too much to cause wastage. The object is to have them eat as much as possible so they will grow as rapidly as possible. The faster they grow, the sooner you can start selling them. Table 2 provides feed conversion figures to use as a guide. Do not try to save the feed until they get older, but do not waste feed. If the house has automatic feeders, the feed track should be operational and full of feed when the chicks arrive. Start with two 5-minute feed distribution periods at 9 a.m. and 3 p.m. The chicks won't really start to use the automatic feed track until the fifth or sixth day, but it is important to get them used to the sound of the feeder. The quicker the birds use the automatic feeder, the sooner the feed trays can be removed. Remember, keep the feed trays two-thirds full and avoid spilling feed on the litter.

By Day 7, the feed distribution periods should be 6 a.m., 12 noon and 6 p.m., 5-7 minutes each. By Day 14, the feed distribution periods should be 7-9 minutes each at 6 a.m., 9 a.m., 3 p.m., 6 p.m., and 9 p.m. By Day 21, the feed distribution periods should be 6 a.m., 9 a.m., 12 noon, 3 p.m., 6 p.m., 9 p.m., 12 midnight. And by Day 35, 6 a.m., 9 a.m., 12 noon, 3 p.m., 6 p.m., 9 p.m., 12 midnight, 3 a.m.—every 3 hours around the clock. From Day 21 on, the feed distribution periods should last 14-16 minutes or as long as it takes to circulate throughout the house. Examine the feed lines and make sure feed is available to the birds in all parts of the house.

The above information should be used as general guidelines and specific adjustments should be made in the feeding patterns according to the needs of the individual rearing house. The birds will eat more in some houses, while in others the birds will eat less. The birds will eat more in cooler weather than in hot weather. The feed track should be raised as the birds grow. This prevents feed wastage and helps keep the feed clean. Feed that has been contaminated by manure can transmit diseases. The guideline to use in raising the feed track is as follows:

The top of the trough should be no lower and the bottom of the trough no higher than the back of the average-sized bird.

The height of the feed track and the height of the back of the average bird should be the same.

Brooders and Heating Systems:
Large metal brooders operated by gas bottles provide the best heating system. No electricity is needed for this heating system. They are inexpensive to operate and work well when given proper care. Use one of these brooders for every 500-750 chicks. There is a tendency to use too much heat
when the chicks are small. Figure 1 shows how the chicks should look under the brooder. Brooding in half of the house is acceptable, if managed properly. Make sure the proper number of small drinkers and feed trays are used. Expand the area to three-quarters of the house by Day 7 and use the whole house by Day 10. When expanding the area, move the brooders, feed trays, and drinkers into the new area to encourage the birds to use this area. Make sure there are brooders near all the corners of the house. Chicks like to stay in corners—make sure they have adequate heat in their favorite places. Chick guards may be used to prevent piling in the corners. See the section on temperature (page 8) for proper heating requirements.

Ventilation

The basic concept of ventilation is to keep the temperature fluctuating as little as possible in a 24-hour period with maximum bird comfort the number one priority. The best way to check if the ventilation is correct is to observe the birds. Are they evenly distributed throughout the house? Are they quiet, especially young birds? Are they eating, drinking, and active? If they are sleeping, are they sleeping in groups in all parts of the house? If you can answer yes to these questions, the ventilation is probably satisfactory.

Are the birds huddled together along the walls? Are the birds making a lot of noise? Young birds will chirp very loudly if they are cold. If you answer yes to these questions, you may be ventilating too much or too little.

Does the air smell bad? Is there dust or ammonia present? Are the birds just sitting, not eating, drinking or sleeping? You are probably not ventilating enough.

When to Ventilate

Each poultry house must be ventilated differently. Ventilation needs change with the time of day, temperature, humidity, wind conditions, age of the birds, and density. Generally speaking, some ventilation is needed the first day. During the first two weeks, the curtains must be lowered to allow fresh air to enter the house, even though the heaters are turned on. This may seem like a waste of energy, but the carbon dioxide and dust must be removed from the house. As the birds grow, the curtains must be lowered.

In general, during the winter months the heat can be turned off by Day 25 and the curtains can remain completely down by Day 30. In the summer, the heat can be turned off earlier and the curtains can be lowered earlier. Let the behavior of the birds tell you what they need.

Ventilate using both curtains: if one side is down half way, the other side should be down half way. This insures proper air movement. Lowering only one side, or only lowering the curtains in part of the house, will not do the job. Ammonia may build up in the poorly-ventilated house and could cause
discomfort to the chicks. It takes more work to ventilate properly, but the birds will grow faster, feather faster, and gain weight faster with proper ventilation. Heat requirements are reduced when the birds grow feathers. These fully-feathered birds will bring a better price in the market. The climate in Yemen, which has a temperature range from 0°C to 34°C, is ideal for raising broilers.

It is very important to check the ventilation and the birds every hour, if possible. If the wind increases the first thing you, as a good broilerman, should think of is the welfare of your birds.

Remember, good ventilation enhances health by removing disease organisms, ammonia, moisture, and dust, while poor ventilation will contribute to poor health.

Vaccination Procedure for Newcastle Disease:
A mild strain of Newcastle virus vaccine, such as Hitchner B₁ type, should be used at 14-18 days of age for two reasons:
   1.) The Hitchner B₁ type is a mild virus and does not stress the chicks as severely as LaSota B₁ strain.

   2.) Waiting until the birds are 14-18 days of age before their first Newcastle vaccination will allow the Newcastle antibody level passed from the hen to the chick to dissipate to a low level and not interfere with the immunity developed by the Newcastle vaccine virus.

The presence of Newcastle disease in some parts of Yemen indicates a second vaccination three weeks later is necessary, or at approximately 34-39 days of age. Vaccination programs must be developed for each individual farm. Information has been distributed advocating the use of 1/2 dose vaccination. This is incorrect!

The following information was obtained from Dr. S. B. Hitchner regarding vaccination procedure in Yemen:

"From the information you have given me regarding Newcastle vaccination, it's my opinion they are wasting their time and vaccine giving 1/2 dose at 7 days. If the maternal antibody is good, I would recommend a full dose at 14-18 days. I question the necessity for revaccination if the birds are marketed at 40 to 50 days. Here is where you have to exercise your judgment depending on the local Newcastle situation. If they are having serious outbreaks with Newcastle after applying a single vaccination, then I would recommend a revaccination 3 weeks later, or at around 5 weeks of age."

Administration of the Vaccine
   1.) Turn the water off at 7 a.m. or earlier in the morning. The birds
have to be without water for 1-1/2 to 2-1/2 hours so they will become very thirsty. In hot weather, 1-1/2 hours; in cool weather, 2 to 2-1/2 hours. Observe the birds.

2.) Equipment needed: 2 to 3 60-liter plastic barrels
   2 to 3 plastic buckets
   broom
   3 small drinkers
   All of this equipment should be washed and rinsed clean.

3.) Wash the automatic drinkers.

4.) Rinse the drinkers with clean water. Make sure all the soap residue is removed. Soap can inactivate the Newcastle vaccine. Raise the drinkers so the birds cannot reach them and get them dirty.

5.) Sweep an area clean in the middle of the house. This is where you will work.

6.) Keep the vaccine refrigerated below 2°C until used. Protect the vaccine from sunlight and heat at all times. Do not use outdated vaccine. It is best to buy vaccine in 500 or 1000 dose vials. Use the proper dosage; do not stretch vaccine. It is better to overvaccinate by 10-30%; this will not be harmful to the chickens. For example, don't vaccinate 10,500 chickens with 10,000 doses, use 11,000.

7.) Getting the vaccine from the vial to the birds is the next step. At 14 days, some manufacturers suggest using 14 liters of water per 1,000 birds. If you have 10,000 chickens use 11,000 doses of NCD.

   14 liters (water) x 11 (vaccine) = 154 total liters of water needed.

   The proper procedure would be to use a 60-liter barrel for mixing the vaccine as follows:

   56 liters and 4,000 doses in one barrel.
   56 liters and 4,000 doses again after the first is consumed -- wait 30 minutes.
   Then mix: 42 liters and 3,000 doses for the final time.
   56+56+42 = 154 liters of water; 4+4+3 = 11 vials of vaccine.

   If you revaccinate at 35 days, use 30 liters of water per 1000 chickens. Even if you lost 200-300 chickens, 11,000 doses of vaccine would not be too much.

   The following procedure should be followed:

   30 (30 liters of water per 1,000) x 11 (11,000 doses NCD) = 330 liters of water needed.
60 liters of water and 2,000 doses in one barrel

Wait 30 minutes.

60 liters of water and 2,000 doses in one barrel
30 liters of water and 1,000 doses in one barrel

= 330 liters of water and 11,000 doses of NCD.

8.) Remember, always open vaccine vials under water. Hand pour vaccine into the drinkers and then lower the drinkers.

9.) Walk through the birds. Move the chickens away from the corners of the house to insure all the birds have a chance to drink.

10.) The vaccine virus is only alive for a short period. Make sure the whole vaccination procedure does not take longer than two hours.

11.) All empty vaccine vials should be burned or buried immediately after vaccinating. This will prevent the accidental spread of Newcastle disease.

12.) The use of spray vaccine is not recommended.

13.) Record on the Broiler Information Sheet the following information:
   (a) Date of vaccination.
   (b) Manufacturer of vaccine.
   (c) Lot number and expiration date of vaccine.
   (d) Amount of vaccine used.
   (e) Weather conditions.

14. Turn on the water when there is no vaccine water remaining in drinkers.

Litter

In much of Yemen, the humidity is very low. This low humidity helps keep the litter dry, but even in this climate the litter can become wet and moist. This may occur during cool, rainy weather or if more than 10-11 birds per square meter are in a house. Wet litter may also occur if the ventilation is poor or if a drinker overflows.

Old straw could be too dusty, but wood shavings and fresh straw are good to use for litter. They will absorb the moisture from the droppings and usually stay dry. If the litter starts to harden, remove these chunks and break up the small pieces with a fork or rake. This usually occurs near the drinkers. The manure in this wet-hardened litter may create ammonia, which is harmful to humans and chickens. Proper ventilation and not crowding the chickens will help keep the litter dry.
Lighting
If the birds appear nervous and some feather picking or cannibalism appears, the lights may be too bright. Reduce the bulb wattage or turn off some lights and remove the affected birds. This should end the problem.

Culling
The purpose of culling is to remove birds 1) that are unfit to eat; 2) that may carry disease and infect the rest of the flock; and 3) that are runts and will not grow. Sick birds will spread disease. They share the same drinkers and feeders with many other birds. They breathe the same air. This is how disease is spread throughout the poultry house. Sick birds must be taken out of the house. Most likely they will not get well, only worse. Most of the time, medication is not the answer. Culling is practiced throughout the world. A poultry farm can never be successful without a proper culling program. It is just as important as feed, water, litter, vaccination, and ventilation.

When to Cull
Cull from Day 1 to marketing. This will prevent disease from spreading. It will also help feed conversion as it eliminates the poor birds as soon as possible.

Temperature

<table>
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<th>Day</th>
<th>Temperature</th>
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<tbody>
<tr>
<td>1-3</td>
<td>32°C - 33°C</td>
</tr>
<tr>
<td>4-7</td>
<td>29°C - 31°C</td>
</tr>
<tr>
<td>8-14</td>
<td>26°C - 28°C</td>
</tr>
<tr>
<td>15-21</td>
<td>22°C - 25°C</td>
</tr>
<tr>
<td>22-28</td>
<td>18°C - 21°C</td>
</tr>
<tr>
<td>29-</td>
<td>Keep the birds comfortable</td>
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</table>

Generally speaking, the heat can be shut off by Day 25 or 26 in the winter and Day 21 in the summer. The best way to determine if the birds need heat is to observe them at night. Are they huddled next to the wall? If so, possibly they are too cold. They should be spaced evenly throughout the house and sleeping in groups. If they are quiet, most likely they are comfortable. Use your own judgment as every house is different.

Density:
The recommended density for broilers in Yemen is 10-11 per square meter. Most poultrymen feel that more profit can be realized when chickens are placed at a greater density. This seems like a good idea. More birds are placed in the house so more birds can be marketed. The
evidence is that more birds can cause a lot of problems. The potential for disease—more culls, slower growth and poor feed conversion—are problems encountered when stocking birds at a greater density than 10-11 per square meter. Consider this additional factor. Birds placed at 17-20 M$^2$ will have a difficult time attaining a weight of 1700 grams at 49 days, whereas birds placed at 10-11 M$^2$ can routinely achieve such weight goals.

Cough Check

The early morning and early evening are the best times to check for respiratory problems in the birds. During this time it is very quiet in the house as most of the birds are still sleeping. If the birds have difficulty breathing or are coughing, the sound can be heard easily. A good procedure to follow is to stand outside the house near the curtain and wait 4-5 minutes. If you cannot hear anything, go inside the house, but move very slowly so the birds won't be disturbed. The best times for a cough check are 5-6 a.m. and 6-7 p.m., depending on the season. Record any noise that is heard on the mortality sheet.

Checkpoints for Bird Health

1.) Utilize the cough check.

2.) Feel the breast of 10-20 birds—is it thin? Can you feel the sharp keel bone? Using this method, you can determine if the bird is not eating, if it is losing weight, or if it is gaining weight.

3.) The head and neck area is a good indicator of bird health. Are the eyes watery? They should be clear. Are the feathers of the neck ruffled? If the bird is sick and its temperature is increasing, the feathers will stand up in the head and neck area to release heat. The normal healthy bird will have smooth, shiny feathers. Is the head swollen or is one eye closed? If there are chickens showing these signs, they should be culled immediately—not tomorrow. They are spreading disease every time they breathe, drink, eat or defecate. Is there discharge from the nasal area? Pick up the chickens and observe them.

4.) As the birds grow there is a tendency for the legs on some birds to collapse. Remove these birds. No broker will buy them.

5.) A good technique to use if a bird is having problems breathing is to put the bird's closed beak in your ear. Keep the beak closed with your fingers. You will be able to hear the bird breathe and determine if it is having any problems. Another method is to hold the breast of the bird to your ear. You can hear rattling from mucus in the lungs and air sacs.

At this time, the only disease for which there is a need to vaccinate (for prevention) is Newcastle disease. Two vaccinations are suggested in most areas of Yemen, the first one at 14-18 days and the second at 35-39 days.
It is not necessary to use drugs routinely. Regular use of drugs is expensive and can cause drug resistant organisms to develop in the chickens. Some drugs are poorly absorbed and do not reach the infected sites because of poor blood circulation, such as the air sacs. If drugs are being used, someone is not doing the proper management job. Drugs are used as a last resort. Drugs can never replace good management. A multi-vitamin mineral supplement should be all that is needed when proper management is used. Drugs should not be used except for a specific problem.

**Performance Goals**

Every aspect of raising chickens must be done correctly to reach these goals. Feed, water, litter, ventilation, culling, and overall management must be the best every day.

<table>
<thead>
<tr>
<th>Age (Days)</th>
<th>Weight (Grams)</th>
<th>Mortality + Culls</th>
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<tbody>
<tr>
<td>7</td>
<td>95</td>
<td>1.5%</td>
</tr>
<tr>
<td>14</td>
<td>270</td>
<td>2.5%</td>
</tr>
<tr>
<td>21</td>
<td>500</td>
<td>3.5%</td>
</tr>
<tr>
<td>28</td>
<td>780</td>
<td>5.0%</td>
</tr>
<tr>
<td>35</td>
<td>1,000</td>
<td>6.0%</td>
</tr>
<tr>
<td>42</td>
<td>1,400</td>
<td>7.0%</td>
</tr>
<tr>
<td>49</td>
<td>1,700</td>
<td>8.5%</td>
</tr>
</tbody>
</table>

**Drugs, Vitamins, and Vaccinations**

A vitamin supplementation program may be essential to make up for the loss in nutrients in the feed during transit and storage. If necessary, start adding vitamins to the water at Day 1. Continue vitamins for 4-5 days, then stop for 2-3 days. Start again with vitamins for 4-5 days, then stop for 2-3 days. Continue this program until the birds are 37 days old. From 37 days until they are sold, vitamins should be added every day. The best time to administer vitamins is just after the drinkers are cleaned in the morning.

**Practices to Avoid**

1.) Never use moldy feed.
2.) Never put different ages of birds in the same house. It is advisable not to have two ages on the same farm.
3.) Never use old, dusty litter.
4.) Never vaccinate with less than a full dose of vaccine per bird.
5.) Never let birds drink water from dirty drinkers.

**Downtime**

1.) Shut the power off.
2.) Remove the equipment and place it outside.
3.) Remove the litter.
4.) Wash the ceiling, walls, floor, and curtains with water and a good disinfectant.
5.) Disinfect the water lines and reservoir. Make sure all water lines are free of dirt and are functioning properly.
6.) Hook up the feed track and oil the corners. Place fresh litter in the house.
7.) Repair the curtains if needed. Patch all holes and replace or repair pulleys.
8.) Protect houses from wild birds--make sure the screen has no holes. Rodents and wild birds are known carriers of disease.
9.) Clean the outside area surrounding the house. Pick up papers and trash.

PROCEDURES FOLLOWING DELIVERY OF CHICKS

Items to Check in a Chick Delivery
There are several things to check when receiving chicks. There are cull chicks; chicks dead on arrival; chicks with unhealed navels; and chicks with stiff or crooked necks, red hocks, or damaged feet. There will also be wet, cold, or heat-stressed chicks and variability in chick size. Since the chicks come from many different parent flocks, the chicks may vary a great deal in their size and general health, depending on the age and health of their parents. These chicks have been in transit at least 24 hours. They are cold and very thirsty. Observe any chicks with unhealed navels, which is an indication of a hatchery-related disease known as omphalitis. The hatchery should be notified immediately if this disease or any poor chicks are received.

Count at least 10 boxes of chicks. If there is a shortage, the company should be notified.

Submit 10-20 chicks to the Veterinary Services Project in Sanaa for MS-MG testing, if possible.

Receiving Chicks
Spread the chicks evenly throughout the house. As the chicks are removed from the boxes, make sure they are near the small drinkers. They are thirsty. The number one cause of early chick mortality is dehydration. After the chicks have settled down, walk through them and collect the dead birds. Record this information on the broiler information sheet. Also record the number of chicks received, their weight, delivery date, time in transit, and general condition.

Daily Procedure
Check the birds every few hours. Make sure the chicks are not bunching up. Hand water the weak chicks. At night, walk through the houses to make
sure the chicks are not bunching away from the heat. Adjust the feed clock. Remember, some ventilation is good even at Day 1.

Day One
Start the First Phase of the Daily Procedure:
1. House inspection. Look for any problems with feed, water, litter, and temperature. Adjust the ventilation for birds at this age.
2. Be aware of the feed situation. Do you have enough for the next few days? Are you feeding a starter mash?
3. Begin picking up the dead chicks and cull any crippled chicks. Make sure the dead chicks are destroyed (buried or burned).
4. Wash automatic drinkers using the two bucket method. Add vitamins; fill the small drinkers only half full. Wash automatic drinkers every day.
5. Make sure heaters or brooders are running properly.
6. Fill the feed trays—make sure no manure or dirt is in the trays.
7. Check temperature and ventilation.
8. Check automatic drinkers for overflows.
9. Repeat this procedure at 5 p.m.. Lock the doors.

Days Two and Three
Continue the First Phase of the Daily Procedure.

Day Four
Continue the First Phase of the Daily Procedure.
1. Fill drinkers all the way.
2. Lower the curtains 1/2 meter during the day, 10 minutes at a time.

Day Five
Continue with the Daily Procedure.

Day Six
Continue with the Daily Procedure.
1. Stop vitamins in water for 2-3 days.

Day Seven
Continue with the Daily Procedure.
1. Add feed runs as needed.
2. Lower curtains as needed.

Day Eight
Continue with the Daily Procedure.
1. Start birds on vitamins again.
2. Weigh birds: try to weigh 1% of the birds in different parts of the house.
3. Figure mortality and culls; enter this figure on the flock information sheet.
4. Raise the feed track and drinkers.
5. Wash the big drinkers twice a day.
6. Lower the curtains at least 15 mm at night. They should be lowered 15-45 mm during the day, depending on weather and general conditions.

**Day Nine**
Continue with the Daily Procedure.
1. Start moving outside feed trays toward the feed lines. This will train the birds to use the automatic equipment.
2. Turn off the heaters during the day depending on weather.
3. Observe the small drinkers. Which ones are empty? Move more drinkers in that area; this is where the birds are.

**Day Ten**
Continue with the Daily Procedure.
1. Move the small drinkers toward the large drinkers. Place the small drinkers on both sides of the large drinkers. This procedure will train the birds to use the large drinkers.

**Day Eleven—Twelve**
Continue with the Daily Procedure.
1. Remove 20% of the small drinkers and feed trays at random throughout the house.
2. Stop vitamins for the next two days.
3. The obvious culls will start appearing now. Remove these runts before vaccination.

**Day Thirteen**
Continue with the Daily Procedure.
1. Remove 20% of the small drinkers and feed trays.
2. Continue culling.

**Day Fourteen**
Continue with the Daily Procedure.
1. All the small drinkers should be removed from the house.
2. Decide when you will vaccinate. The first vaccination is between 14-18 days.
3. Add feed runs if needed.

**Day Fifteen**
Start the Second Phase of the Daily Procedure:
Wash the automatic drinkers, using a non-toxic disinfectant and two buckets, in the early morning and early evening. Curtains should be lowered as needed. There should be at least a 15-30 mm opening all night at day 15. Keep the litter in good shape—no wet spots or ammonia. Raise the feed track to keep up with the birds. Start checking for any respiratory problems. The cough check should start now and last until the end of the brood. Check the birds for coughing in the early morning and early evening. Remove any sick or extremely small birds.
1. Weigh the birds for 2-week weight; enter the figure on the sheet.
2. Figure mortality and culls; enter the figure on the sheet.
3. Start vitamins again.
Days Sixteen to Eighteen
Continue with the Second Phase of the Daily Procedure.
1. Vaccinate.
2. A slight cough may be apparent for 4-5 days after vaccination.
3. Keep the birds on vitamins a few more days because of the stress of vaccination.

Days Nineteen to Twenty One
Continue with the Second Phase of the Daily Procedure.
1. Curtains should be lowered at least half way to all the way down during the day, depending on the weather and time of year.
2. Make sure there are no wet spots or ammonia. Evidence of ammonia means poor ventilation or overcrowding. Remove the wet litter and replace with new litter as necessary.
4. Keep the cough list current.
5. Observe the birds at night; decide when to stop the heat.

Day Twenty-Two
Continue with the Second Phase of the Daily Procedure.
1. Weigh birds for 3-week weight; enter the figure on sheet.
2. Figure mortality and culls; enter the figure on sheet.
3. Stop vitamins for two days.

Days Twenty-Three and Twenty-Four
Continue with the Second Phase of the Daily Procedure.
1. Remove heaters from the growing area and place them in the feed room. Clean the heaters and put a cover over them.

Days Twenty-Five to Twenty-Eight
Continue with the Second Phase of the Daily Procedure.

Day Twenty-Nine
Continue with the Second Phase of the Daily Procedure.
1. Weigh birds for 4-week weight; enter weight on the flock information sheet.
2. Figure mortality and culls; enter on sheet.
3. Think about vaccinating between 35-39 days.
4. Are more feed runs needed?
5. Curtains should be completely down during the day and half to two-thirds down at night, depending on the weather and presence of ammonia.
6. If using a starter feed, change to grower. If starter feed is left, use it along with the grower. Don't keep feed over from one flock to another. A complete feed that can be fed from Day 1 to marketing is probably the best method.

Days Thirty to Thirty-Four
Continue with the Second Phase of the Daily Procedure.
1. Plan vaccination.

Day Thirty-Five
Continue with the Second Phase of the Daily Procedure.
1. Stop vitamins for two days

Day Thirty-Six
Continue with the Second Phase of the Daily Procedure.
1. Weigh birds for 5-week weight; enter on sheet.
2. Figure mortality and culls; enter on sheet.

Days Thirty-Seven to Forty-Two
Continue with the Second Phase of the Daily Procedure.
1. Resume vitamins from now until all birds are sold.
2. You should only be removing crippled birds. All the little birds and sick birds should have been removed.

Day Forty-Three
Continue with the Second Phase of the Daily Procedure.
1. Weigh birds for 6-week weight; enter on sheet.
2. Figure mortality and culls; enter on sheet.

Days Forty-Four to Forty-Nine
Continue with the Second Phase of the Daily Procedure.

Day Fifty
Continue with the Second Phase of the Daily Procedure.
1. Weigh birds for 7-week weight; enter on sheet.
2. Figure mortality and culls; enter on sheet.

Day Fifty One—End of Brood
Continue with the Second Phase of the Daily Procedure.

HEALTH

Disease Signs and Symptoms

Part of any sound disease prevention program is alertness for early signs of disease. Detection of a disease before it involves the entire flock often gives sufficient time to correct management errors and control the problem. Diseases vary widely in the ways they affect a flock, but close attention to the appearance and behavior of your birds will assure detection of most diseases.

Observe your flock closely and regularly
Disease conditions are much more readily detected if you are familiar with normal patterns of activity and appearance in your birds. Note the activity of the birds and their posture, the appearance of head, feathers, and legs, the noise level, and the condition of the litter, feed, water, and
ventilation. A distinct change in one or more of these observable signs may signal the onset of disease. You should be especially alert for decreased activity and noise, difficult breathing (abnormal respiration), weakness, abnormal posture in individual birds, changes in comb or shank color, discharges or crusting around eyes or nostrils, ruffling or roughness of feathers, unusual color and consistency of droppings, appearance of wet litter, and odors such as ammonia.

Check feed and water consumption daily
Sick birds may go off feed or water for a variety of reasons (weakness, paralysis, pain associated with eating or swallowing). Some diseases may cause an increase in water consumption. Sudden changes in feed or water consumption are excellent early indicators of disease in the flock.

Remove Sick or Dead Birds Promptly
Sick or dead birds are a source of disease for the rest of your flock. Remove them daily. It is best to kill sick birds and dispose of the carcasses by burning or burial.

Description of Some Common Poultry Diseases

Newcastle Disease (NCD)
NCD may range from a very mild respiratory disease to a devastating disease characterized by severe respiratory problems with high mortality. The signs of NCD are gasping, coughing, rattling and mucus in the windpipe, loss of appetite, huddling, and nervous symptoms. Such signs may include partial or complete paralysis of the legs or wings; holding head down, rotating of the head and neck, walking backwards, circling, tumbling, and the head may be twisted.

Prevention and Control
All chickens should be vaccinated with NCD vaccine followed by repeat vaccinations. There is no treatment for NCD.

Mycoplasma infections (Chronic Respiratory Disease, CRD)
Mycoplasmosis is a term applied to diseases caused by the Mycoplasma organisms, M. gallisepticum and M. synoviae in chickens. The mycoplasma infection probably lies dormant until a stress factor (no feed, no water, overcrowding, poor ventilation) starts an outbreak of the disease.

Signs of the disease
Initially a small number of birds are affected. The familiar respiratory signs—difficult breathing, mucous discharge from the nose, and coughing—are seen. Feed consumption drops off and birds soon become weak and emaciated with many thin-appearing breasts observed in the advanced stages of CRD. To tell the difference between CRD, infectious bronchitis, and NCD, CRD usually moves through the flock slowly and lasts for weeks—the whole life of the broiler flock.
Prevention and Control

Prevention: The only prevention is to obtain mycoplasma-free chicks.

Control: Remove sick birds, cull, adjust management. Check the ventilation and water management. Are the waterers clean? Is the feed moldy? Is the litter dry?

Coli Infection

Coli infections are part of a disease complex rather than a disease itself. Coli refers to Eschericia Coli, a bacterium commonly found in the intestinal tract of birds, animals, and man. It is also found in dust, water, and soil, on skin, hair, and feathers, and in all places where there are droppings. Following are specific conditions where E. Coli may be found:

Enteritis: Large numbers of bacteria in contaminated water will break down the body's natural resistance.

Airsaculitis: Bacteria invade the air sacs causing mild to severe respiratory distress, including rattling and coughing.

How these bacteria are spread

E. Coli organisms are encountered in many places. Birds are under constant exposure through droppings, feed, water, litter, dust, air, equipment, people, wild birds, rodents, and insects.

Prevention and Control

Poultry growers must use all their management skills to prevent E. coli infections. The sanitation program must include a thorough cleanup of the premises and a thorough cleanup of equipment between flocks. As in mycoplasma infections, if an outbreak occurs check all the basics: ventilation--are the curtains open? Is there enough fresh feed? Should vitamins be added to the feed or water? Are the waterers clean? Is the litter dry and have no bad smelling areas? Are the sick birds culled?

Infectious Bronchitis (IB)

Although this virus-caused disease is not notorious for inflicting high mortality in older birds, it has often been responsible for severe death losses in baby chicks. IB is a very swift spreading disease. The incubation period (the time from actual exposure to the disease until the appearance of first signs) is only 18-36 hours. The younger the birds, the higher the mortality.

How is it Spread?

IB is easily spread through the air and by direct contact. The usual noises are evident--gasping, coughing, and a mucous discharge from the nose. The eyes may be wet. The birds are quiet and inactive; there is a drop in feed consumption. Unlike NCD, there are never any nervous signs. It usually does not cause serious mortality in broilers after three weeks of age.
Prevention and Control
Vaccination at the hatchery. Once established, bronchitis is difficult to control and will require continued vaccination of future flocks. There is no specific treatment. Vitamins may help. Vaccination is not recommended until the disease occurs in Yemen.

Marek's Disease
This disease is caused by a virus. The disease can be transmitted by very small feathers and through the water. Most of the affected birds will have some degree of paralysis or tumor formation in the visceral organs.

Prevention and control
Vaccination at the hatchery. There is no treatment for Marek's disease. Vaccination is not recommended until the disease occurs in Yemen.

Fowl Pox
There are two forms of Fowl Pox: *Dry Pox*—the skin has pimples followed by scabs on the comb, face, and wattles; *Wet Pox*—sores are present inside the mouth, the throat, and on the tongue. Wild birds can carry the disease. In Dry Pox, the lesions start as small white bumps which grow rapidly and turn yellow, then dark brown. Two to four weeks later they dry up and become scabby. In Wet Pox, breathing may be difficult and death can result from suffocation. There may be a nasal or eye discharge and swelling may occur. The white-yellow sores can be seen on the tongue and in the mouth. Fowl Pox is usually found in laying birds.

Prevention and Control
Prevent Fowl Pox by vaccination at eight weeks with a vaccine for chickens. The vaccine is administered by the stab method in the wing web. Broilers are not usually vaccinated for Pox.

Infectious Bursal Disease (Gumboro Disease)
Infectious bursal disease, or Gumboro disease, of chickens is characterized by ruffled feathers, watery diarrhea, trembling, and prostration. Young birds between 3 and 6 weeks of age are most often affected. Morbidity is high and mortality is from 4-30 percent. Feed consumption drops and the birds will not gain weight.

Signs of the Disease
Chickens become very droopy and depressed, and move very slowly. They will tremble. Look for watery droppings. Look at the vent of the chicken; it may have manure pasted around it. Chickens may pick at their own vent. Feed consumption will drop. The Bursa of Fabricius located inside this bird is greatly enlarged and yellowish.

Prevention
Good sanitation is the best preventative. Birds will not respond to treatment once they have contracted the disease. A vaccine is available,
but the immune status of the parent flock should be known before a program is started. There is no history of this disease in Yemen. It would be very bad management to vaccinate and introduce the disease. Wait until a positive diagnosis is determined, then obtain the history of the parent flock and design a vaccination program. Diagnosis must be made by isolating the virus.

**Nutritional Deficiency Diseases**

The first signs of any deficiency are usually not specific. For example, small birds, or uneven growth and feathering. One may assume that the feed may be vitamin and/or mineral deficient because of the transportation distance. Vitamin supplementation may be essential to maintain flock health.

**Coccidiosis**

Coccidiosis is caused by a microscopic single-celled animal called coccidia. The organisms destroy cells lining the gut normally used by the bird for absorbing nutrients. The acute types of coccidiosis cause severe tissue damage, bleeding, and death.

**Signs of Disease**

Infected birds show a loss of weight, ruffled feathers, weakness, and generally look like culls. There may be bloody droppings in the litter.

**Prevention**

A coccidiostat is fed in the feed. Coccidial oocysts thrive in moist litter. In Yemen, the litter stays dry so coccidiosis does not seem to be a problem except when birds are crowded and ventilation is poor. In the coastal areas where humidity and high temperatures prevail, coccidiosis may be present. A coccidiostat should be used. Careful observation is needed to insure resistance to the coccidiostat does not take place. If this happens, a new drug must be used. Do not give two or three coccidiostats during the life of the flock.

**Cannibalism**

Cannibalism may occur in a flock at any time. This problem can be very serious, involving picking at the head, wing, and vent. Causes of cannibalism include overcrowding, high temperature, extensive lights, or insufficient feeders. This can result in many cull birds.

**Prevention**

Overcrowding must be avoided. If further picking occurs in a house that has the right number of birds, the lights may be too bright. Dim the lights at night and the birds should calm down.

**Important Note**

As of March 1985, we believe NCD is the only viral disease present in Yemen. Proper vaccination will control the disease. If you are experiencing
problems, contact your extension agent. He can contact the extension poultry specialist or poultry technicians who can help solve your problems. Contact the Veterinary Services Project for the necessary laboratory tests to insure the proper course of treatment is followed. Many servicemen or drug salesmen are not qualified to diagnose poultry diseases.
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TABLE 2*

APPROXIMATE FEED REQUIRED PER 1,000 BROILERS

STRAIGHT-RUN (AS HATCHED - MALES AND FEMALES)

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<th>Age in Weeks</th>
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<th>Weekly (kg)</th>
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Figure 1. - Brooding - Examples of how chicks react to different temperature conditions. Chicks will "tell" you when they are comfortable.
BROILER INFORMATION SHEET

Flock Number
Broiler Number
Source

Arrival Date
Number of Chicks
Dead on Arrival
Total Chicks Started

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