DAY-OLD CHICK PRODUCTION

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01

Establishment of Breeding Flock

Summary

Establishing the breeding flock for Philippine native chickens requires a stringent selection at acquisition. The possible sources are selected research centers for Philippine native chicken, research and outreach stations of the Department of Agriculture, and legitimate raisers. The morphological characteristics of the chickens reflect both their growth and reproduction abilities. The technology packages will take care of the tenderness, juiciness, and distinctive taste of meat for the requirement of consumers.

The ideal crosses are between the hens from smaller and those of a larger genetic group in mating. It is to take advantage of the performances of chicks intermediate with those of parental stocks. The succeeding generations can be used as parental stocks. Introducing at least five roosters for every 100 stocks from other sources help minimize the possible impact of inbreeding in the flock. The recommended culling period is when the flock reaches two years old from hatching. In addition, pen mating is suggested for easy monitoring and recording of performances.

Sourcing of Breeding Stocks

The common problem in sourcing the breeding stocks is the reliability of the available hens and roosters in terms of their purity as Philippine native chickens. The possible sources of stocks can be among the higher educational institutions (HEIs) like Central Philippine University (Figure 1) that are researching the local fowl of this country. Another source can be the Research and Outreach Station (ROS) of the Department of Agriculture in the respective regions or provinces having the nucleus farm for Philippine native chicken. The latter can be the nearest source of stocks.

Knowing the physical features of Philippine native chickens is of great advantage in establishing the breeding flock. The procurement can be done directly from the farmer's field to reduce the expenses of sourcing breeding stocks. The location can be far-flung areas where the dispersal projects on native chickens seldom could reach. Others might consider acquiring the stocks from other enthusiasts of native chickens.


SETTING
UP A PROLIFIC BREEDING FLOCK
FOR NATIVE CHICKEN

Distinctive Features of Philippine Native Chicken

There are two significant groups of Philippine native chickens in the country. These are the larger and smaller phenotypic group. The name of the group varies from where it originates. The Bisaya chicken is a widely distributed group from the Visayas to Mindanao. This chicken belongs to the smaller phenotypic group along with the Manok Tagalog of Luzon, Banaba of Batangas, Bolinao of Pangasinan, and Camarines chicken of Bicol.

On the other hand, the larger phenotypic group comprises the Basilan chicken of the Zamboanga Peninsula, Paraoakan of Palawan, Jolo of Western Visayas, Egon of Bicol, and Joloano of Northern Luzon. The Darag chicken of Panay is a standardized native chicken from the Bisaya. In contrast, the Zampen is the standardized breed of the Basilan chicken.

Of these groups, each has unique features the would-be raisers should know. It will serve as a guide for them when acquiring chickens from other raisers or enthusiasts. It is to examine the integrity of the bought breeders. Knowing the distinct features of the local fowl could also benefit the consumers. Unlike the broiler chickens, the local fowls are less fleshy. The body's shape is somewhat like a "banana blossom" when holding it from the base of the neck towards the tail. The legs are slender regardless of shorter or longer.

The foreign native chicken has a blocky body similar to the broiler. These chickens are more prominent in body size than the Philippine native chicken. According to the breeder where it belongs, they have thicker feathering and are almost uniform in plumage color and pattern. Most of the chickens in this group possess a single comb type.

The less fleshy body shape, somewhat like a "banana blossom," is a unique feature of most Philippine native chickens.

As a hybridized chicken, the viability of the stocks is limited within a generation. The raiser must purchase new chicks to have almost consistent growth and reproductive performance. Other raisers practiced upgrading where the rooster of a foreign is mated with the hen of local chicken. The productivity of the offspring is between the two parents but degraded when used in the next generation. Moreover, some raisers detected chicks' sensitivity to infections and unpredictable reproductive performance.

Identifying and Establishing the Traits of the Flock

A steady supply of one-day-old chicks is the purpose of establishing a breeding flock. The offspring is expected to be marketed at three months with a marketing liveweight of 850–900 grams. The meat quality should match the requirement of its niche market, having a tender, juicy and distinctive taste as the distinguishing features of the Philippine native chicken. In attaining these traits, the breeder stocks should possess the following characteristics.

Liveweight. The stable live weight of the chickens can be detected when they are ten months old. After this age, the increase in weight is minimal. The ideal weight for the hen should range from 1.5 to 2.0 kg and 2.5 to 3.0 kg for the rooster. The probability of attaining the expected marketable weight to the offspring is workable in these weights.

Shank and skin color. The color of the shank and skin signifies certain traits of economic importance. It is recommended to have breeder stocks with yellow legs and skin. A yellow shank can be if both the shank and skin are difficult to acquire. The chicken with this trait can digest roughage more than other colors. Its meat has a higher level of free amino acids and a higher infection tolerance or resistance.

Comb type. The chicken's comb signifies certain traits that may be valuable to the location of the project site. The single-comb chickens are best suited in warmer areas. About 30-40% of the heat generated in the body is dissipated in this organ of the chickens. On the other hand, the chickens with pea comb are ideal for raising in areas with a cooler environment. They conserve more heat and have thicker skin over their breast area. This comb type also signifies for faster growth rate at a young age.

Suppose the raiser aims for a faster growth rate at a young age. In that case, the chicken with the pea comb type can be selected instead of the other. It is to shorten the growing or rearing period until the marketing age. The provision of balanced nutrition will further help reduce growing days in less than three months without affecting the quality demanded by the market.

Body size. The Philippine native chicken has smaller body sizes but lays more eggs and tastier meat. It is flighty and ideal for a free-ranging production system. On the other hand, the larger phenotypic group of local fowl lay fewer but bigger eggs. The chicks from this group of chickens grow faster and have a higher survival rate. They are not flighty and have nearer-ranging behavior from the house where these fowls are kept.

Raisers who kept on keeping native chicken for free-range prefer the smaller phenotypic group because of its ability to escape predators and excellent grazing behavior. The trade-off of this group is the extended growing period to attain the marketable live weight. Besides, keeping these chickens in confinement makes them vulnerable to infections.

The technical aspects of breeding are deduced into a practical learning experience. It allows the raiser to possibly develop native chicken based on the requirement of a niche market in their respective area. One element of success in raising native chicken on a commercial scale lies in the quality of the breeder stocks.

Simplified breeding technique. Keeping the various genetic lines of Philippine native chickens is expensive and needs a technical person/s to handle such work. Besides, the in situ (on research station) where the production environment is highly controlled and the genes of the chickens have limited exposure to various factors which may warrant for it to develop naturally. Keeping the native chicken lines under farmers' fields will be more practical and cheaper.

The breeding system at the Central Philippine University Research Station for Philippine Native Chicken is a simplified crossing between the smaller and larger phenotypic groups. It is to make use of the performances of the offspring that can equal or superb to the two parents. The gauge of performance assessment is based on the identified traits that raiser/s would like to have in their flock.

However, those who wanted to keep the native chicken in semi- or full-confined conditions preferred the larger genetic group. Raising this group of chickens requires supplemental feeding. It is marketed within three months from hatching to have tender and juicy meat. These chickens are easily tamed and resistant to infections.

Bigger body size, pea comb, and long legs. To take advantage of the unique characteristics of each group, consider crossing these two phenotypic groups of native chicken. Most chicks produced from this crossing reach the marketing weight of 850 to 900 grams within 90 days. With a stringent selection, most chicks from this mating possess an intermediate body size, long legs, and a pea comb. Its capacity is almost the same as those in the comb of single-comb chickens. The native chickens having these characteristics could thrive in warmer areas. The heat generated in their body dissipates through their long legs. This fowl is prone to predators in mountainous areas due to its inability to run faster and fly higher than smaller fowl.

Breeding System and Technique

The breeding stocks of Philippine native chickens at Central Philippine University are the product of crossing between the Bisaya and Jolo native chickens of Western Visayas. The crossing of these two phenotypic groups started in 2013. In the succeeding years, the basis of the selection of stocks is on the niche market's quality and the raisers' needs. After years of selection, the current breeder stocks fit with the package of technology developed in the CPU Research Station for Philippine Native Chicken.

In this breeding technique, the hen is from the smaller phenotypic group, and the rooster is from the larger group. This mating pattern has a better combining ability than the reverse one. The chicks from this mating are used to produce day-old chicks. It can either be sold for the market or fattened and later sold in the market when it reaches the marketable liveweight of 850-900 grams.

The pen mating technique ensures the proper combination of hens and roosters based on identified traits. Seven hens and a rooster are held in pens measuring 4ft wide and 8ft long. The number of breeder stocks per pen had no significant effects on the fertility and hatchability of eggs laid. Reducing the number to five hens per rooster can also be done. Still, the offset will be the cost of supplemental feeds due to the increased number of roosters. The possible production cost per day-old chick can be more expensive than those hatched out of seven hens for every rooster.

Minimizing the Impact of Inbreeding

The possible impact of inbreeding among the breeding stocks is of significant concern among the raisers of Philippine native chicken. Its economic implications can bring losses to the project's operation. Reducing reproductive performances and lower infection resistance are possible effects of inbreeding among the breeding stocks. Thus, if possible, the inbreeding should be minimized through a practical technique to avoid it without sacrificing the quality of the final product–the dressed Philippine native chicken.

Introducing at least five roosters in the flock of 100 breeder stocks every year can minimize the possible impact of inbreeding the flock without affecting the established traits. However, these roosters should come from far-flung areas where the possible intrusion of foreign native chickens is limited. Acquiring it from farmers' fields with smaller flock sizes is already purified. It has naturally-evolving genes adaptable to current climatic conditions.

Furthermore, it should possess the same traits as established in the flock. It is to allow the detection of any possible infections and have them cured first. Vaccinate these chickens before mingling them with the existing stocks.

Culling, Selecting, and Replacing Breeding Stocks

In pen mating, cannibalism among the stocks may be detected. It is due to fighting, intentional prolapse of the uterus due to picking at egg-laying, or introduction of the new member in pens. It is recommended to prepare at least 15 pullets and three roosters every three months to replace those dead, unproductive, and sickly breeder stocks. Do not mix the pullets and cockerels among the older stocks. It is suggested to mix the breeders of the same age only. It can be done by putting fewer chickens from pens into a single pen based on the stocking rate of seven hens for every rooster.

Characteristics of productive breeder stocks. A careful examination of the physical characteristics of good breeder stocks must be done. It is usually done among the hens than those the roosters.

A productive hen commonly has a moist cloaca, flexible/soft bones in the vent, reddish face and comb, brittle feathers, and thinner deposited fats in the vent area. The records for reproductive performances in every pen can further aid in identifying unproductive breeding stocks. However, there might be some breeder stocks on the rest. Those with physical characteristics beyond what has been described can be candidates for culling. Giving at least two months of observation before culling would be better.

Culling age. The compulsory age to cull the flock of breeder stocks is when they reach the age of two years old. At this age, the yearly egg production drops by 20%. The eggs can be bigger but can be offset by reducing the number and, possibly, the vertical transmission of infection. Older stock in the flock has a higher infection tolerance. Still, it might transfer to the chicks via the yolk formation in the reproductive tract. Follow the culling age religiously for a higher survival and egg production rate.

02

Housing Design and Positioning of Equipment

Summary

The housing design developed here at Central Philippine University can be expensive at first glance. Still, in the long term of operation, it is cheaper than conventional housing for the backyard scale of production. It is the materials used in the construction that commands higher costs. However, fewer individuals can easily construct this, and the maintenance costs are cheaper.

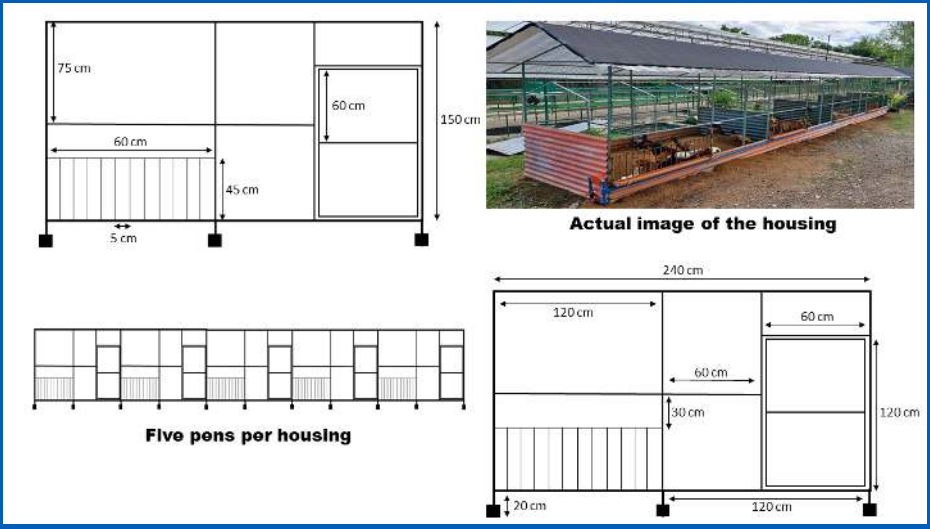
The production costs can be further reduced by employing fewer caretakers to take care of larger flock sizes. The caretaker's occasional entrance to the pens will minimize stress on the flock. The occurrences of infection can be minimal if there is good ventilation, accessibility to natural light, and the flow of fresh drinking water in the housing. The automation of drinking water and light ensures the timely delivery of the critical needs of the chicken.

Monitoring can be done with ease due to the confinement of the flock. Greater flock size can be raised in the limited area with this design. Integrating the rice hull as litter materials help minimize odor and fly infestation in the project.

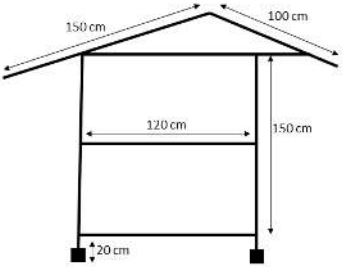
Thus, with this housing design, the project on commercial production of Philippine native chicken can be constructed even in peri-urban areas.

Sketch Plan

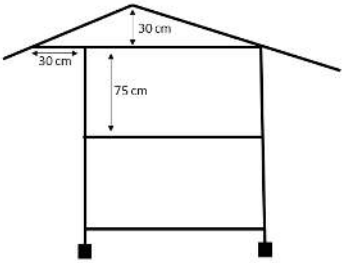
The sketches and actual images for the standardized housing for the breeding stocks are shown in the succeeding pages. The drawing of the footing used to construct the collapsible housing is added. This housing could be transferred from one place to another if opted for by the raiser.



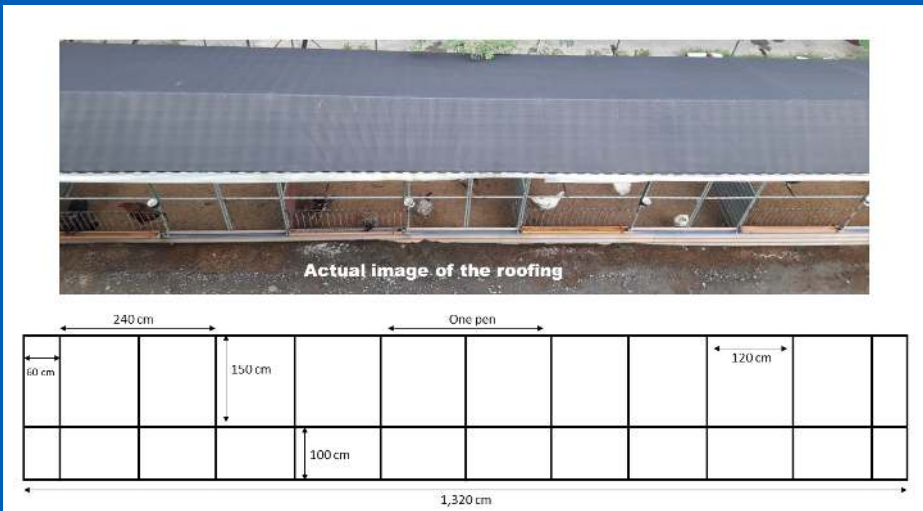
The figure in this page shows the front view of the housing for the breeder stocks of Philippine native chicken. Every housing comprises five pens that can accommodate 35 hens and five roosters. The entire length of this side of the pen is 240cm, and the height from the tip of the footing is 150cm. The depth of the foot is 20cm. On the other hand, the slatted area where to put the feeding and drinking troughs should be on the other half, whereas the other half will be the door. Its opening should be adjusted to fit the door with a dimension of 60cm wide by 120cm high. The complete measurement of the other parts of the front view of the pen is also given in the above figure.



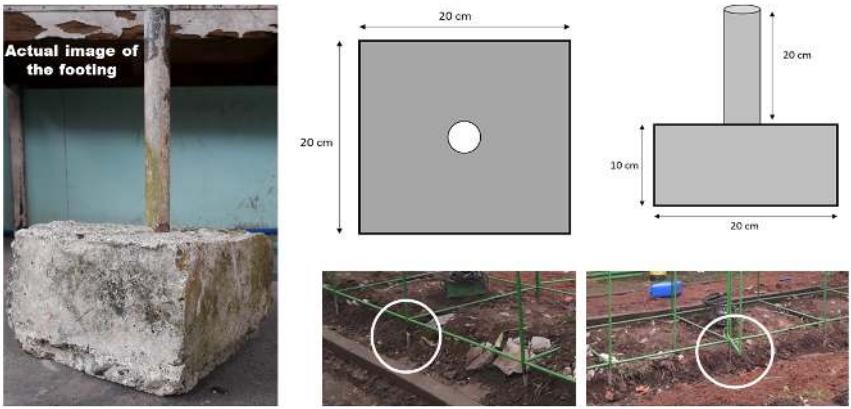

Actual image of the housing



For the side view of the housing, it is presented in the figure in this page. The total height from the footing to the topmost of the housing is 200cm. The width is 120cm, and the height from the truss to the supporting frame is 75cm. The height from the supporting structure to the base is 75cm, as well. The width of the roofing trusses is 250cm. More measurement is shown in this figure.



The total length of the frame for roofing for the housing is 1,320cm. An extra 60cm on both sides is added on 1,200cm to come up with such length. On the 150cm length, it will be the bending part. It will be toward the back/rear side of the housing. Wield the supporting frame on the bending length to support the trusses of the roofing. These measurements are shown in the above figure.



Moreover, the housing should have a footing that will be buried in the ground (figure in this page). It has a dimension of 20cm in a square with a 10cm thickness. It has embedded with ¾ GI pipes having a height of 20cm, where an extra length of ½ GI pipes from the frame (as the post) will be inserted and partially welded.

Material Requirement and Specification

The design and materials used in housing construction followed the ones used here at Central Philippine University. The frames of the collapsible housing comprise ½ GI pipes with a thickness of schedule 20, as enumerated in Table 1. The ¾ GI pipes are used in the footing's fabrication for the housing. The GI pipes are preferred because they are galvanized and do not rust easily. The 9mm corrugated bar is used to fabricate the slats for the opening towards the feeding and drinking troughs. Five centimeters is the gap between the slats. This is enough to allow the heads of the breeder stocks to access the troughs behind it.

The roofing comprises 200 microns of UV plastic and 50% UV net. The net is above the plastic to filter sunlight penetrating it. Instead of a plastic clip, the aluminum W-clip holder and W clip are used to hold the roofing and strengthen its integrity against strong wind and heavy rain. Do not invert the positioning of the roofing materials, for it will intensify the heat inside the housing.

List of Materials and Other Costs Associated with the Fabrication of 40 Breeder Stocks Capacity Collapsible Housing

Table 1. List of materials and other costs associated with the fabrication of 40 breeder stocks capacity collapsible housing

Materials	Unit	# of unit	Cost per unit	Total
½ GI Pipes schedule 20	length	35		
¾ GI Pipes schedule 20	length	2		
9mm corrugated bar	length	6		
Wielding rood	kilos	5		
Cutting disc	pieces	30		
Aluminum W-clip holder	length	11		
W-clip	length	22		
50% shade UV net	meter	15		
200 micron UV plastic (3.0m wide)	meter	15		
Gauge 26 GI sheet (8ft long)	length	9		
½ hole Aquanet (10 ft wide)	meter	33		
#2 Nylon twine plastic rope	roll	3		
Cement	bag	2		
Ready-mix sand & gravel	cu.m.	1.5		
1¼ blue pipes	length	5		
1¼ blue pipes - T	pieces	10		
½ blue pipes	pieces	1		
½ ball valves	pieces	2		
½ union valve	pieces	2		
Liquid cement (100ml)	tin can	1		
Solenoid valve	piece	1		
24 hours timer	piece	2		
2.0 THHN wire	meter	30		
15 Amp circuit breaker w/ casing	piece	1		
Bulb receptacle	pieces	5		
5 watts LED warm white LED bulb	pieces	5		
Electrical tape	pieces	1		
3" orange pipe	length	2		
GI wire (gauge 16)	kilo	1		
Rice hull (50kg cap feed sack)	sack	25		
Labor (45–50% of the material cost)				
Electricity (10-15% of the material cost)				
			Total fabrication cost	

The blue pipes, ball valves, union valves, liquid cement, solenoid valve, and a 24-hours timer are needed to install the automated drinking water system. It is one way to reduce the time spent cleaning the individual drinking troughs. It can be connected to a pressurized water tank or an elevated water storage container at a height enough to generate minimal pressure upon dropping. Pressure is needed in distributing the water in pens. A 24-hour timer and a normally-closed solenoid valve will control water availability for the whole day. Setting a time when the water will be available is one way to save from untimely flowing.

Another 24-hour timer will control the lighting in the housing of the breeder stocks. It is to allow the automatic to put on and off lights based on the set number of lighting requirements of the hens and roosters. The estimated cost for this housing design is around Php50,000.00–Php70,000.00. The labor cost may vary depending on the area where this project will be established.

Positioning of Feeding and Drinking Troughs

The feeding and drinking troughs are critical to the spread of infections and cleaning time. It takes almost three to five minutes to cleanse the individual waterer and is shorter for the feeding troughs. The improper cleaning might lead to the propagation or spread of infections. At Central Philippine University, automated distribution of drinking water is developed. The time spent cleaning this equipment was significantly reduced.

The continuous connections of blue pipes situated below the feeding troughs serve as the channel for drinking water distribution for the breeding stocks (as shown in the figure in the next page). Do not reduce the size of the blue pipes to less than one inch in diameter. This diameter will allow a better flow of water inside the tube. Some of the rice hulls that stick on the chicken's beak might fall into the drinking troughs and block the water flow if the diameter of the blue pipes is smaller than what is prescribed.

The three inches in diameter orange pipes can be used for the feeding troughs for this purpose. The allotted feeder length will be one to one and a half feet. It will be cut in half, and the tip of its longitudinal sides will be reformed toward the inner side. The curve will prevent feed wastage. A C-holder from corrugated bars is welded on the slat to hold the feeding troughs. The reformation of the orange pipe as a feeding trough is shown in the figure in this page.

A T-connector connects both ends of the two blue pipes near one end of the feeding troughs, as shown in the figure in this page. An extension pipe with enough height to prevent water overflow is connected on the third end of the T-pipe, pointing upwards. An extra pipe is installed at the end to cater to the overflowing water from the water lines (in the previous page). A leveler must be used in installing the blue pipe for a water system to prevent overflow.

The three inches in diameter orange pipes can be used for the feeding troughs for this purpose. The allotted feeder length will be one to one and a half feet. It will be cut in half, and the tip of its longitudinal sides will be reformed toward the inner side. The curve will prevent feed wastage. A C-holder from corrugated bars is welded on the slat to hold the feeding troughs. The reformation of the orange pipe as a feeding trough is shown in the figure in this page.

Automation of Lights and Drinking Troughs

The five watts LED warm white bulb can be used for lighting in the housing. It should be installed in between of the two pens of the housing. For the flow of water, a normally-closed solenoid can be used for this purpose. A bypass line should be installed and opened when there is a solenoid valve malfunction.

The ON and OFF of the light is governed by the 24-hours timer (as shown in the figure in this page). In lighting, it is being ON at around 5:30 PM and OFF at 10:00 PM. It compensates for the 16 hours of light requirement of the breeder chickens. Another timer will be installed to control the solenoid valve in the drinking troughs and is put off during nighttime. The timing of the opening of the solenoid valves can be at 10-15 minutes every hour of operation in the daytime. However, the continuous flowing should be done from 10:00 AM to 3:00 PM if the climate is warmer.

Lay-outing of the Housing in the Project Area

The housing for breeding must be properly layout and consider the flow of air, convenience, traffic of humans, easiness in the daily routine activities, positioning of the equipment, and the overall biosecurity measures for the farm. Figure 13 shows the housing positioning for Central Philippine University breeder stocks and brooder/grower native chickens. It is conceptualized based on the assumption that the interested raiser has a limited area for this kind of project. The accessibility of the project to the owner/raiser is critical for the efficient operation of the enterprise.

The technology demonstration area for the commercial production of Philippine native chicken is about 330 square meters. It can hold 176 breeder stocks and over 1,100 grower chickens. The concept of this design is to maximize the limited available area. It is also on the premise that it may earn more per square meter of the area being utilized.

The distance between the housing is four meters (figure in this page). It is already enough to allow a good flow of air between housing. Using the Aquanet enables good air distribution due to its larger hole, which could not easily be blocked with dust. The shorter height of the housing could grant for even distribution of sunlight during the day. The raiser could add short-growing plants in between housing to further filter the circulating air within the area.

Practicality and Convenience of the Design

At first, the materials used in constructing the CPU-developed housing can be expensive. It can easily be fabricated, requiring fewer individuals to do the repair and maintenance. However, considering the valuable life years, ease in daily activities, airflow, accessibility to natural daylight, and possible integration with plants is cheaper. The figure in this page depicts the breeder house at the Research Station here in Central Philippine University.

The caretaker can easily access the feeding and drinking troughs. It requires a shorter time than those conventional designs. Caretakers of various ages can even do these tasks. The monitoring can carry out conveniently due that the chickens are held within their respective pens. The pen can easily be cleaned if an infection occurs by removing the infected stocks and rice hull.

The automation of the light and water further eases the work. Using disinfectants can be reduced due to the accessibility of the pens to natural light. Sunlight is the cheapest and most effective means of disinfecting the area and the housing. It means saving and thereby increasing the potential profit derived from this project.

The Payback Period

03

Flock Nutrition Management

Summary

Any reduction in the cost associated with feeds implied an improvement in the bottom line of day-old chick production. The corn-based formulation is one way to ease the sourcing of feedstuff and possibly further reduce the cost by planting the corn. It does not need sophisticated equipment for milling. The mechanized mini-corn mill can compound feeds enough for even 200 breeder stocks. The mixing can be done manually using the cleaned shovels on the pavement or a mini mixer readily available online. In storing feedstuffs or compounded feeds, they must be piled in a wooden pallet about a foot high to allow easy floor cleaning from where they will be put. A cleaned sack is the common packaging material for storing feedstuffs and finished products. A repellent like the essential oils citronella or lemongrass can help repel the common species of insects infesting the stored grains.

Furthermore, the storage room must be in an elevated area, and the environment within the room or building can easily be controlled. There is a provision to prevent the storage pest easily and enough space between piles of feedstuffs and feeds to facilitate easy cleaning and airflow for ventilation. Always check the roofing for a leak to prevent the room from being humid. The storage moisture content of the product that will be stored should be within 10-12% only. Periodic cleaning should be done to remove areas that will serve as inoculation areas for pests and allow better ventilation between piles.

Feed Formulation

The cost of supplemental feeds comprised the most significant proportion of expenses associated with producing one-day-old chicks. Any reduction in the cost means increases in the profit derived from selling the chicks or the fattened chickens directly. The compounding of ration in the farm can be the best alternative to reduce costs. Besides, the Native Chicken Breeder Feeds will always be fresh for your flock.

Table 1. Formulation and Inclusion Levels of Native Chicken Breeder Feeds

Feedstuffs	Inclusion level	Volume (kg)
Corn meal	0.805	80.50
Soybean/Beans meal	0.100	10.00
Copra meal	0.030	3.00
Fishmeal	0.040	4.00
Natural feed premixes	0.025	2.50
Total	1.000	100.00

The Central Philippine University Research Station for Philippine Native Chicken compounded the Native Chicken Breeder Feeds specifically for the local fowl of this country (figure in this page). It is a corn-based formulation for easy sourcing of the raisers in nearby areas and allowing the farmers to have an alternative market right where they are. The soybean meal can be replaced by the mungbean, pigeon pea, or any beans available in the area. The copra meal and fish meal can easily be source-out. It will be the Natural Feed Premix that will be sourced from Central Philippine University. However, instead of it, the feed premixes available in the local poultry supply can replace it.

Feed Processing Equipment

The milling machine used to compound the supplemental feeds is accessible online (figure on this page). Depending on the design and milling capacity per hour, the cost can be as high as 25,000 per unit. The greater the milling capacity, the higher the costs. The 100 to 200 kg capacity per hour corn grinder is enough for compounding the rations needed to feed the chicks of even 200 heads of breeder stocks.

It would be nice to have a mixture of bran and grits in its meal form in corn milling. Adjustments should be made in the milling machine with a good proportion of the grits and bran as the final product. If corn bran is cheaper, this can also be used at a ratio of 30% cracked corn and 70% corn bran.

The soybean or other beans must be roasted before milling in the same equipment used in corn. The consistency should be like that of the corn bran. Do not over-roast the beans, for it will reduce the quality of the meal.

The copra meal should be re-milled because it is the cake form when purchased from the coco-oil refinery plant. One pass milling is enough to develop the consistency needed to compound Native Chicken Breeder Feeds. On the other hand, dried scrap fish can also be milled in the corn mill. After the milling, have extra corn grains grind in the equipment to remove the salt clings on the machine's sides. It is to minimize the possible corrosion that will take place if not cleaned.

The compounded rations can be mixed manually using clean shovels in a wider flat container or cemented pavement. The mixing should be thorough until the compounded rations become homogenous in consistency. However, in greater volume, a mechanical mixer can be used as in the figure shown on this page. Allow about 10 -15 minutes of running before unloading the supplemental feeds.

Sourcing and Handling Feedstuff

Considering that the greater inclusion level is corn, it is accessible to source corn in the farmers' fields. It will be cheaper if the corn to be milled is purchased during the harvest season. However, extra care must be taken into consideration when storing the feedstuffs. Construct provisions to eliminate the possible infestation of rats and weevils. The soybean and other beans are the most sensitive to storage insects. Using either of the essential oils of lemongrass or citronella can help.

The newer acquisition is ideal for copra meals because it enhances the supplemental feeds' odor. It is the same with the fish meal. It could be stored for one to two months, but the quality may degrade.

The ideal moisture of feedstuffs at storage must be 12%. It is to prevent the possible proliferation of microorganisms causing aflatoxin. Before stacking the sacks, do not pile them directly on the pavement; put a wooden or metal pallet. Good ventilation is recommended within the storage area. Check the roofings for any leaks, and the wall must be rat-proof.

Packaging and Handling of Processed Feeds

After mixing supplemental rations, the feeds should be packed using an appropriate container and its purpose. The material used in the packaging of supplemental feed is a woven plastic sack. Using plastic liners or laminated bags can protect the products from excess moisture or rain during transport. However, if the feeds will be solely used on the personal farm, empty containers like plastic tubs, clean old sacks, or drums of any kind can be used.

Moreover, the optimum quality of the compounded feeds is attained when it is newly mixed. It is suggested to prepare enough volume for a maximum of one month. The freshly prepared supplemental feeds have better palatability and degrade as the storage time increases. It should be piled using a wood or metal pallet less than one foot high from the pavement/ground. This gap allows aeration and easy cleaning to prevent storage pests from the accumulated dust below the pallet.

Conditions of a Storage Room

The availability of feedstuff is critical in compounding rations for native chickens. It is suggested to have at least two months of reserve raw materials. It is to allow a substantial volume of required feedstuff needed for mixing the supplemental feeds. The establishment of a storage room or area must be considered. The following are the requirements for identifying the place or space to be a storage area where the feedstuffs will be stored:

Elevated area. In low-lying areas, the housing flooring should be elevated from the ground. It is to prevent the feeds from getting wet during the rainy season.

Controlled environment. There should be an insulator in the roofing or sides to prevent drastic changes in temperature and humidity. The presence of a window could be of help in maintaining good ventilation.

Pest free. The window should be provided with fine-hole wire mesh to prevent the possible entrance of small insects and rodents. The wall can be made of concrete or GI sheet to prevent rodents from making a hole.

Easy movement between piles. There should be space between stacks for easy monitoring and airflow. It will also serve as a passage for periodic cleaning.

Leak-free. The roofing should be rigidly and regularly checked for any leak that will allow water to flow and increase the humidity within the storage room. The dampness of over 70% relative humidity may cause the proliferation of molds among the feedstuff.

Handling and Storage of Feedstuffs and Rations

The freshness of the native chicken supplemental feeds is critical for their palatability and nutritional level. The absence of synthetic preservatives shortens its shelf-life. There is a negative correlation between the quality and storage duration. Here are some pointers to consider in storing supplemental feeds for free-range native chickens:

The moisture content (MC) should be within 11–12%. It was observed that the lower MC lengthens the shelf life of the feeds. However, the meals should be moistened before feeding them to chickens.

Storage room temperature is about 25 degrees Celcius. The compounded supplemental feeds need to be stored in a dry and cool room, ensuring that there is no leak in the roof that can cause possible flooding in the floor.

Air movement in a pile. One or two feet of space between stacks should be provided. It will allow sufficient airflow.

Provision of controls for the entrance of rodents and insects in the feed room. It can be done by putting fine wire mesh in the intake and exhaust of the storage room. Rats and insect traps can also be added for this purpose.

Periodic cleaning of storage room/area. Remove the dust in the room-it can serve as an incubation area for the insects. Besides, the free flow of air within the place can help minimize the occurrence of such pests.

Supplementary Ideas

04

Flock Health Management

Summary

The best prevention for the occurrences of infection is through vaccination. However, this must be complemented with enough knowledge about the common ailments infecting the Philippine native chickens and the techniques to prevent and control if its presence is detected in the flock. Considering housing design, balanced nutrition, fresh and clean drinking water, and biosecurity measures will enable the raiser to produce a healthier flock. Phytomedicines' processing, storage, and dosages will be an alternative to synthetic medications.

Vaccination program for native chicken being practiced at CPU Research Station for Philippine Native Chicken

Diseases	Age (days)	Class of vaccine	Route of administration
Newcastle disease	3 - 5	NCD B1B1	Either intranasal or intra-ocular
	21 - up	NCD Lasota	Either intranasal or intra-ocular
	80 - 90	NCD Lasota	Either intranasal or intra-ocular
Newcastle disease Infectious bronchitis Infectious coryza Salmonella spp. Egg drop syndrome	110 - 114	5 in 1-lifetime vaccine (NCD, IB, IC, S, EDS)	Intramuscular injection

Vaccination Program

The purpose of vaccination among native chickens is to prevent infection with no specific treatment. It may come either singly or in Bordeaux. The latter is the combination of several killed pathogens into one vaccine. The attenuated vaccine is intended for short-term immunity, whereas the killed vaccine is for lifetime immunity. The table on this page shows the vaccination program for native chicken practiced at CPU Research Station for Philippine Native Chicken.

Three major vaccines are used for the local fowl and administered at different ages. The NCD B1B1 is administered via intranasal or intra-ocular when the chickens are three to five days old. The intra- means for administering the vaccines via the opening of the nostril (for intranasal) or eyes (for intra-ocular).

The NCD Lasota as a booster dose is given when the chicks are 21 days old and older. These doses are good until the chicks reach three months old. Before administering the 5-in-1 lifetime vaccine, a follow-up dose using the NCD Lasota is administered when the chickens are 80-90 days old. This vaccination aims to determine if the intended replacement stocks are free from infection. The chicken experiencing ailments will indeed be killed after administering such a vaccine. Extra care must be taken when using either NCD B1B1 or Lasota for a highly infected vaccine. It would be best to let the neighboring raisers know about the vaccination schedule. They should be given extra doses, or any arrangement should be made to benefit both parties.

Among the replacement stocks that survived after the dose of NCD Lasota, the 80–90 days old, select the individual chicken possessing the traits of economic importance and separate them from the rest of the flock. The 5-in-1 lifetime vaccine should be given two weeks after the previous dose. In using for an oil-based lifetime vaccine, it should be administered through intramuscular injection. It means that the syringe needle should penetrate the muscle of the stocks. It is usually injected either in the thigh or breast. Do not inject it into the fatty portion of the body, for it will trigger the formation of cysts. Use 16mm needles to withdraw the vaccine from the vial. It should be used explicitly for this purpose only. It is to prevent possible contamination of the vaccine. The disposable tuberculin syringe (1ml capacity) should inject the vaccine into the recipient chicken. Carefully remove the tuberculin syringe from its needle and insert the siphon end on the 16mm needle inserted into the rubber cap of the vaccine. Withdraw the recommended dosage and return the original needle of the tuberculin to administer the vaccine. Gently massage the injected part to dissolve the bubbling condition of the skin.

Do not use any vaccine if such an intended infection is not prevalent. The water-based vaccines are highly contagious and infective, even if the wind carries a few drops of them. To prevent conflicts, possibly inform and share your vaccines among the neighboring raisers. Administer the vaccine in the afternoon. Do not administer if the condition is about to rain. The remaining or excess oil-based vaccines can be stored under chilling conditions. The number of days for storage is written on its label. However, for NCD B1B1 and Lasota, the excess should be burnt along with its containers. It can also be buried deep enough that stray animals cannot excavate it.

Common Ailments of Breeder Stocks

The focus of this presentation is on organic native chicken production. Many infections inflect the flock, but the diseases enumerated below commonly occur among the Philippine native chicken. If infections are not listed here, please consult the nearest Disease and Diagnostic Laboratory of the Department of Agriculture or the Doctor of Veterinary Medicine.

Newcastle Disease (NCD)

The NCD is also called pneumo-encephalitis. It is a viral infection characterized by a watery discharge in the nostril, gasping, swelling of the face, paralysis, and trembling or twisting of the neck of the infected chickens (figure on this page). The NCD virus may infect the respiratory, nervous, or both, which is considered a lethal disease. A mild occurrence of either of the first two forms is possible. The laying hens infected with NCD may exhibit decreased feed consumption, water intake, and egg production.

The chicken experiencing the mild form of NCD shows either twisting of the neck, improper gait, sticky discharges in the nostril, red eyelid, or combinations of such signs.

Transmission, treatment, and prevention. The NCD virus can be transmitted through contaminated farm equipment, caretakers, visitors, and equipment from areas where this infection is prevalent and wild birds. The aerosol droplets from infected fowl can be carried by wind and transmitted to neighboring farms. At the early onset, the dead chickens should be buried and not be dressed to minimize the infection rate. There is no specific treatment, but using the pure juice extract of lemongrass at one to two teaspoons can help boost the immune system of infected chickens. The administration of vaccines is the best option to prevent the occurrence of the NCD virus.

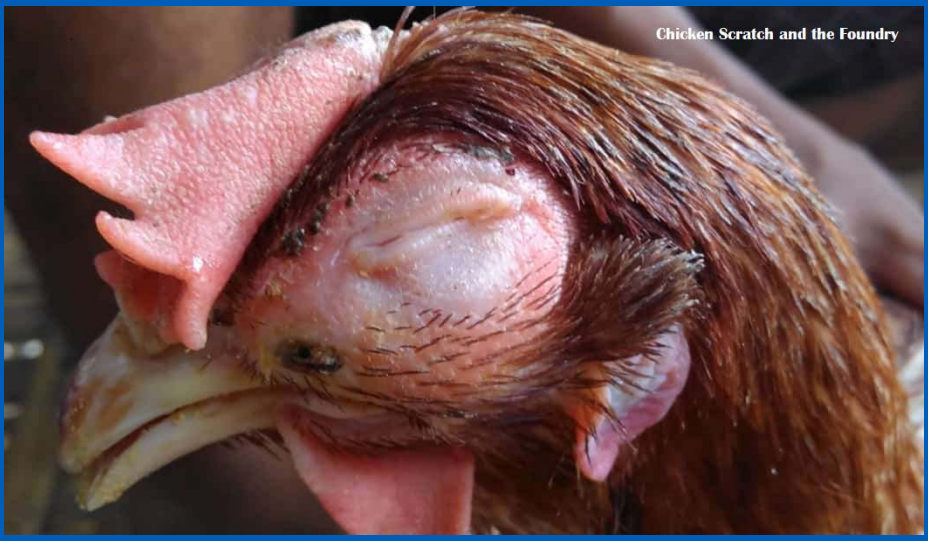
Mycoplasma gallisepticum

This pathogen handles an ailment called chronic respiratory disease (CRD). It is synonymous with infectious sinusitis and Mycoplasmosis. The signs of this infection among the breeder stocks can sometimes be sticky watery secretions from the nostril, bubbly exudates in the eyes, and enlarged nostrils, as shown in the figure above. Furthermore, sneezing and rales may be observed in infected chickens. There are events that the infected chicken could be survived but may have an unthrifty appearance and stunted growth.

The outbreaks of M. gallisepticum are due to poor housing ventilation. The presence of decomposing excreta may further aggravate the conditions. Furthermore, the infected chickens may spread the infection through the feeding and drinking troughs and even in the laid eggs of the hen. This infection can be prevented by periodic cleaning of the housing and equipment, provision of good ventilation, and good nutrition. Using CPU Lemongrass Emulsified Concentrates by mixing in the drinking water can help to mitigate the conditions. There is a vaccine for Mycoplasma gallisepticum, but its availability is limited to only a well-known poultry supply store or the maker's representative.

Mycoplasma synoviae

This pathogen causes silent air sacs, infected synovitis, and synovitis. The infected chickens may exhibit lameness due to the leg joints' swelling (figure on this page) and the blister's formation in the breast. Aside from this, it also has a respiratory form that is indistinguishable from those experiencing chronic respiratory diseases (CRD). Greenish diarrhea will be observed among the chickens experiencing a severe level of this infection. The treatments and preventive measures adopted in Mycoplasma gallisepticum can apply to this pathogen.



Infectious coryza

This infection is caused by Haemophilus paragallinarum and is synonymous with Avibacterium paragallinarum. The chicken infected with infectious (fowl) coryza may exhibit nasal and sticky eye discharges, swelling of the face, labor breathing (dyspnea), inflammation of the eyes, and reduction in egg production. The eyelids may stick together when irritated, manifesting in the case's severity as shown in the figure on this page. It may be further aggravated by secondary infections, like a chronic respiratory disease. The mortality of the infected chickens ranges from 20% to 50%, depending on the severity of the condition.

Transmission, treatment, and prevention. The transmission is facilitated by direct contact between the infected and healthy chickens. The birds that recovered from the infection may remain carriers and shed the disease-causing pathogen irregularly. Consuming contaminated feeds and water can be an agent of disease dispersion. It can be prevented through vaccination and the provision of well-ventilated housing. Putting a rolling curtain in the housing can help protect the breeder stocks during inclement weather. There is no replacement for the periodic cleaning of housing and surroundings to prevent the occurrence of infectious coryza. There are reported plant preparations to cure the infection. The eye spray made of 50% hydrogen peroxide and 50% distilled water sprayed directly in the eyes can help open the stick eyelids. Still, we could not guarantee their effectiveness due to limited laboratory studies.

Infectious bronchitis

It is caused by the infectious bronchitis virus (IBV), a family of the avian gamma coronavirus specifically for chicken only. It is synonymous with bronchitis and cold. The infected chicken may exhibit chipping, watery discharges on the eyes and nose, and dyspnea. It can easily distinguish from the CRD when observation is done in the evening when the flock is at rest. A prominent breathing noise can be heard among the infected chickens compared with those suffering from CRD. It is also one cause of the rough-, thinned-, wrinkled-, paled-shelled eggs and watery-like egg white.

Transmission, treatment, and prevention. The infection can easily be transmitted through air, contaminated feeds and water, infected dead chickens, contaminated equipment, and even by rodents and birds. Using garlic tea at five grams per tea bag can help minimize the infection. Every tea bag should be soaked overnight or for 12 hours in 10 to 15 liters of clean water. The following day, give it to the chicken's drinking water. Moreover, the vaccinations given to breeding stocks had better results than those given to chicks.

Salmonellosis

Salmonella enterica Pullorum is the causal organism of Salmonellosis. It is synonymous with pullorum and white bacillary diarrhea. The breeder stocks experiencing this infection are less active, are anorectic, have diarrhea, and have untidy plumage (figure on this page). The survivor becomes the asymptomatic carrier having the disease on its ovary.

Transmission, treatment, and prevention. Salmonellosis is transmitted from eggs to chicks, contaminated equipment and facilities, and even feedstuffs. Fish meal and oilseed meals are the potential sources of infections. Housing full of dust and with higher humidity promotes the growth of Salmonella. It can be prevented by buying breeder stocks from Salmonella-free flocks. Keeping the status of the flock free from such infections can be very important. Garlic tea can be of help to prevent the occurrence. Applying 0.3–0.5ml per head of breeder stocks of freshly extracted pure juice garlic via drenching can help control the infections.

Fowl pox

This infection is synonymous with chickenpox, sore head, avian diphtheria, and bird pox. It is caused by avipoxvirus in the Poxviridae family. Fowlpox can either be in dry or wet forms. There are cases where both conditions occur at the same time. The dry form is characterized by dark scabs in unfeathered areas but is very prominent in the fowl's head (figure on this page). It may even cover the entire face of the chicken in severe cases.

Transmission, treatment, and prevention. The transmission can be through direct contact, vectors, or both. The picking between the infected with healthy chickens can facilitate the faster transmission of infection. However, if the project area is swarming with mosquitoes, they can also serve as a carrier/vector of fowlpox. The feeding of mosquitoes from infected chickens to others that are unaffected may hasten the transmission. The virus lives in the blood of infected chickens. It is the reason for the transmission due to mosquitoes. It can be prevented by controlling the population of mosquitoes in the project area.

There is no specific treatment for fowlpox. It can be prevented through vaccination. It can be done two months before the laying period and is administered through wing web puncture. Furthermore, including fishmeal mixed with whole shrimp or exoskeleton prevents this infection.

Egg Drop Syndrome

This infection is caused by the Atadenovirus or popularly known as Adenovirus. It is synonymous with egg drop syndrome 76 (EDS-76). The infected hen lays pale, soft-shelled, or shell-less eggs (Figure 8). There will be drastic decreases in egg production. Still, before it, the hen excretes watery manure and dullness as early manifestations. The infected chickens remain healthy, and their fertility and hatchability are not affected. At CPU Research Station for Philippine Native Chicken, the occurrences of EDS are observed during the colder months of the year.

Transmission, treatment, and prevention. Reports showed that the transmission is due to the indiscriminate use of a vaccine specific to this infection. The spread of EDS was possibly due to importing stocks from countries with such illnesses. There is no specific treatment except for a vaccine as a preventive measure.

Botulism

It is caused by the exotoxin produced by Clostridium botulinum. It is synonymous with limberneck, bulbar paralysis, western duck sickness, and alkali disease. The rotten feed is a potential source of infection. After a few hours of eating the feeds, paralysis occurred. First to be paralyzed are the legs and wings. The severely infected chickens become sleepy and dull, with neck feathers that are easily pulled. The death of the infected chicken is due to the paralysis of the respiratory muscles.

Transmission, treatment, and prevention. Using spoiled supplemental feeds as fed to breeder stocks may further aggravate the cases of botulism in the flock. Discard the existing one and replace it with a new feed sooner. Use Epsom salts at 0.44 grams per bird in water or wet mash. The dead birds should be buried immediately to prevent the spread of infection.

Staphylococcus

Staphylococcus aureus is the causal organism of staph infection, staph septicemia, staph arthritis, and bumblefoot. Infected chicken commonly manifests weakness, loss of appetite, fever, swollen joints, watery diarrhea, and painful movement. On the other hand, the chicken exhibiting lameness, breast blister, and reluctance to walk are the arthritic (chronic) form. The bumblefoot or swollen footpad is due to the secondary infection of staphylococcus. It is a puncture injury because of pointed/sharpened objects stepped by the infected chickens.

Transmission, treatment, and prevention. Staphylococcus aureus is commonly found in the soil. When the chickens drink in the stagnant pool of water contaminated with it, it spreads infection. It can be controlled using garlic tea in drinking water or wet mash. In severe cases, have the freshly extracted pure garlic juice administered at the dose of 0.5ml per breeder stock by the drenching method. The chickens in the elevated flooring can get infected through the stray birds that might have the pathogens in their feet and step on either feeding or drinking troughs. Furthermore, using rice hulls as litter materials can prevent the occurrence of bumblefoot.

Colibacillosis

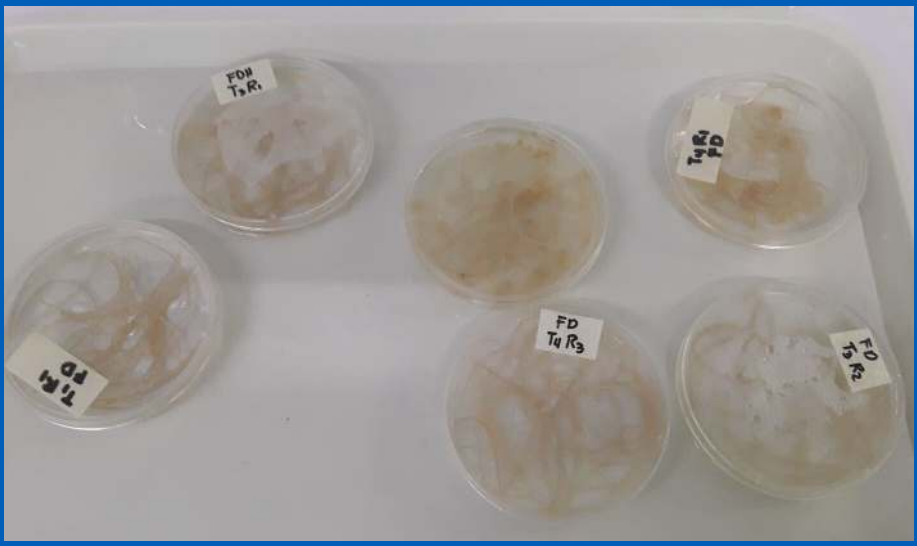
This infection is due to the pathogenic strain of Escherichia coli. It may even appear as deadly septicemia, subacute pericarditis, airsacculitis, salpingitis, peritonitis, and cellulitis. The E. coli may even serve as a secondary source of infection in some ailments of native chicken. The infected chickens may show blood in the feces due to lesions in the intestine and inflammation of the heart, lungs, reproductive tract, tissues of the abdomen, and some parts of the skin (figure on this page).

Transmission, treatment, and prevention. Stray animals like birds can transmit the infection by stepping their dirty feet in a waterer or feeder. The transmission route can be through the respiratory tract, gastrointestinal tract, skin, navel, and reproductive tract. It may transmit through the contaminated water and feeder with feces, housing, and litter materials. This ailment can be controlled by improved sanitation of the production environment, reduced fecal contamination, good ventilation, proper disposal of dead chickens, and the use of probiotics either in drinking water or feeds. Using vaccines for E. coli vaccine can help reduce the occurrence of infection. In addition, using garlic tea in drinking water is proven effective in controlling E. coli.

Fowl cholera

This infection is synonymous with avian pasteurellosis, cholera, and hemorrhagic septicemia. The causal organism of this infection is the Pasteurella multocida. The early signs of this disease are mucous discharge in the beak, ruffled feathers, diarrhea, labored breathing, lameness due to swollen joints and footpads, and rattling noise. Loss of weight, fever, and anorectic are the other symptoms. Death may follow in severe cases. The figure depicting the chicken infected with fowl cholera is shown on the page.

Transmission, treatment, and prevention. Fowl cholera can be transmitted by introducing infected stocks in the flock, stray animals, caretakers, and contaminated equipment and facilities. It can be prevented by incinerating dead birds. Using garlic tea in the drinking water can help prevent the occurrences. In severe cases, drenching 0.5ml of freshly prepared pure juice extracts can help recover the flock from infection.



Helminthiasis

The roundworm is the most common among the internal parasites infesting the Philippine native chicken (figure on this page). The tapeworms followed it. In the chickens, in free-range conditions, the rate of infections is over 80.00%. The chickens infected with helminths manifested reduced appetite, patches of bloodstain in excreta, pale, thinned bodies, dried shank, ruffled feathers, and sunken eyes with black lines surrounding the eyelids. In severe cases, it may lead to death among the infected chickens.

Transmission, treatment, and prevention. The infection due to helminths is more limited among the native chickens in confinement than those in free-range conditions. For the chickens in the latter situation, the transmission is usually facilitated by the droppings of infected fowls. Those healthy ones can directly ingest the adult worms expelled by carrier chickens. On the other hand, the eggs of helminths can be dispersed by the flies in the leaves of grasses which other chickens can pick. The chickens in confinement can get infected because of the flies and birds. Possibly, some eggs of helminth stick in the feet or legs of such vectors, and later they land in the feeding and drinking troughs of fowl in confinement. The infestation can be controlled through periodic housing cleaning and changing litter materials. Using garlic tea or pure juice extract effectively prevents adult worms and has ovicidal effects on the eggs of helminths. The same mode of administration as prescribed above with other infections.

Consideration to prevent the occurrences of infections

Reducing the cost associated with preventing and controlling diseases among the breeder stocks implies an increase in profit. There are alternatives to control the proliferation of pathogens, but damage/mortality will be experienced. Some considerations should be integrated into the farm operation to minimize infections.

Housing design. Access to natural daylight, free flow of air in and out, accessibility to water and feeding troughs, practicality, and protection against inclement weather and predators should be considered in housing construction. Allowing the native chickens to perform their natural behavior is another add-on to the housing.

The CPU developed-housing design passed in the decade of studies to meet the requirements for the commercial production of Philippine native chicken. All the considerations are considered to keep the occupants free from possible infections. The UV net and UV plastic allow for daylight to penetrate within the housing.

The sunlight serves as a natural disinfectant enough to destroy pathogens. The ½-inch hole aquanet as walling provides better ventilation, preventing the accumulation of harmful gases that may trigger the proliferation of carbon-loving pathogens like Mycoplasma spp. It has a rolling curtain that could protect the chickens from any form of draught.

The provision of feeding and watering troughs outside the housing provides easy access for the caretaker. It prevents the breeder stocks from contaminating it via their feet. The controlled-free flowing of water offers fresh, clean water at a specified time. The rice hull further augments this as litter materials. It can easily be removed and replaced with new when infections are detected.

Sanitation and cleanliness. The litter materials should be removed periodically to prevent the accumulation of manure, which may serve as the inoculation site for pathogens. A fresh rice hull should replace every three to four months. If the infection is detected, immediately replace the rice hull to prevent the possible spread of disease. There is no such replacement for the cleanliness of the project site.

Finely spread with agricultural lime in the litter materials to prevent the occurrences of small insects or mites. The misting of the rice hull with either lemongrass or citronella essential oil can further repel such insects. The vinegar of the coconut can be used as a disinfectant. It is at one tablespoon for every four liters of clean water.

The feeding and watering troughs should be cleaned before feeding to remove contaminants and spoiled feeds. Remove empty containers in the surroundings to prevent the mosquitoes from making it a breeding area if when filled with rainwater. Pointed and sharpened objects should be removed and stored in safer areas. Dust should be washed or released periodically.

Balanced nutrition. The breeder stocks fed with a balanced diet are more likely to be resistant to infections. The CPU Feed is the first scientifically-formulated supplemental rations for the Philippine native chicken. It is added with feedstuffs that help the fowl's immune system. Adding finely chopped grasses reduces the cost associated with feeds and their natural compounds, enhancing meat quality and its immune system.

It is suggested to use fresh supplemental feeds always. It was found that longer storage time may reduce the quality of meals. Besides, it makes the chicken more vulnerable to infections due to spoiling feeds. Using wet mash must be prepared enough for the feeding. Do away with preparing an extra volume, for it will be spoiled in the feeding troughs.

Fresh, clean drinking water. The drinking troughs are the agent for the spread of infections. Anyone of the chicken in a pen with illness drops contaminated body fluids on it. It will propagate on drinking trough that might infect the healthy chicken upon drinking on it. It is suggested to have the individual drinking troughs be washed at least twice a day.

At the CPU Research Station, the water system for the breeding stocks is automated and controlled-flowing. It is to eliminate the so much time that will be spent washing the individual drinking troughs. It requires about three to five minutes to be thoroughly washed in one drinking trough. Unlike in the automated system, the time spent cleaning was reduced. The water lines are cleaned weekly using a pressure sprayer to obliterate the rice hull and feed residue on it.

The controlled valve will open at five to ten minutes per hour, starting from 6:00 to 10:00 AM. Continuous flow is set from 10:00 AM to 3:00 PM when the environment is warmer to provide cooler water. The controlled flow resumes from 3:00 to 6:00 PM. The valve will close at 6:00 PM. In the evening, the water will be shut. It is the daily scheduling of controlled-free-flowing of drinking water for breeder stocks.

Vaccination. In addition, vaccination is another vital consideration in preventing infection. Using 5-in-1 vaccines effectively prevents infections from common diseases among the breeder stocks at the CPU Research Station for Philippine Native Chicken. It can help to minimize the usage of phytomedicines in the flock. The cost of vaccines is a little expensive. However, the savings on the use of preventive and therapeutic medications in the long term are still competitive.

Moreover, the raiser should limit vaccines for diseases prevalent in the project area. If an infection is absent in the place, do not use it; otherwise, the infection will spread in the area. NCD B1B1 is recommended if the breeder stocks are vaccinated with the 5-in-1 vaccine. The immunity present among the hens and roosters can be passed to the offspring, making the latter resistant to infections.

Biosecurity measures. Several measures need to be taken here; however, only a few essential factors will be considered for discussion. The newly acquired stocks should not be immediately introduced to the existing breeders. Have it in isolation for at least a week to detect any infection. Before introducing them to the flock, proper treatment should be given until the new stocks recover and are vaccinated.

Immediately isolate the infected from the rest of the flock in a pen if there are infections. Remove all the breeder stocks in that pen, disinfect, and change the litter materials with a new rice hull. The chickens in the said pen should be isolated from the rest in the housing if the detected infection is highly infectious. Assess the infected chicken's conditions to determine whether it is curable. It would be helpful to humanely dispose of it if the rate of infections is not curable or the chances of recovery are very nil.

Visitors' entrances should be controlled and adequately logged as the previous farms they visited. This practice establishes traceability if infections can be observed after the visits. Other related information, like exposure to areas known to have a disease epidemic, the purpose of the visit, and any contact with disease or vaccination activities outside of the farm, should be considered. Limit the number of visitors to less than five persons to minimize the stress the flock will experience. If still in doubt, have the visitors shower and wear disinfected gowns and boots before roaming on the farm.

Provide a perimeter fence to control visitors' entrances and stray animals like dogs. Additional traps can be installed to limit the access of rodents. One important thing, a record should be kept on the farm for future reference. It will always be better to be prepared than to be caught unaware.

Phytomedicine Processing, Storage, and Dosage

The methodologies in the processing, storage, and dosage of the phytomedicines are based on the practices being done at CPU Research Station for Philippine Native Chicken. The other techniques we are doing on using very sophisticated equipment are omitted because of its impracticality by raisers. These pieces of equipment are available in the online store.

Cleaning and slicing. Plant material like Asiatic bitter yam should be washed thoroughly to remove the soil from its roots. The garlic cloves should be peeled before it will be subjected to further processing. These plant materials should be sliced thinly before subjecting to dehydration

Drying. The equipment to be used for drying should be a food dehydrator. It is available online with various capacities and has a very affordable price. It is ideal for drying because the temperature can easily be manipulated and protected from any contaminants during the operation. Set the temperature from 40-50 degrees Celcius for 24 hours in drying the sliced garlic and Asiatic bitter yam. After the set time, add more time for drying until the plant materials become crispy. Then, these will be ready for grinding.

Grinding. A high-speed grinder (about 22,000RPM) can grind dried plant materials. It is available online at an affordable price. The coffee grinder can be used in the absence of a high-speed grinder only that the final product is not as refined as the previous grinder.

The grinding should be done right after the drying when the plant materials are still crispy. Set the grinding time for three to five minutes. Check the final product for the desired fineness. Increasing the grinding time produces a finer or a powdery soft final product. In the tea preparation, three minutes of grinding is enough for the desired fineness of the product.

Use the 5.0 cm x 7.0 cm tea bag for the tea preparation. It is available online at a lower price per 100 pcs. Fill it with 5 grams of garlic or Asiatic bitter yam powder. It can be stored at room temperature for one month. For a capsule, the content may vary depending on the capsule's size and the chickens' age to be given it. The garlic powder can be added to feeds at 15–20 grams per 100 kg of supplemental feeds. It serves as a substitute for feed premix antibiotics.

05

Cultural Management of Breeding Stocks

Summary

The breeder stocks are the core of the Philippine native chicken farm. The practices in keeping them can be minimal if raising is for a backyard scale of production. A guiding protocol must be adopted for commercial-scale production to ensure better productivity. Incorporating fresh green grasses or silage at a recommended rate can help to reduce costs and improve reproduction performance. The feeding should be done twice a day. Egg production can be improved by providing at least 16 hours of lighting programs, including natural daylight.

Moreover, using fresh hulls as litter materials can help keep the housing free from noxious odors and houseflies. It is a good source of organic fertilizer for crops. It should be winnowed before pouring into the pen and periodically changed to prevent possible infections if it is already soiled. The cleanliness of the equipment, facilities, and environment is vital in maintaining the good health of the flock. Clean the feeding and watering troughs every feeding. The number of visitors to the farm should be controlled, and flock monitoring activities should be done at night to minimize the possible stress experienced by the breeder stocks.

The infected stocks should be isolated, and assess the conditions if it is curable or subject to disposal to prevent their possible spread.

Feeding Scheme

The timely offering of supplemental feeds for the breeding flock should be at a fixed time of the day. The frequency of feeding can be done twice a day. It should be at 7:00 – 8:00 in the morning and 3:00 – 4:00 in the afternoon. If this will be the schedule, have it be done religiously. The stress from deviation in feeding time in a smaller flock (less than 50 hens) can be unnoticeable. Still, it may be prominent for larger flock sizes.

If possible, feed the hens and roosters with Native Chicken Breeder Feeds. It is specifically formulated for the breeder stocks to improve their reproductive performances. In the absence, the Chicken Layer Mash/Pellets can be used. This supplemental feed is compounded to enhance egg production among the commercial layers. The effects on fertility and hatchability were not considered.

Pelletized feeds can be offered, but some heat-sensitive nutrients during the processing may be lost. One way to overcome this is by mixing the drinking water with vitamins and minerals. On the other hand, these nutrients remain intact in the mash form of supplemental feeds. It should be moistened before feeding the chickens. It is one way to have the fine particle clings together and be ingested by the chickens. The essential feedstuffs are usually in finer particles. If this is left in the feeding troughs, the requirements of the breeder stocks will not be met.

Lighting Program

The Philippine native chickens are photosensitive. It implied that their egg-laying capacity depends on their exposure to the length of lighting. To attain the maximum egg-laying performance, the native chicken needs almost 16 hours of illumination. It will include sunlight in the daytime. If the sun rises at 6:00 AM and sets at 6:00 PM, this implies adding four hours of artificial lighting in the evening. The bulbs can be put off at around 10:00 in the evening. However, the perimeter light can be turned on after the said time until morning for security.

The three units of seven-watt warm white LED bulbs can be used for this purpose. White LED bulbs can also be installed in the absence of the previous. However, it was observed that the chickens lighted with warm white LED bulbs were more active than those in the daylight white LED bulb. One bulb per pen is enough to accommodate the requirement of the breeding stocks.

Litter Materials Disposal

Fresh rice hull is one of the best litter materials to be used in the pens of the Philippine native chicken. It could efficiently absorb moisture, mix well with the excreta, and provide a good cushion for the eggs. However, it could easily get infested with mites. The proliferation of such insects may affect the egg production of the flock. Two tablespoons of powdered Carbaryl pesticide or a mist of citronella essential oil can eliminate the mites from the litter items.

The four-foot by eight-foot pen requires about four to five sacks (about 15 to 20kg/sack) of fresh rice hull to attain a one-foot depth litter material. Have the pen's floor be the soil and not have it be cemented. It allows easy absorption of the rice hull's excess moisture if any.

If the rice hull is moistened due to the entrance of rain, this can quickly be dried if the roofing comprises a UV net and UV plastic.

If the litter is moist, dirty, or there is an infection in the pen, it can be replaced. Under normal conditions, the rice hull could be replaced with the new one after five to six months. However, when the state does not warrant because it got wet due to the entrance of rain, this should be replaced immediately to prevent the possibility of infections.

Before pouring the new rice hull into the pen, have it winnowed. It removes the finer dust particle which might inhale by the chickens. It may be a precursor of respiratory infections if not removed. Using carbonized rice hulls as litter materials in pens where the stocks are directly scratched is not recommended. It is very dusty. Wood shavings, rice straws, and hay can also be used as litter materials but may need frequent replacement.

Cleanliness and Sanitation

Remove or cut the tall grasses, for they will serve as houses to vectors (insects/animals serving as an alternative host of pathogens) like mosquitoes. Maintaining the pens and their immediate environment to be cleaned can help minimize the occurrence of infections. The dust in the housing can be removed by having it washed during the warmer time of the day. At the same time, bathe the flock to minimize the hotness they feel. It can be done using an electric-driven pressure sprayer or the knapsack sprayer.

Before the feeding, the feeding and watering troughs must be cleaned. It is done to eliminate stale food remnants, grime, dust, and other impurities. Vinegar or a commercial brand can be used as a disinfectant in cleaning the housing. Follow the recommended rate as prescribed for commercially available disinfectants. Use five to ten tablespoons for every liter of clean water for the vinegar. There is no overdosage for this natural disinfectant.

Handling of Breeder Stocks

The breeder stocks at their active reproductive age are sensitive to stress. It would take almost two weeks to recover from the stress they experienced. Thus, significant activities which may bring pressure must be scheduled when the hens are about to molt. It is when the level of egg production is low.

Vaccination. The vaccine being used is for lifetime immunity. It means there is no need for the raisers to administer it every four months, like Newcastle disease. The vaccination and marking should be done before the egg-laying age of four to five months old. If the lifetime vaccine was not administered at such an age, it should be done at the molting age. It is to prevent interruptions in egg production.

Farm visitors. The presence of a farm growing the Philippine native chicken on a commercial scale would likely be an attraction to those who like to venture on the same flock size. However, visitors' entrances should be controlled regarding the number and distance in viewing the flock. Limit the number of visitors to not over five individuals per visit and set the area where the viewing should be done not to disturb the flock. The breeder stocks of Philippine native chicken are susceptible to stress, particularly seeing new faces and coming in more significant numbers. It would take almost two weeks before the hens could recover from their regular daily egg production. The setting of the technology demonstration outside the production area can be the best alternative for visitors to view the totality of the project.

Flock repopulation. The breeding of local fowl in a pen mating like the CPU Research Station for Philippine Native Chicken had mortality due to picking, prolapsed uterus, and fighting. It is suggested to have around 20 pullets and three cockerels as replacements for every 100 breeder's stocks. The repopulation should be done every three months. It is to replace the dead and unproductive stocks. The grouping should be done randomly and according to the batch of introductions in the flock. It minimizes the possibility of fighting between the residents of such pen and the introduced replacement stocks. It should be done when egg production for such a period is low. The repopulation and re-arrangement should be done at night.

Flock monitoring. It is essential, particularly if your flock size increases. The monitoring can be in terms of number, health status, increases or decreases in liveweight, and any deformities among the stocks. These activities should be done at night and possibly when egg production is lower. Scheduling at night is a means of reducing the level of stress your chicken will experience. The daily record for egg production can help in this matter—monitor what weeks of the month when egg production drops typically.

Care and Management of Sick Stock

Those infected breeder stocks should be isolated from the rest of the flock as early as possible. It is to prevent the potential spread of infection/s among the healthy stocks. Assess the nature of the infection if it is curable, infectious, or contagious. Only those chickens experiencing curable ailments should remain in the flock. The stocks having infectious or contagious conditions, should be disposed of properly to prevent the possible spread of pathogens in the flock.

For curable infections, have it be treated using the appropriate medications. Follow the recommendations on how it will be administered and the correct dosage of veterinary drugs. Seek guidance from the authorities about infection/s if you are in doubt. Secure pictures of how the infection/s occurs and the cultural management practices to be shared with a person in charge can help diagnose the disease. It should also include the photos of infected chickens, the pens and housing where it is raised, and the ranging yards if grown using the free-range conditions.

06

Handlings of Eggs for Hatching

Summary

The proper handling of eggs, from when they are laid to when they are incubated, significantly impacts their hatchability. Three times a day is the recommended frequency for collecting laid eggs. Under room temperature, the egg storage position is with the large end up. Wipe away any dirt on the eggshell's surface with a clean cloth or tissue paper dampened with lukewarm water. The recommended storage period is seven days before loading the eggs into the setter. The weekly incubation schedule is required to ensure a consistent supply of day-old chicks each week. Before putting the eggs in the incubator, check their physical condition

Time of Collection

The timely collection of the eggs of Philippine native chickens for incubation is needed to attain the highest possible hatching. If the one responsible for performing this task, the egg collection can be done several times daily. The suggested time for collecting the eggs is three times a day. It can be at 10:00 AM, 2:00 PM, and 5:00 PM. Most hens lay eggs between 8:00 to 1:00 AM and 2:00–5:00 PM. It is critical when the environmental temperature is enough to trigger embryo development.

Cleaning the Eggs

Using the nests when adopting the technology for commercial production of Philippine native chicken depends on the raisers. The CPU Research Station for Philippine Native Chicken used the nest early in the studies. Still, it also served as a roosting area for breeding stock night, filling it with manure in the morning. It takes more time for the caretaker to clean every day. Failure to remove the excreta can contaminate the newly laid egg, affecting hatchability.

After the last egg collection for the day, separate those eggs having dirt from the rest of the clutch. Have those eggs with soil wiped with fresh tissue paper moist with lukewarm water. Remove the earth and brush with dry tissue paper to remove excess moisture from the eggshell. Store the collected eggs in a cool room and protect them from any draft form.

Storage Conditions and Positioning of Eggs

The condition and the position of the eggs during storage could affect the output on the setting and hatching. After cleaning the eggs collected in a day, store the eggs with a large end up. It is on this end where the air cell is situated. It will allow good ventilation within the eggs due to their position and not being forced down by the yolk. The eggs can be put in the cartoon or plastic trays during storage. The essence of the cartoon tray is to minimize the possible breakage during transferring trays.

Do not stack over five trays to allow a better fresh air flow between trays. Store the collected eggs in a room protected against the unwanted entrance of animals or other persons to protect them from contamination or breakage. The ideal temperature for storage is between 12 to 18 degrees Celsius.

Period of Egg Storage

According to studies on the storage of eggs from indigenous chickens, the best time to store eggs for incubation is less than ten days. The longevity of the viability depends on the storage condition of the eggs. It can be in a room or a temperature-controlled environment, such as an air conditioning unit set to the ideal temperature range of 12 to 18 degrees Celsius. Some raisers used to chill collected eggs and reported successful hatching even after two weeks of storage. Avoid loading the eggs into the setter immediately when using the latter technique. Have it rested at room temperature for at least 12 hours to bring the eggs' conditions back to normal and remove excess moisture.

The collected native chicken eggs can be stored at room temperature for convenience, and loading to the incubator should be done every seven days. The modified storage room can be constructed under the raiser's goals for keeping such eggs. It allows for weekly chick hatching, resulting in a consistent supply of either day-old chicks or fattened native chickens regularly. It does not necessitate the purchase of additional equipment for increased storage capacity.

Other Considerations in Handling Eggs

Proper handling of collected eggs should be done to improve their hatchability during incubation. The time of egg collection, storage conditions and position, and cleaning of eggs are already discussed. The following is the additional information that should be considered in correctly handling eggs for incubation.

Transporting of eggs. If the farm is far from the hatchery, transport the eggs using paper/cartoon trays. This tray type is suitable for absorbing shocks during travel, protecting the eggs against cracks. The egg should be positioned with a large end up, reducing the possible breakage along the way. Have the eggs be rested overnight before loading them in the setter. It is to allow the germ in the yolk to settle in its normal position.

Assessing the physical condition of the eggs. Only those eggs of standard configuration, with no cracks, cleaned, stored in less than ten days, and weighing 40 grams and up should be considered for incubation. The eggs that did not fit the criteria can either be for household consumption or market. It is one way to use the eggs that will be excluded for incubation. Moreover, eggs less than 40 grams in weight will produce smaller chicks with slower growth rates and are sensitive to infections.

07

Hatchery Management

Summary

The setter and hatcher are the classes of incubators used to produce one-day-old chicks of Philippine native chickens. Whether it is a manual- or fully-automated operation, the required temperature is 37.5 degrees Celsius either in setting or hatching eggs. The humidity for the setter and hatcher ranges from 59.00-62.00% and 69.00-72.00%, respectively. The quality of eggs at candling can trace as the core of concerns either in breeder stock management or in the hatchery operation. The periodic cleaning and sanitizing of the equipment used in hatching can help reduce infections and abnormalities among the chicks

Specification for Setter and Hatcher

The classes of the incubator are the setter, hatcher, and a combination of setter and hatcher. This equipment is necessary when planning to get involved in the commercial production of Philippine native chicken. In determining the loading capacity of the incubator, the considerations are the flock size, hen-day, and expansion plan.

Setter and hatcher. The setter is where the eggs spend the first-eighteen days of incubation. On these days of incubation, the embryo gradually develops into a chick. The required temperature ranges from 37.40 to 37.80 degrees Celsius and 59 to 62% humidity. On the nineteenth day of incubation, transfer the fertile eggs to the hatcher for hatching. It would take until the 22nd day of incubation when most of the fertile eggs hatched into chicks. The chicks hatched beyond the 22nd day are usually of low grade or quality. When grown, these hatchlings are weak and quickly get infected by pathogens. Some might survive but have a slower growth rate than those hatched earlier.

Temperature and humidity controller. The setter or the hatcher might use the enumerated controller below. Setting such temperature and humidity requirements depends on the type of heat controller installed in the incubator on hand. Some units use the wafer type of thermostat to control the temperature inside the incubator. The microcomputer controller governs the automatic temperature and humidity adjustments.

A thermometer inside the incubator guides the temperature adjustments for the wafer-type controller. The wafer thermostat expands when heat increases, triggering the heating element off. It contracted when the temperature cooled until it reached the gauge to switch on the electrical current towards the heating element. The knob in the wafer thermostat is loosened or tightened to adjust the desired temperature. The wafer-type thermostat is commonly installed in a still-air incubator with no additional control over humidity.

The temperature and humidity adjustments for the automatic incubator are shown through the microcomputer controller. It's easier to adjust the temperature and humidity with the digital interface. It has less than a one percent margin of error in the setting on and off the heating elements. The automatic synchronization of warming among these elements stabilizes temperature and humidity inside the incubator.

Before using the microcomputer-controlled incubator, calibrate it using an analog thermometer to check for timing accuracy for warming and humidifying the unit. A user's manual can guide the raiser in calibrating the controller. Perform a series of fine-tuning to the controller before deploying the incubator in the hatchery operations.

Heating elements. The incandescent bulb, ceramic heater, or tubular heater are the probable heat source for the incubator (Figure 3). The first-two heaters are ideal for producing warm air for the incubator. Tubular heaters serve both in warming the circulating air and humidifying the internal environment of either the setter or hatcher. The heater's wattage may vary depending on the egg-loading capacity of the incubators. At Central Philippine University, the power for the heating elements in the 1,700-capacity

Egg turning. The turning is significant for developing embryos in the chicken eggs. The sequence is every 60 to 90 minutes for an automatic incubator, whereas it is every other hour in the manual unit. For the automated unit, the microcomputer controller switches on the power of the egg-turning motor. There is a mechanism that turns left to right and vice versa the next time. However, the standard practice for the manual incubator is turning the eggs three to six times daily. The angle for each turn is 45 degrees.

Humidifier. A humid environment within an incubator is essential for developing embryos and hatching chicks. Various models range from fully-automated filling to manual water-filled-in. The latter model is commonly installed in the manual incubator, while the former is in the automated unit.

Air circulation. The forced-draft and still-air classes are incubator classes based on airflow inside the unit. There is a limited flow of air, and most of it is due to ambient movement. Unlike the forced-draft incubator, there is a uniform distribution of warm air inside the unit due to a fan forcing the warm air to circulate. The warmer air beyond the set temperatures is sucked by the exhaust fan as controlled by the microcomputer controller. The still-air incubator is best for incubators with less than 200 egg capacity.

Handling of Eggs Before Loading to Setter

Artificial incubation is an integral component of the commercial production of Philippine native chicken. The eggs laid are collected daily, stored for a week, and incubated. This practice is to have a weekly output of one-day-old chicks and correspondingly with the marketing of

Eggs are stored in the chiller. The ideal temperature for the storage of eggs for incubation is 12 to 15 degrees Celsius. Some raisers kept the collected eggs in the chiller but adjusted the temperature to the prescribed levels. It protects the stored eggs from damage due to fluctuating environmental temperatures. Loading the eggs directly from the chiller to the incubator can cause thermal shock. Remove the eggs from the chiller and have them stand at room temperature overnight to adjust to the environmental temperature before loading them into the incubator. Wipe with clean clothes or tissue any extra moisture on the surface of the eggshell.

Eggs are stored at room temperature. The eggs stored at room temperature can be loaded directly into the incubator. Ensure that the room temperature is less than 30 degrees Celsius to prevent the embryo's development beyond the said temperature. Providing a pail with cool water during the summer months in the storage room can help maintain the humidity needed by eggs. It can allow cooling the room temperature.

Physical evaluation. Before loading the eggs for incubation, check the eggshell for small cracks, contamination due to thick dirt, and any deformity. It includes soft-shelled and double-yolk eggs that are not viable for incubation. The extra large eggs relative to the body size of the hen are an indicator of double yolk eggs. The chances of hatching this egg are very nil.

Cleaning and weighing. Preferably, eggs are cleaned right after the collection on that day. The ultimate check for dirt is before loading in the incubator. Wipe the eggs with clean tissue/cloth (soaked in the warm water of about 35 to 40 degrees Celsius) evenly to remove the dirt. Then, follow it with dry tissue/cloth to remove the extra moisture from the surface of the eggshell.

The hatchling weight is almost 67% of the egg weight. Only the eggs weighing 40 grams and up is viable for incubation. The larger hatchling has a higher survival rate and faster growth than chicks from smaller eggs. The smaller eggs (less than 39 grams) hatch more petite chicks with lower resistance to infection and require an extra number of days before they attain the marketable weight.

Position of eggs on the setter trays. The correct part of the eggs in the setting trays is a large end-up. The air cell on this end serves as an area for exchanges of air between the external and internal environment of the developing embryo. It serves as the end where the embryo's head is for easy hatching.

Common Problem in Setting the Eggs

The primary concerns on the production side reflect in the setting's output of eggs. In reality, the fertility and hatchability of the eggs started from the farm operation. As a result, the raiser could determine the typical difficulty in incubating (setting) the eggs, which aids in identifying the origin of faults in operation. The following are the concerns particular for the setter only.

Uncalibrated incubator. Before using the incubator, there is a need for testing and calibration. It tests the circulating temperature and humidity accuracy based on the set standard. The calibration is significant for the raiser using the fully automated incubator. For the purchased units, request the fabricator for the calibration and have it followed up when it reaches the hatchery.

Frequent power interruption. A standby generator is of great help in areas with frequent power interruptions. The power generated by the portable generator matches the incubator. For some, a standby battery helps to ease the concern. Do not open the incubator when there are shorter power interruptions to conserve the warmer air inside the unit.

Unavailability of extra units. Sometimes the incubator experienced a damaged microcomputer controller, faulty heating elements, electrical concerns, and many others. Expect these problems mainly if the incubators are operating in a 24/7 scheme. The procurement of extra units can help to lighten the situation.

Dried-up water basin. The drying of the water basin is a frequent problem for the automated incubator. It is due to a lack of checking the water storage container, blocking water lines toward the plastic basin, and stocking up the water controller floater. Periodically check the unit about this concern to avoid trouble setting eggs and hatching chicks.

Transferring Fertile Eggs from Setter to Hatcher

The setting of eggs lasts for 18 days only. After then, transfer the fertile eggs to the hatcher for hatching. It is the standard practice for automated incubators where a setter differs from the hatcher. The setting and hatching are in the same unit in the manually operated incubator. The following are the practical practices for managing a Philippine native chicken hatchery.

Room temperature. When transferring fertile eggs from the setter to the hatcher, the recommended room temperature is near the incubator's temperature. It minimizes the temperature shock to the developing embryo if the temperature is more or less the setter. With the recommended room temperature, the damage in the embryo due to the delay of reloading fertile eggs in the hatcher is minimal.

Candling. The seventh day of incubation is the recommended time to candle the incubated eggs, and the last is on the 18th day. Candling on the 7th day is one method for removing infertile eggs and determining any issues with breeder stock management. It is an unplanned activity to improve egg production on the farm and hatchability in the hatchery. On the 18th day of incubation, the CPU Research Station personnel candles and separates the fertile eggs before transferring them to the hatcher.

Hatching trays. The breeder basket and standard tray are the two classes of hatching trays. The dimensions may vary depending on the available supply in the sources or sizes of the hatcher incubator. Using ½-inch hole gauge 16 wire mesh as material for the customization is also possible.

The breeder basket hatching tray has cubicles that separate hatchlings from different breeder stocks. For identification, each box has a corresponding label. Establishing chicken pedigrees (records for each breed/group) is critical. It is not only limited to known breeds but also local chickens. Keeping records of the chicken's parental lines can help to reduce the impact of inbreeding in the flock.

For commercial hatching, ordinary hatching trays are used. It has no cubicle within the tray. It is ideal for large-scale hatching. Using shredded paper as the bedding can help minimize the occurrences of wry legs among the hatchlings. The legs of hatchlings, within a few hours after hatching, are soft enough to deform if malposition. This circumstance is due to the plastic hatching tray's slippery bottom or the wire mesh's broader hole.

Setting the Temperature and Humidity for the Setter and Hatcher

The hatchability of incubated eggs is related to the breeder stock's cultural management and the quality of the incubators. For the latter, the setting of the temperature and humidity is critical. The adjustments for automated units are more manageable than those of the manually operated incubator. The unit can be customized for the latter type of incubator by installing a microcomputer controller for temperature and humidity to address the concern. For the incubator with a microcomputer controller, the following is a guide for setting the temperature:

Setting the temperature and humidity of the setter. Setter's recommended temperature and humidity are 37.5 degrees Celsius and 60.0%, respectively. The temperature setting for turning on the heating element is 36.5 degrees Celsius, which turns off when it reaches 37.5 degrees Celsius. The same procedure is for the hatcher; only the changes are in percentages. The power-on of the humidifier is at 59.0% and off at 62.0%. Shorter parameter ranges provide a more conducive environment for the developing embryo.

Setting the temperature and humidity of the hatcher. The setter and hatcher are both at the same temperature. As a result, the raiser can use the setting guide of the setter to the hatcher. It is the humidity when the hatcher is 10.0 percent higher. The user manual for the microcomputer controller contains a step-by-step guide for configuring the temperature and humidity parameters. The buttons where the setting is applied may differ; read the manual before enabling the calibration and setting.

How to Candle Incubated Eggs

In candling, the personnel examines the quality of incubated eggs under intense light. The candling equipment comprises a robust electric bulb enclosed in a container where the light can illuminate only in the aperture. The aperture is a circular opening enough to hold the eggs on its top. The batch type and individual egg candling machines are available in the market.

With the availability of materials, customization of the batch type is possible. The loading capacity will depend on the fabricator. It uses wood and several 10 to 15 watts LED bulbs within the box. The size of the aperture or whole on the upper cover is enough to hold the eggs for candling. The other one is the flashlight-like candler used for individual egg candling.

Fertile egg determination. Position the small end in the aperture and turn on the light. The eggs with a live embryo have prominent pulsating movement, and the network of blood vessels is visible. The infertile eggs have a clear inner image. The eggs with dead embryos have disrupted blood vessels and floating dark germs. Remove the infertile eggs and those with dead embryos.

Harvesting of Hatchling

The harvesting of the hatchling is the most awaited part of the hatchery operation. With the recommended incubator temperature and humidity settings, hatching begins on the 19th and ends on the 22nd day of incubation. Remove the chicks in the hatcher on the 22nd day of incubation.

Handling of hatchlings. Wear masks before opening the hatcher. The finer dust due to hatching may threaten the respiratory system of the personnel during the harvesting of chicks. Remove the dust before pulling out the hatching trays with a vacuum cleaner.

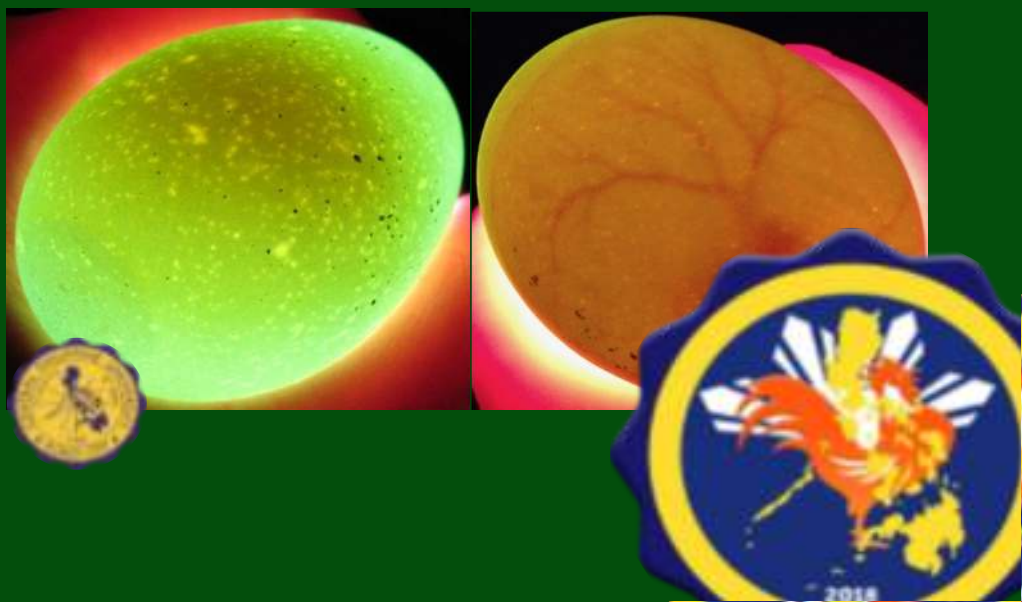
Remove the chicks from the trays and put them in a clean box. Separate the healthy from sickly or weak chicks. It avoids piling and making the vulnerable chicks stacked over the others. Brood the chicks after harvesting them from the hatcher.

Chicks from the breeding baskets require extra recording to trace the parental stocks. Avoid the mixing of chicks without the proper identification marks or tagging. Record the number of eggs that hatch, unhatched, infertile, and with dead embryos for those keeping the accounts for hatchery operations. Classify the chicks into healthy, weak, and others for future reference.

Common Problems in Hatching Eggs

Clear eggs. The clear eggs implied an infertile egg. Figure 9 shows the clear and fertile eggs on the 7th day of incubation. A network of blood vessels is prominent among the fertile eggs. The infertile egg does not show any prominent marking of the developing embryo. The probable reasons for the occurrences of clear eggs are:

Younger rooster. Preferably, put an older rooster in the pen housing several hens. The younger rooster cowardly feels over to



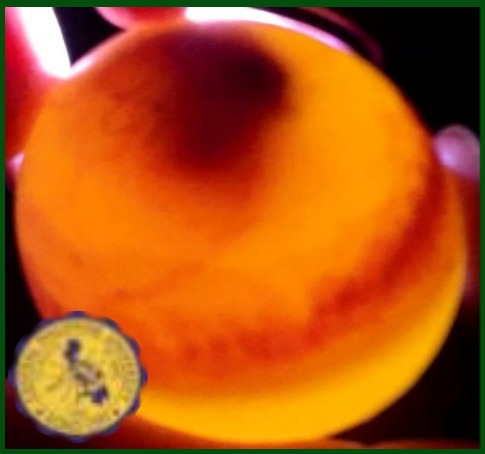
Rooster to hen ratio. The adopted ratio is seven hens for every rooster at the CPU Research Station for Philippine Native Chickens. The ideal proportion for producing eggs for incubation is five to ten hens for every rooster. Beyond the established number of hens for every rooster, the chances of having clear eggs are higher. Some hens will lay eggs but are not mated. Mating between male and female chickens is essential to produce fertile eggs.

Molting season. The yearly shedding of the old chicken feathers takes place for two months. It is this time when the hen walks away with a rooster. The mating is painful for the hen due to the emergence of new feathers. On behalf of the phenomena, the native chicken can still lay eggs, only that it is infertile.

Nutritional deficiency. It is common among native chickens in confinement, unlike free-range chickens, where they can access various scavengeable feed resources in the yard. Provide the breeder stocks with balance rations. Incorporating finely chopped carabao and Napier grasses increase the daily egg production and the hatchability of fertile eggs.

Early embryonic death. The fertile eggs with a dead embryo have a floating dead embryo with detached and decomposing blood vessels. Those eggs with live embryos show palpating germ and more intact blood vessels distributing around the inner part of the eggshell. Early embryonic death is due to:

Unstable environmental temperature. Premature embryonic death is due to inconsistent temperature in the environment. Having a temperature beyond 30 degrees Celsius during the day and being cold at night is the primary cause of such concern.



The ambient air measuring more than 30 degrees Celsius will trigger the embryo's development. It will stop when the warm changes into cooler air at night. The continuous exposure of the developing embryo to such a condition leads to temperature shock.

The raiser may collect the newly laid eggs three times a day. It is to limit exposure to a warmer environment during the day. Have the collected eggs stored at an ambient room temperature of less than 25 degrees Celsius. The ideal temperature for egg storage is 12 degrees Celsius. Good ventilation in the storage area helps to minimize early embryonic death.

Late embryonic death. Late embryonic death is detected on the 18th day of incubation and the last candling. When candled, the fertile eggs with dead embryos have floating embryos and a disrupted network of blood vessels compared to eggs with live embryos. The pulsating movement is prominent among the fertile eggs with a living embryo.

Poor nutrition and infections are associated with the concern. The entrance of pathogens in the eggs is due to the uncleaned environment. Periodic cleaning of the pen or nest can help to minimize infections. Reduce the incidence of late embryonic death by providing well-balanced meals to the breeder stocks.

Unhatched chicks. The unhatched chick is a fully developed embryo but failed to come out of the eggshell. It may partially break the eggshell, but the feathers stick in the shell membrane. There are various reasons for this condition:

Very low humidity. The concern about the unhatched chick results from extremely low humidity in the setter, hatcher, or both. There is a recommended humidity for the setter and hatcher to ease hatching. The controller's accuracy in turning on and off the heater and water level in humidifying pan can help mitigate the problem.

Wrong turning of eggs. The complete turning of eggs is 90 degrees. This turning angle allows for the repositioning of the embryo. The embryo's head should be below the left side of the wing and beneath the air cell. For an automated incubator, check the turning angle to see if it fits with the recommendation. Adjustments of turning to the recommended angle can help to reduce the incidence of late embryonic death among the fertile eggs.

Aging parents. Culling breeder stock when they reach two years of age could help reduce the cases of unhatched eggs. The resistance or tolerance of the aging parent stocks to infections is higher than the pullets and cockerels. Along with this characteristic, the old breeders have a reservoir of pathogens in this system.

Early and late hatched. The early and late hatching cases are attributed to the setter's unstable temperature. The temperature beyond 37.8 degrees Celsius may trigger early hatching than the scheduled 19th to 22nd day of incubation. It is also the probable cause of unhatched chicks. The chicks hatched in this temperature could tolerate the warmer production environment but are sensitive to cooler areas.

The incubator's periodic calibration can help minimize either early or late hatching. The temperature of the setter less than 36 degrees Celsius may lengthen the hatching to over 22 days of incubation. The chicks hatched at this temperature are weaker.

Weak and wet hatchling. The helpless hatchling is due to poor ventilation, higher temperature, and an untidy hatcher. The cleaning and disinfecting of the hatcher every hatching could minimize the problem. Check the ventilator's opening for fresh intake and exhaust of circulated air. These openings are in the upper, lower, or both portions at the back or front of the unit. Some of these ventilators have adjustments to control the in and out of the air. Make a habit of calibrating the hatcher periodically.

The wet hatchlings are due to humidity within the hatcher beyond 72.00%. This humidity level could hasten the hatching but may lead to wet hatchlings. Monitor the moisture of the hatcher during the hatching. If the level keeps increasing, the humidity due to hatching is enough to provide the required moisture. Removing or emptying the pan with water can help minimize such a problem.

Spraddle or splayed legs. The spraddle or splayed legs are due to the improper temperature of the hatcher and malposition in the eggs if this condition is prominent during hatching. Calibrate the hatcher periodically and adjust the turning angle in the setter to have a complete turn of 90 degrees. The slippery bottom of the hatcher may also cause splayed legs among the hatchlings. Putting shredded paper as beddings to the hatching trays could minimize the cases of spraddle legs. This abnormality in the chick's legs is due to the damage to tendons in their legs.

Wet navel. The wet navel is due to the late hatching of chicks, humidity beyond the recommended level, and pathogens. The periodic calibration and disinfection of the hatcher can help control the wet navel occurrences. It is possible that with proper management of the chicks experiencing wet navels, healing will follow over time. These chicks are slow growers and have poor immune systems.

Cleaning and Sanitizing Incubators

Cleaning and sanitizing the setter and hatcher are essential for producing healthy chicks. Several forms of infection and deformity are due to uncleaned incubators. Like every after-batch, periodic cleaning can help reduce the incidence of abnormality.

Disinfection of the incubator. The disinfection was followed by cleaning the in and out of the incubator. Using soap mixed with water, moisten in a clean towel and wipe in different parts to remove the organic matter clinging to it. After then, re-wipe with plain tap water to remove the soap residue. Wipe with a dry towel to remove the extra moisture, and spray with alcohol. Allow it to dry before loading the next batch of eggs for setting or hatching.

Washing of trays. Washing the setting or hatching trays is essential to remove the clinging dirt. Using pressured sprayer can easily remove the organic matter. Drying it under the sun's heat is the cheapest form of disinfection. Store the sanitized trays in a dry and clean room until use.

Day-old Chick Production

This live ebook on Day-Old Chick Production is geared towards the Commercial Production of Philippine Native Chicken. This reference material is the output of the participants' suggestions during the webinars on the height of COVID-19. It enables the readers or participants of the seminar or webinar to implement what they will learn after reading this learning

The Central Philippine University Research Station for Philippine Native Chicken is committed to help the Philippine Native Chicken Industry through scientific innovations. This live ebook is the output of our decades of study in promoting the large flock-size production of native chicken. The author will be glad for any feedback from those who implement this technology package. You can reach us at https://www.facebook.com/carespnc.