



# PLEYSIER

## INCUBATORS EXOTIC DUCKS & GAMEBIRDS

### USER MANUAL

Please read carefully before use  
Please note that some details/features may be  
different from your machine.

#### Basic Incubation

#### Basic Set-up for Setters

#### Basic Set-up for Hatchers

#### Basic Set-up for Brooders

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"It takes time and patience to set up an incubator. You cannot expect to switch on your incubator one day and use it the next. Before the start of any breeding season, whether you are a beginner or have a good knowledge of incubation, we suggest you turn your incubators on at least a month before you need them.

Each incubator seems to have its own personality and before you put your precious eggs into one, we suggest you learn exactly how it works, and monitor it for as long as possible.

Before you turn your incubator on and even if it was cleaned at the end of last season, we suggest you clean it now.

It is a bit silly to get your incubator running smoothly and then turn it off to clean it before use, because it may need adjusting again when you turn it back on."

## **“The quality of the chick all depends on the quality of the egg.”**

### **Incubation basics**

All bird eggs require five environmental conditions to be controlled to enable the correct development of the embryo:

- The egg must be maintained at the right temperature to enable the metabolic processes within the developing embryo to occur at the correct rate.
- The egg must be frequently turned and carefully positioned so that the embryo passes through fresh nutrients in the white of the egg, while forming in the correct position for hatching.
- The egg loses water through pores in the shell. The humidity of the air around it must be controlled to ensure the right amount of water is lost over the incubation period.
- The egg “breathes” so there must be a supply of fresh air to provide oxygen and to remove waste carbon dioxide. Eggs are susceptible to infection so the incubator must provide a clean, disinfected environment.

### **Nutrition of the Egg**

The egg is composed of many nutrients that come from the parent so, **to ensure a healthy hatched chick, the parent needs plenty of nutrients at least two weeks prior to laying.** The most important vitamins and minerals are as follows:-

- **Vitamin A** – Sources of this vitamin are in green feeds, yellow vegetables, maize and synthetic compounds. The vitamins can be easily destroyed by light and heat. A lack of this vitamin is a common cause of poor hatchability, weak chicks and poor disease resistance.
- **Vitamin D** – The raw source of this vitamin is in sunlight. Chicks kept indoors will need supplements. A lack of it causes weak bones that will bend and deform. Also eggshells may become deformed, resulting in complications of the chick’s use of shell calcium that in turn makes control of moisture loss difficult.
- **Vitamin E** – The source of this is in seed germs – i.e. wheat. A deficiency results in poor hatches of chicks that are weak and do not thrive. Most deaths occur due to circulatory failure in which the walls of the blood vessels are ruptured.
- **Vitamin K** – This can be found in most green feed. A gross deficiency will cause haemorrhages over the body of the chicks. In eggs, deaths may occur in turning due to severe bumping or sudden jarring.
- **Amino Acids** – Lysine and Folic Acid. A deficiency results in embryonic deaths due to lack of blood formation & pipping strength.
- **Vitamins in the B Group**– Vitamin B1 – Thiamine– Vitamin B2 – Riboflavin• Nicotinic Acid or Niacin• Vitamin B6 Pyridoxine
- **Pantothenic Acid• Biotin• Vitamin B12• Minerals• Calcium• Phosphorous• Manganese• Magnesium• Zinc**

### **Hygiene**

- If you do not clean your incubation equipment regularly, you may only lose a small percentage of eggs most years. But when a nasty bug does appear in an incubator, you stand the chance of losing almost every single egg that it contains. It is very common for eggs to pick up bacteria in an incubator and although it might not kill the developing chick then, the chances are it will kill it a week or so after hatching.
- Obviously then it is a good idea to keep the incubation room and all equipment as clean as possible. I would suggest that the incubation room you are intending to use is given an extremely good clean before the season starts. Thereafter, incubators should be sterilized approximately every three weeks if possible.

In addition, if you can get into a regular routine every morning of wiping over the surfaces in the incubation room, and also anything you are likely to touch after you have scrubbed your hands, then this will help considerably in the fight against bacteria.

### **Cleaning & handling eggs**

- It is a complete waste of time to clean and sterilize your eggs if you handle them later at any time during incubation without properly scrubbing your hands first in an anti-bacterial soap!

**The quality of the chick all depends on the quality of the egg.** It is essential that care is taken in the storage and handling of the eggs. It must be emphasized that the eggs cannot be improved once laid, and will only deteriorate with poor storage and handling.

The following factors will help to ensure an egg is of best possible quality:- **NOTE:- Eggs should be stored with pointed end down.**

#### **• Temperature**

Ideal storage temperature is between 16°C and 20°C. Too high a storage temperature and some incubation can commence but at the wrong rate. This will decrease the chances of the embryo developing normally. If storage temperature is below freezing the cell structure of the egg can break down and prevent the embryo developing.

#### **• Humidity**

The best humidity level at which to store eggs is between 75 to 85% RH to avoid significant drying out of the egg before incubation.

#### **• Time in Storage**

Depending on species, it is preferable that eggs should not be kept for more than 7 days prior to incubation. Between 7 and 14 days hatchability begins to decrease considerably. Vitamins decay and membranes breakdown in time and so the embryo can often suffer early mortality.

#### **• Cleanliness**

Cracked, mis-shaped and heavily soiled eggs should be discarded (if possible). Soiled eggs may be cleaned using a brand egg wash solution, “*Cleaning & Disinfecting-page 14.*” It is essential to wash eggs in solution that is significantly warmer than the egg so that expansion in the egg causes flow out through the pores rather than dirty water flowing inwards. Bear in mind that all solutions will remove the outer cuticle from the egg as well as the dirt and may leave the egg at greater risk from bacterial contamination in the future.

#### **• Turning During Storage**

Eggs should be turned once a day, 45 degrees each way, back and forth through 90° during the storage period. Insufficient turning can cause the yolk to float and touch membranes near the shell. If the embryo touches then it may stick and prevent growth once inside the incubator.

#### **• Handle Eggs Carefully**

Eggs should be handled with care as severe bumping may rupture the yolk membranes, even if the shell remains undamaged. Reasonable care should also be taken during incubation also. A bump can rupture blood vessels causing the chick to bleed to death.

#### **• Collection of Eggs**

Generally the best time to collect eggs is before 9am, and to check again at lunchtime. Eggs left in the nest for much longer than 24 hours tend to be poor hatches.

#### **• Egg Shape, Shell Texture and Quality**

Some naturally misshaped eggs have lower than expected hatch rates. Undersize eggs often have a large yolk in proportion to the albumen. Large eggs can sometimes be ‘double yolkers’ which will not hatch. Misshaped eggs usually have faults in the shell. It is important to remember that in natural circumstances eggs warm up quite slowly. Incubators often warm up quickly, and so if placed in the incubator immediately the egg may suffer some thermal shock. If possible, the eggs should be brought up to temperature slowly.

# SETTER SET-UP

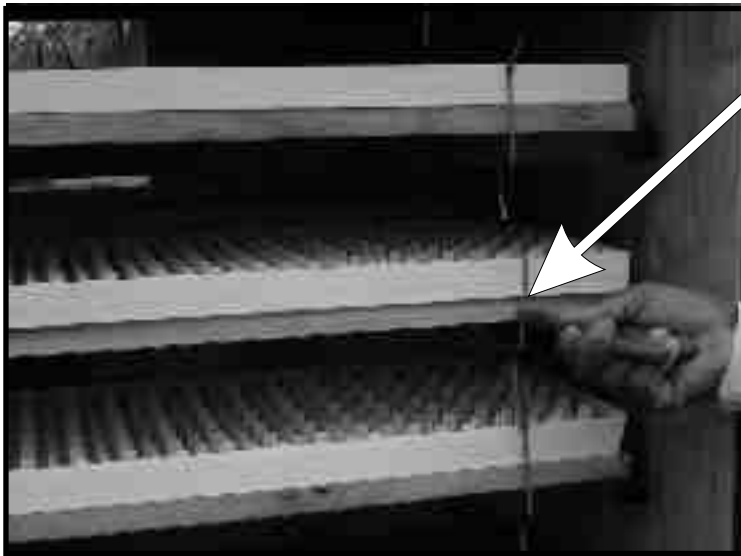
## Unpacking and Checks

1

Remove all plastic wrapping and place machine on suitable table so that door/s can open. Ideally the machine should be in a climate controlled room. Ensure that the position will not have direct sun light falling on the machine & the room temperature is constant. In winter, it is advisable that the room has some form of heating if it is not climate controlled. Remember for instance, mopping a concrete floor will affect both the temperature and humidity in the room and machine.

It is advisable that you consider a surge/lighting protector. A generator is also recommended if you experience power cuts in your area.

**Please note that some details/features may be different from your machine.**



Remove all cable ties holding trays/rollers with a side cutter. Check that there are no cable ties attached anywhere in the machine that will restrict movement.

**Now Plug the machine in at power point.**

2

## Filling the Wet/Dry Reservoir. 3



Fill bottle with **distilled water** and turn upside down (Do this quickly) on top of white plastic holder. Screw down. Replace water when empty (+/- 3 weeks).

**Do not add chemicals as it will alter the surface tension!**

Distilled water is used because it contains no minerals and impurities. Calcium in suspension in normal water evaporates and coagulates on the wick, becoming hard. It then absorbs heat, thus giving a higher temperature reading. If no distilled water is available then use tap water and replace the calcified section of wick once a week. (Wicks-see Section 5.)

3



## Filling Water Reservoir.

Fill the humidity bowl from outside with **tap water**. **Do not add chemicals as it will alter the surface tension!** (Top up clean water every day)

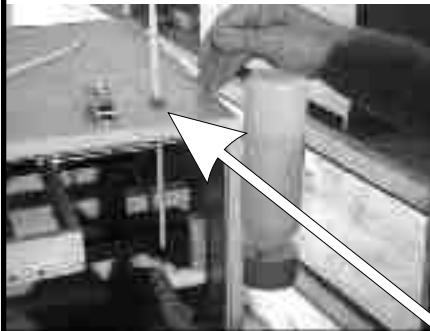
**Bigginer100** - Fill the bowl provided at bottom of machine.

Make sure the bowl is placed under the fan unit!

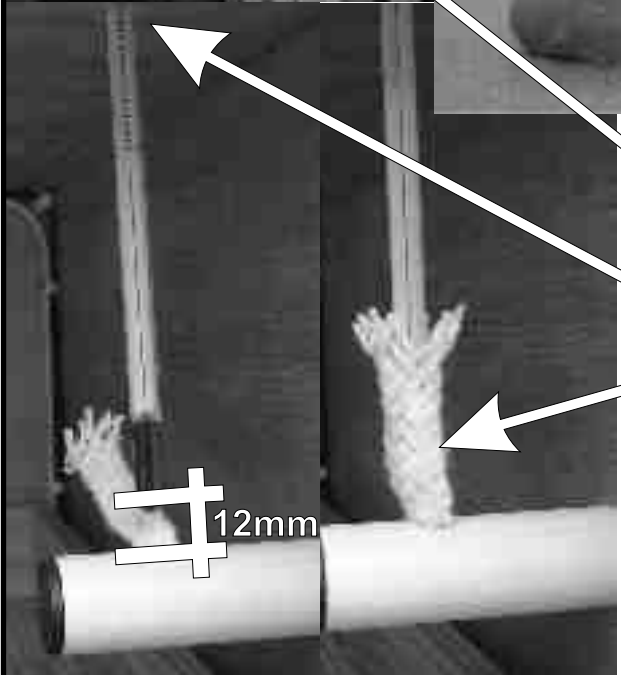
4

## Humidity control Set-up

5



If your machine is supplied with this type of hydrometer, reset by placing in a wet toweling cloth for a ½ hour. The needle will now be set at 90% humidity. Dail/turn the face till the number and needle line up at 90%. The unit can now be replaced into the machine. On to section 5.



Use green rubber ring for adjustment, slide thermometer through rubber ring to 25 degrees and then push through hole in the cabinet and down to the wick so that the thermometer is 12mm **above** the pipe.(see below)

Insert thermometer through cabinet hole into cotton wick but **not** into the plastic pipe and **not** into water of white plastic pipe. (I.e. +/- 12mm above plastic pipe.)

*The cotton wick must be replaced every 3 weeks, as a calcium deposit on the wick will give an incorrect reading. Just cut 30mm off and refit thermometer as stated above.*

If you run out of wick, buy white shoelaces and replace or order genuine cotton wick from us.

**The higher the reading on a wet bulb thermometer, the higher the humidity in the Incubator.**  
**The lower the reading on a wet bulb thermometer, the lower the humidity in the Incubator (see Section 6).**

## Setting this could take up to 24 hours!

6

Refer to the charts in Section 18 for Humidity setting.

Start with all vents closed and let the machine run for 30 minutes. You will now have maximum humidity. (Reading taken on the long thermometer/hydrometer in Section 5.)

(You cannot put eggs into the machine yet!)

Now open all the vents a little bit. Allow the machine to run another 30 minutes. Check the reading on the long thermometer again.

Continue this procedure till you have reached the optimum reading as required in chart (Section 18).

It is suggested that a line is drawn along the vent flap to indicate the optimum reading reference.

**NOTE** that you will have different reading in summer and winter depending on your geographical location. Also note that mopping the floor can influence the humidity in the room and therefore the humidity in the machine.

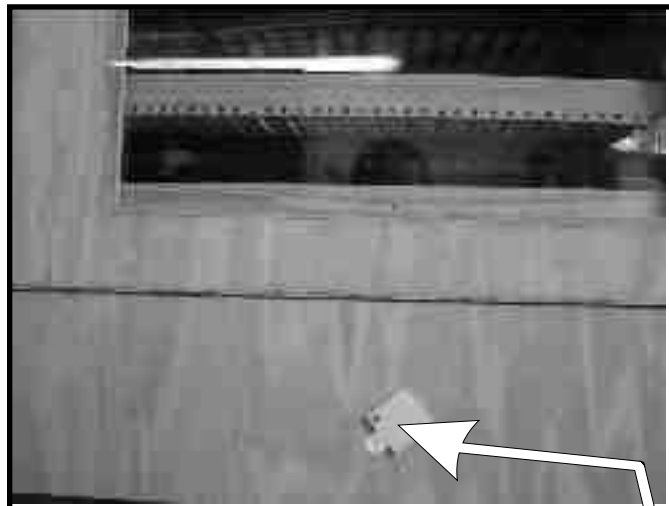
5

## Adjusting Humidity

To adjust humidity to, say 29.5°(against the hydrometer/wet-dry thermometer), you must open or close side vent/s and front/s vent.(2 plastic squares-4 depending on model.)

**Higher/top** vent/s - allow fresh air **IN**.  
**Lower/bottom** vent/s - take stale air **OUT**.  
 (Vent location vary depending on model.)

By closing both squares, you will raise the humidity. (E.g.-When the temperature on the long thermometer is 31.5° C, the humidity in the setter will now be 65%.)





7

## Incubation Temperature and/or Heat backup cut-off (May not be visible)

- 1- Set temperature by turning the dial.
- 2-The backup cut-out Bezel is factory set.  
(Please contact us if you should need to adjust this.)



8

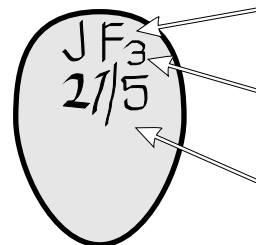
## Incubation Temperature.

(The Digital Thermostat has been factory set)  
Set to 37.5°(For chickens).  
(Please contact us if you should need to adjust this.  
See Digital Thermostat user manual)



## Egg Marking

It is important to mark the eggs so that you can determine when they are expected to hatch.



Specie - e.g.  
Jungle Fowl

Cage # -e.g. 3

Hatching date  
- e.g. 21 May  
(Chicken eggs laid on  
the 1st will hatch  
around 21st)

**Remember that the egg needs to be placed in the hatcher about 3 days before the hatch date! Hatching requires a different temperature and humidity.**

Mark on **rounded end** with a soft tipped marker. Use pen at an angle and light pressure!

9



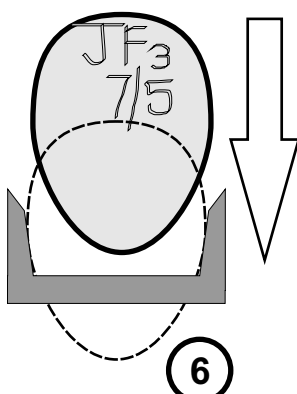
## Egg storage

Eggs can be stored for up to 7-10 days before setting. The eggs need to be turned twice(2x) a day and must be kept cool at between 16-20°C.

**Also see Page 3 for more information related to this.**

10

## Egg setting - Tilt machines



6

After machine has stabilized for +-24 hours place eggs **sharp end down** in tray.

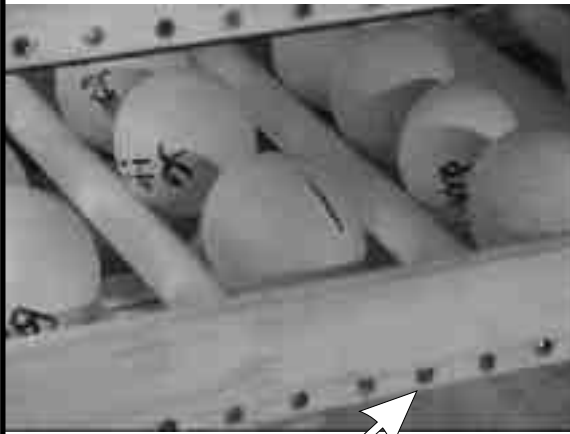
Eggs should be candled with a bright light source to check, by transparency, that the embryos are developing normally. Any infertile eggs and dead embryos should be removed.(See page 13)

Eggs need to be transferred to the hatcher about 3 days prior to the hatching date!

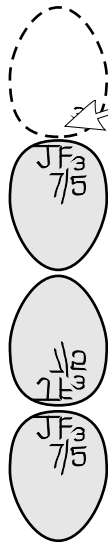
**Do not let the chicks hatch in the setter - use a hatching machine!**

11

## Egg setting - Roller machines

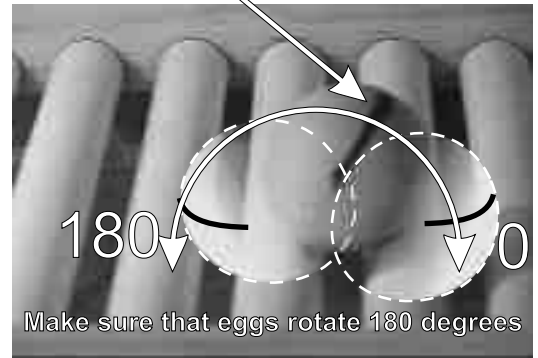


The rollers can be unscrewed & removed to accommodate different size eggs.



After machine has stabilized for +/-24 hours place eggs on rollers with blunt ends facing each other. Place a line across egg to indicate 180° reference point.

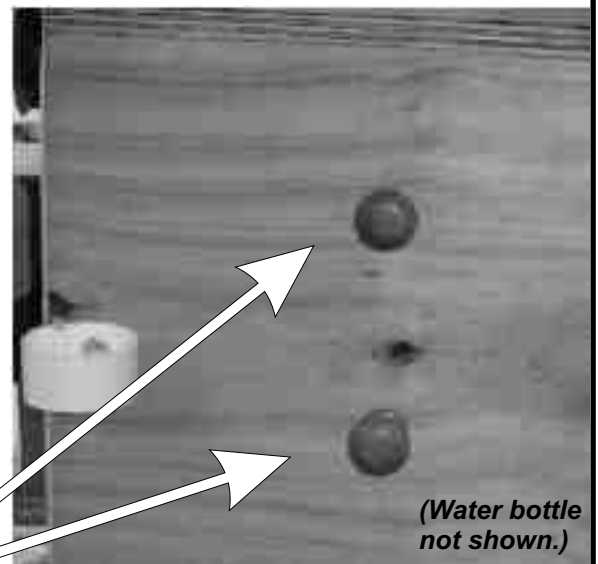
# 12



Do not let the chicks hatch in the setter - use a hatching machine!

## Push & Pull Rolling the Eggs

# 13



Push and pull knobs from left to right and from right to left 3-5 times per day minimum. Make sure that eggs rotate 180 degrees each time, but not more than 180 Degrees. (See 12.)

## Cooling Off Phase

# 14



This is required by Ducks and Geese, as well as some Pheasants. The un hatched chicks need to get rid of excess heat. The Air sack also needs to get rid of the CO<sup>2</sup> to replenish with fresh oxygen.

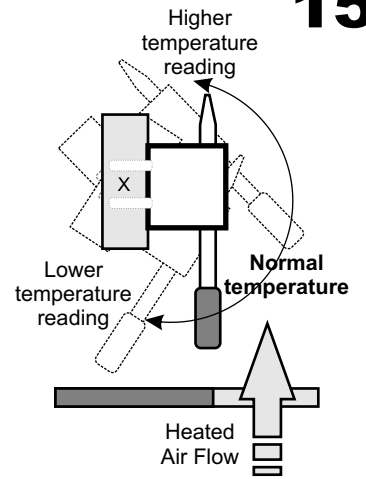
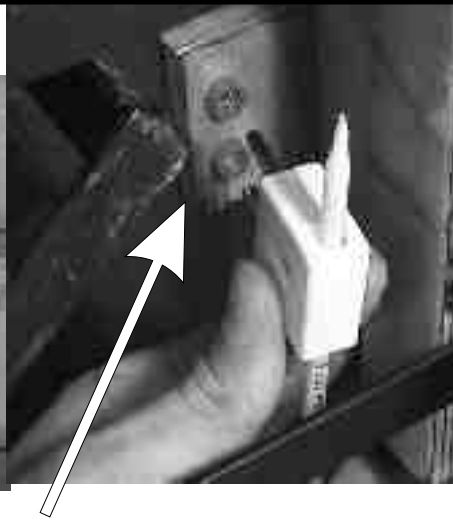
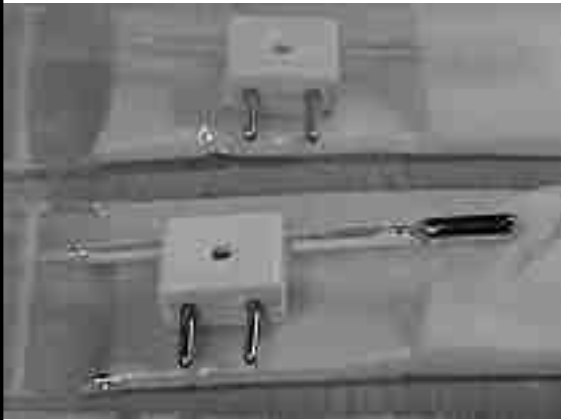
The setter needs to drop the internal temperature to +/- 33 °C for +/- 30 minutes. This is simply done by putting a timer set for 30 minutes, onto the plug the machine is plugged into. These are available at any Hardware store (See pic.). This is very important in the last week and a half, though it is fine to do this from the very start.

**Duck eggs** also need to be removed from the setter around day 22 to 28 and sprayed with a mist of water and be allowed to cool off for 10-15 minutes, before being placed back into the setter.

Eggs should be candled with a bright light source to check, by transparency, that the embryos are developing normally. Any infertile eggs and dead embryos should be removed.(See page 13)

**Eggs need to be transferred to the hatcher about 3 days prior to hatching date.**

## Contact Thermometers



15

*This feature depends on model.*

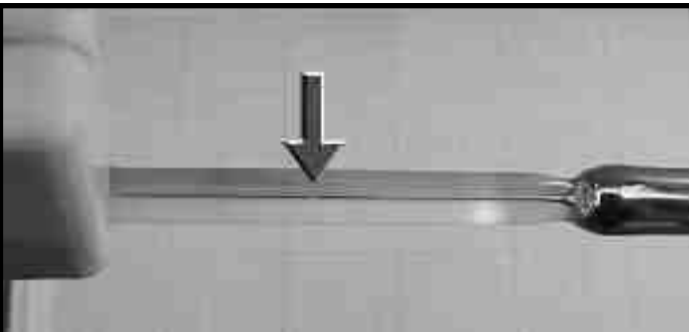
Insert the pins of the thermometer in the contact holes. These are usually located on the vertical sides above the air slots of the fan board. The units will already be in place and require only to be pushed in. (Some models only have one unit.)

## Checking Splits in Mercury column

16

A split happens when the thermometer has been bumped or exposed to a sudden temperature drop.

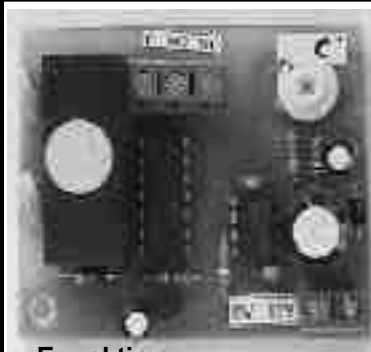
Insert the thermometer **bulb down** in boiling water. Wait a few minutes then check if the splits are gone. Allow to **cool** completely. Insert unit into original position.



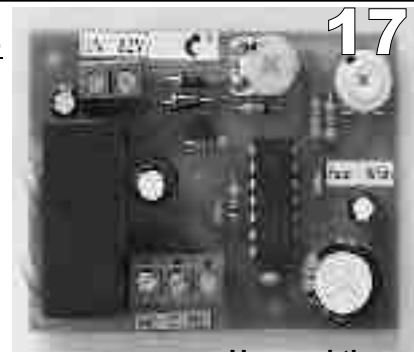
## Auto Rolling/Turning the Eggs

(Not visible)

This has been Factory set. There should be no reason to change this. (If otherwise, please contact us for details of how to do it.)



Equal timer



Unequal timer

17

## INCUBATION:

SPECIES	RELATIVE HUMIDITY	TEMPERATURE HUMIDITY
Pheasants	55%	29.5°C
Partridge	"	"
Waterfowl	"	"
Guineafowl	"	"
Touraco	"	"
Cranes	"	"
Chickens	"	"
Parrots	45% - 55%	27.2°C - 29.5°C
Spoonbills	24%	21.5°C
Ostrich	"	"

## RELATIVE HUMIDITY

## TEMPERATURE HUMIDITY

35%	24.8°C
40%	26.0°C
45%	27.2°C
50%	28.3°C
55%	29.5°C
60%	30.5°C
65%	31.5°C
70%	32.4°C
75%	33.4°C
80%	34.3°C
85%	35.3°C
90%	36.0°C
95%	36.9°C

18

# HATCHER SET-UP

Follow steps 1 through 7 as for Setters.



8

## Hatching Temperature.

(The Digital Thermostat has been factory set)  
Set to 37.0°(For chickens).  
*(Please contact us if you should need to adjust this.  
See Digital Thermostat user manual)*  
Let machine run for 5 hours minimum before  
moving on to step 10.

## HATCHING:

SPECIES	RELATIVE HUMIDITY	TEMPERATURE HUMIDITY
Parrots	55%	29.5°C
Pheasants	60% - 65%	30.5°C - 31.5°C
Chickens	"	"
Ducks	70%	32.4°C
Geese	75%	33.4°C

9



Chicks are normally kept in the hatcher till dry - (+/-1 Day.)

## Hatching Tray/s

10

Place a cloth (dish cloth) on top of the gauze.  
Make sure that the air vents at the tray corners  
are not obstructed/covered.  
The cloth is essential. It prevents the egg shells  
and fasces from falling into the fan & mechanism.



## Disinfecting

11

This must be done after **EVERY** hatching batch. Spray the inside of the machine with disinfectant. (Virukill - see Pg14)  
The cloth also needs to be well washed - in normal wash powder.



9

## Parrots

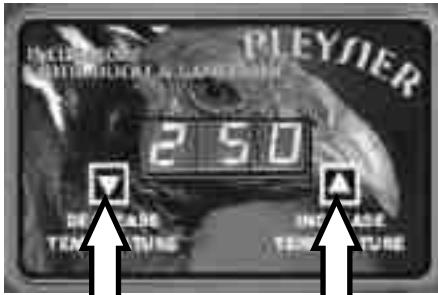
12

We recommend that you use a plastic  
container, lined with soft paper tissue  
for parrots and other delicate species.

# BROODER SET-UP

## Brooding Temperature.

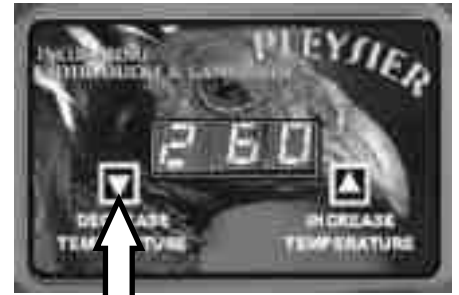
1



Press both buttons down.  
It will **flash** at 25°C.  
(The unit is now reset.)

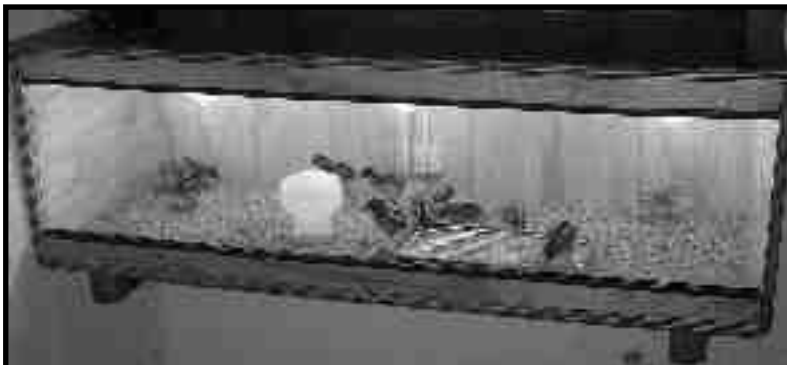


Press the "Increase" button  
till it reads 35°C. The display  
will **flash**. (The memory has  
accepted 35°C)



Decrease the temperature  
using the "decrease" button.  
The unit must **flash**, indicating  
the acceptance of the new  
setting.

**Set the Digital Thermometer to 35.0°C.** (See *Digital Thermometer* section for more info if required.)  
**Slowly decrease the temperature from 35.0°C till it reaches 26.0°C, over 2 to 3 weeks.**



### **For landfowl:**

Place on newspaper under the wire, a layer of river sand.  
Chicks are placed in the brooder from the hatcher.  
Make sure that they have drinking water/food.

Open/close the air vents to allow more/less oxygen in.

**For water fowl** place newspaper down on top of wire, cover with sand.

**Slowly decrease the temperature from 35.0°C till it reaches 26.0°C, over 2 to 3 weeks.**



2



## Parrots

3

We recommend that you use a plastic container, lined with soft paper tissue for parrots and other delicate species.

**You must place a bowl of water in the brooder for moisture.**

# DIGITAL CONTROLLER

## Overview:

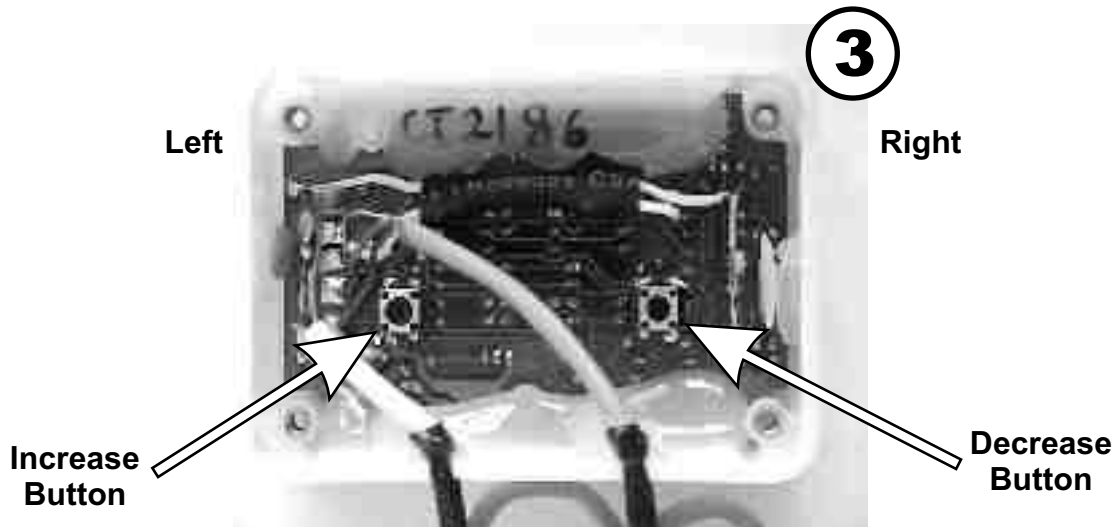
The unit uses a digital sensor, which is accurate and can also be calibrated if so desired. Setting up the unit is extremely simple; simply press either the increase or decrease button ('up' or 'down' button) to adjust the set point value. The unit display will flash and display the current set point value. The value may be adjusted until the display stops flashing. Set this value to the temperature, in °C, at which you wish to control the environment. When the display stops flashing, the unit stores the value in non-volatile storage, which means it will not be lost when power is switched off. The unit has been factory calibrated before despatch do not adjust this calibration value unless you have a more accurate reference.

## Procedure for Setter and Hatchers only:

The Digital unit is located inside the Control box. Remove the screws to this to gain access to Digital Controller. (1)

Remove the 4 screws at the back of the Digital Controller. (2)

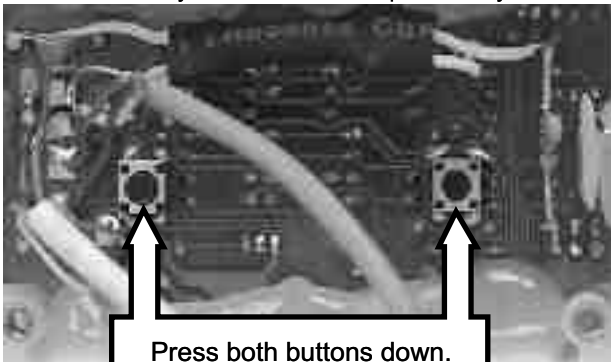
Remove screws.



Locate Increase and Decrease buttons as shown.(3)

## Special functions: (Factory Default setting)

The unit may be restored to factory default by pressing both buttons at once. This will set the control temperature to 25°C, but will not affect any calibration value previously set. Refer to the section entitled "Calibration" to alter the calibration value.



## Calibration:

Calibrating the unit should not be necessary, but is possible. Calibration is effected by an offset-adjustment method. The maximum offset is 7.9°C. **Method** : Default the unit and then immediately press the increase or decrease button ('up' or 'down' arrow). The offset value is displayed and changes as long as a button is depressed. For negative offset values a '-' sign is prefixed and for positive values a 'C'. **This value is added to the measured sensor temperature. NB: If you suspect that your thermal controller is displaying an inaccurate temperature, check that this value is set to "C00"!**

Example: Your unit displays 26°C but the actual temperature is 26.2°C. Enter calibration mode and increase the calibration value by 0.2. The displayed (and controlled) temperature will now be 26.2°C, thus effecting re-calibration.

Press both buttons down.  
It will **flash** at 25°C.  
(The unit is now reset.)

Immediately press right button down  
The display changes from  
-0.1(°C) to -7.9(°C), lower  
than original displayed  
temperature.

Immediately press left button down.  
The display changes from  
C0.1(°C) to C7.9(°C),  
higher than original displayed  
temperature.

Re-set till the display  
changes to C0.0  
(Using decrease/increase buttons)

The display now shows the  
actual internal setting - e.g. 27.9°C.  
This is too low for incubation.

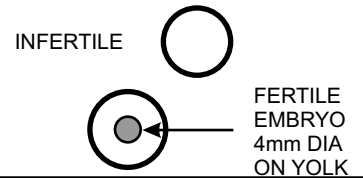
Using decrease/increase buttons, set for  
the species you are incubating.  
(Eg 37.5°C - for chickens.)

The display on the unit will flicker slightly every couple of seconds. This is normal and happens during the temperature measurement phase. As the sensor is digital, temperature conversions/measurement takes place in its entirety within the sensor. In effect the sensor is a small 'computer' that sends the temperature to another 'computer', the control unit. There is therefore no signal degradation, external conversion error or temperature dependencies of electronics to take into account.

# EMBRYO DEVELOPMENT (based on hen egg)

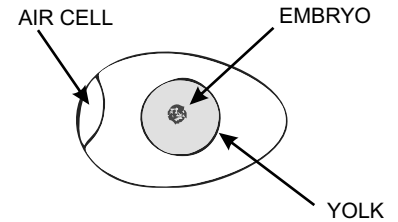
The yolk is dropped from the ovary into the unfundibilum where it is fertilised by the male sperm if present. The embryo commences development while the yolk travels down the egg canal. Here it receives coatings of white. The egg progresses to the shell gland where it receives membranes and forms the shell itself. This process takes approximately 20 hours, in which time the embryo grows to about 4mm in diameter. The egg is laid.

## FERTILISATION AND FIRST 24 HOURS



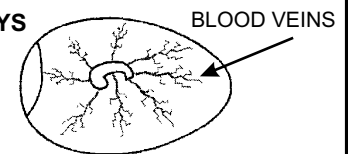
After the egg is laid it cools and growth slows or stops. Many birds (but not all) accumulate a 'clutch' of eggs before commencing incubation. During this 'storage' time temperature is preferably between 0 and 20°C but some species tolerate more extreme temperatures. However, embryonic death is a risk if extremes are maintained. In the first day of incubation a line called the primitive streak appears. This allows the formation of a third layer of cells. From these new cells the organs of the body will form. The cells are made up in three layers called ectoderm, mesoderm and endoderm. Ectoderm forms the skin, feathers, beak, nervous system, claws eyes and mouth. Mesoderm forms the skeleton, muscle, blood and reproductive organs. Endoderm forms the respiratory organs, secretory system and digestive system. By the end of the first day's incubation, the head, eyes, nervous system and blood island have started to form. The heart is formed on the second day and is functioning by 44 hours.

## 2 DAYS



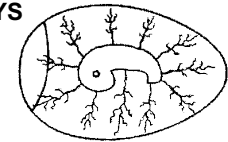
On the fourth day the heart changes from its simple form and becomes a fully formed beating heart. During this time extra membranes are formed to produce the amniotic sack. The embryo will now float in the amniotic fluid for the rest of incubation. The amniotic fluid and turning of the egg ensure the embryo orients itself correctly for hatching. By the fourth day, legs and wing buds begin to form and the heart is still positioned outside the body.

## 4 DAYS



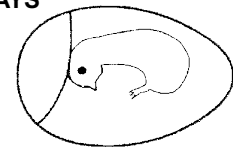
By six days the legs and wings are almost complete, and by eight days feathers are appearing. On the 9th day the embryo starts to look like a chick. The heart is now within the body with blood circulation to the outside via the umbilicus. By ten days the bones are now being formed.

## 10 DAYS

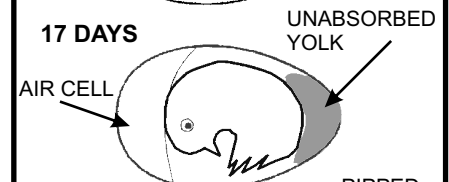


Thirteen days into incubation and the down is apparent and is coloured. By sixteen days the beak, leg scales and claws are almost complete. The albumen is used up with just the yolk remaining. The amniotic fluid decreases and the yolk then acts as a food source. By the nineteenth day the yolk is incorporated into the body. The ability of the embryo or now 'chick', to get oxygen through the shell and into the blood system is now limited. The carbon dioxide levels in the blood therefore rise dramatically, which causes twitches in the chick's neck muscle. The beak then forces its way into the air cell at the large end of the egg. The beak now opens for the first time and the lungs inflate. This causes the blood system to circulate within the lungs. This is time of great stress for the chick, where any deficiencies become apparent. The stress is so much that it will kill chicks that are not strong enough, usually those who have a lack of group B vitamins. The chick continues to try to breathe in earnest, which causes more twitching and hopefully a breakout through the shell. This process forces the beak out and chips a small hole in the shell. The legs push the chick slightly to the side so next time there is a twitch the next piece of shell will fall off. This continues all the way round the shell until the end of the shell falls off. The chick has an egg tooth, which helps with this hatching process. The tooth falls off soon after hatching. After the end falls off the chick kicks itself out of the shell. The old blood vessels and membranes remain in the shell.

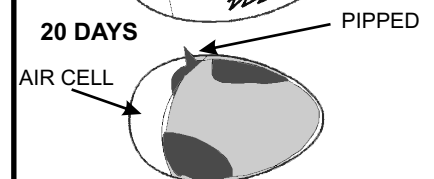
## 14 DAYS



## 17 DAYS



## 20 DAYS



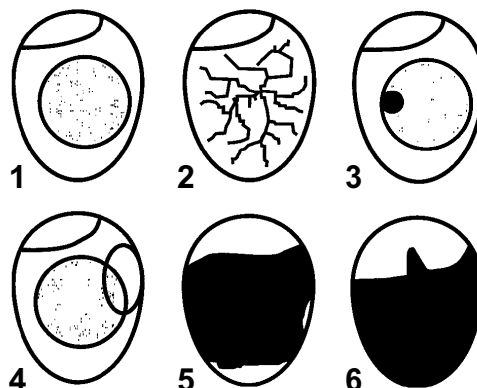
## 21 DAYS



## CANDLING

Candling lamps are lights with a concentrated beam that may be shone through the shell of the egg to illuminate the egg contents.

Eggs need to be monitored during incubation to determine embryo progress. Candling also allows the development to be observed so that eggs that are infertile or have died may be safely removed from the incubator.



1. Clear when candled - probably infertile (or very early death) when candled at 1/3 of the incubation period.
2. Fertile with red blood vessels - after 1/3 of the incubation period.
3. Red or black staining - early death when candled after 1/3 of the incubation period.
4. Embryo with red blood 'ring' - early death when candled after 1/3 of the incubation period.
5. Dark outline with ill defined detail - late death (1/2 or 2/3 through incubation period).
6. Live embryo with bill in air sack - due to hatch in 24-48 hours.

# CLEANING & DISINFECTING



This must be done after **EVERY** hatching batch. Spray the inside of the machine with disinfectant. (Virukill)  
The cloth also needs to be well washed - in normal wash powder.

## VIRUKILL

**For use in cleaning and disinfection Setters, Hatchers and Brooders.**

For broad spectrum disinfection of surfaces against all poultry viruses, bacteria, fungi, mycoplasma, yeasts and algae.

For disinfection of hatching eggs.

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## A Guide To Problems When Incubating Eggs.

Problems	Referance to causes		Causes	Referance to poss. solu.	Possible Solutions
Clear Eggs.	1, 2	1	Infertile.	A, B, C	A Get better stock.
Early death with blood ring.	2, 3, 8	2	Chilled.		B Feed better diet.
Embryo dying after 40% of incubation period.	6, 7, 8, 9	3	Eggs too old.		C Get a more compatible pair of birds.
		4	Too high humidity.	H	
Dead in shell.	4, 5, 6, 7, 8, 9	5	Too low humidity.	D	D Raise the humidity
Sticky chicks.	5, 8, 10	6	Infestious disease.		E Turn down the temperature.
Large soft bodied chicks.	4	7	Incorrect turning.		F Turn up the temperature.
Late hatching.	9, 10	8	Too high temperature.	E, G	G Check the thermometer is accurate.
Early hatching.	8	9	Too low temperature.	F, G	H Lower the humidity.
Crooked toes.	8, 9	10	Too low humidity in hatcher.	D	I Check the humidity is not too low in the hatcher.
Sprayed legs.	8, 11	11	Slippery sufrage in hatcher.		
Bent neck.	12	12	Took too long to hatch.	I, J	J Check the humidity is not too high in the hatcher.

**The Tables shows the Incubation Periods for various species measured in number of days.**

<b>Albatross</b>		<b>Duck</b>	
Albatros Royal	79	African Black	28
Wandering.	70-80	American Widgeon	26
<b>Amazon</b>		Australian Grey Teal	26
Blue-fronted	26-27	Australian White-eye	26
Cuban	26-28	Australian Wood(Maned Goose)	30
Green-cheeked	24	Baer's Pochard	27
Hispaniolan	25	Bahama Pintail	26
Lilac-crowned	26	Baikal Teal	26
Puerto Rican	25-27	Barrows Golden-eye	30
Red-lared	25-26	Black Scoter	28
<b>Spectacled</b>		Blue-winged Teal	26
Spectacled (White Fronted)	24-25	Brazilian Teal	26
Yellow-naped	28-29	Bronze-winged	30
White-fronted	24-25	Canvasback	26
<b>Anhinga</b>	25-28	cape Shoveler	26
<b>Avocet</b>		cape Teal	26
Avocet American	22-24	Chestnut-Breasted Teal	26
Common	22-24	Chilean Pintail.	24
<b>Bee Eater</b> Eurasian	24	Chilean Thai	26
<b>Bittern</b>		Chiloe Wigeon	26
American	28-29	Chinese Spotbill	28
Australian	25	Cinnamon Teal	26
Eurasian	25	Comb.	30
Least	19-20	Common Shoveler	26
Little	16-17	Common White-eye	26
Sun	27	Crested	30
Yellow	22	Cuban nee	30
<b>Blackbird</b>		European Eider	27
Common	15-Dec	European Golden-eye	28
Red-winged	12-Nov	European Pochard	27
<b>Bustard</b>		European Widgeon.	26
Great	25-28	Eyton's Whistling	30
Little	20-21	Falcated Thai	26
<b>Buzzard</b>		Florida	28
Common	33-38	Fulvous Whistling	28
Honey	30-35	Gadwall	26
Long-legged	28	Garganey	24
Rough-legged	31	Goosander	30
<b>Cacique</b>		Greater Brazilian Teal.	27
White-Bellied	28	Greater Scaup	28
<b>Capercaillie</b>		Green-Winged Teal	25
Black-billed	28	Grey	28
Common	27-28	Harlequin Duck	30
<b>Caracara</b>		Hartlaub's	32
Crested	28	Hawaiian	28
<b>Cassowary</b>		Hooded Merganser	28
Twin-wattled.	49-56	Hottentot Teal	25
<b>Chaffinch</b>		Indian Spotbill	26
Eurasian	13-Nov	Javan Whistling	28
<b>Chicken</b>	21	Kerguelen Pintail	26
<b>Cockatiel</b>	18-20	King Eider	22
<b>Cockatoo</b>		Laysan Teal	28
Bare-eyed	23-24	Long Thiled	23
Black	28	Mallard	28
Blue-eyed	30	Mandarin	28
Citron Crested	25-26	Marbled Thai	26
Galah	22-24	New Zealand Brown Teal	28
Gang-gang	30	New Zealand Scaup	26
Glossy	29	New Zealand Shoveler	26
Goffirt's	25	North American Black	27
Greater Sulphur	27-28	North American Ruddy	24
Leadbeater's	26	North American Wood	28
Lesser Sulphur	24-25	Northern Pintail.	26
Medium Sulphur	26-27	Philippine	26
Moluccan	28-29	Puna Thai	26
Palm	28-30	Radjah Shelduck	30
Philippine Red-vented	24	Red-billed Pintail.	26
Red-tailed Black.	30	Red-billed Whistling	28
Slender-billed	23-24	Red-breasted Merganser.	30
Triton	27-28	Red Crested Pochard	28
Umbrella	28	Red Head	28
<b>Condor</b>		Ringed Teal.	24
Andean	54-58	Ringneck	26
<b>Ostrich</b>	40-42		
<b>Falcon</b>			
Eleanora's	28	<b>Junglefowl</b>	
Gyr	35	Ceylon	18-20
Lanner	32-35	Green	21
Prairie	31	Grey	20-21
Peregrine	29-32	Red	19-21
Red-footed	28		
Saker	30	<b>Kookaburra</b>	
		Laughing	25
<b>Geese</b>			
Abyssinian Blue-winged	31	<b>Lorikeet</b>	
Andean	30	Fairy.	25
Ashy-headed	30	Goldie's	24
Atlantic Brant.	23	Johnstone's	21-23
Atlantic			
Canada( <i>canadensis</i> )	28	Little	22
Bar-headed	28	Masena's	23-26
Barnacle	28	Meyer's	23-24
Black Brant	23	Musk	25
Cereopsis	35	Ornate	26-28
Cackling Canada	28	Purple-crowned	22
Dusky Canada	28	Red-flanked	25
Eastern Greylag	28	Scaly Breasted	23
Egyptian	30	Stella's	26-27
Emperor	25	Swainson's	25-26
European White-fronted	26	Varied.	22
Giant Canada ( <i>maxima</i> )	28	Weber's	27
Hawaiian.	29		
Kelp	32	<b>Macaw</b>	
Lesser White-fronted	25	Blue & Gold	26
Magellan	30	Buffon's	26-27
Magpie	30	Caninde	26
Moffitt's Canada.	28	Chestnut-fronted	28
Orinoco	30	Green-winged	26
Pied	35	Hyacinth	26-28
Pink-footed	28	Hliger's	26-27
Red-breasted	25	Military	26
Ross's	23	Red-bellied	25
Ruddy-headed	30	Yellow-collared	26
Snow	25	Red-fronted	26
Spur-winged	32	Red-shouldered	24
Swan	28	Scarlet	26
Taverner's Canada	28		
Western Bean	28	<b>Partridge</b>	
Western Greylag	28	Chukar	23
Whitefront	26	English	23
Vancouver	28	Gray	23-25
		Hungarian	24
		Red-legged.	23-25
<b>Guinea Fowl</b>		Rock.	24-26
Helmeted	24-25		
Vulturine	25-26		
		<b>Peafowl</b>	
		Congo	26-28
<b>Parakeet</b>		Green	28
Alexandrine	26-27	Indian	27-28
Barred	18		
Budgerigar	18		
Canary-winged	26	<b>Pheasant</b>	
Derbyan	26	Blood	28
Quaker	23	Blue Eared.	26-28
Red-fronted	20	Blyth's Tragopan	28
Rose-ringed	24	Brown Eared	26-27
Long-tailed	24	Bronze-tailed Peacock	22
Malabar	27	Bulwer's Wattled	25
Moustached	25-26	Cabot's Tragopan	28
Sierra	28	Cheer	26
Yellow-fronted	20	Common Ringnecked	24-25
		Copper	24-25
<b>Parrot</b>		Crested Argus	25
African Grey	28	Crested Fireback	24
Amboina King	20	Crestless Fireback	21-24
Australian King	20-21	Edwards'	21-24
Blue-bonnet	19	Elliot's	25
Blue-headed	24-27	Germain's Peacock	22
Blue-winged.	18	Golden	23

# INCUBATION TROUBLESHOOTING

The artificial incubation of eggs is an art form and a science in its own right. It is not just a matter of heating eggs until they hatch. Every stage of growth, from the first cell stage to the full chick, requires a perfect sequence of developmental events. Any interruption of these events will alter any development that follows. Changes in early incubation will therefore be critical in final development.

Interference with development may occur as a result of infection, changes in temperature, changes in humidity, handling and storage. Bacteria may enter the egg either before the shell is formed or more commonly, after the egg is laid. Immediately upon laying, the egg is at body temperature. As it cools, the egg contents shrink somewhat, creating a vacuum within the egg. This suction of the air through the pores of the shell will normally then form the air-cell at the blunt end. Under unhygienic conditions, bacteria will also be drawn inside the shell at this time. This bacteria will multiply within the rich nutritious conditions of the egg and these eggs will shed bacteria in the incubator, particularly at hatching, to infect other eggs. A situation of good initial hatches and poor subsequent hatches may be due to remnant bacterial population within the incubator. Fumigation between hatches may rectify this problem.

As mentioned previously, storage conditions are important. The egg has already begun embryonic development when laid and this is halted as the egg cools. It is possible at this stage to kill the egg through poor or prolonged storage. Conditions that will kill this embryo include prolonged cold, prolonged heat (greater than 21°C), evaporation due to high air movement, condensation due to high atmospheric humidity (allowing bacterial entry) and denaturation or weakening of the protein due to prolonged heat. Egg storage is best at approximately 12°C. The length of storage time depends on the species, but generally seven to ten days is considered maximum for best hatchability. Stored eggs tend to produce smaller chicks than fresh eggs.

Turning during storage is considered beneficial. The yolk tends to float within the egg and will contact the shell. Under ideal temperature and humidity it will take about a week for the yolk to stick to the shell and cause inhibition of development. Under sub-optimal conditions, sticking will occur sooner and therefore the egg should be turned daily. This is easily accomplished by tilting the egg storage tray to different directions each day.

Rough handling may crack the eggs, either visibly or otherwise and can damage the fine structures of the dormant (resting) embryo. If eggs are jolted in any way, waiting 24 hours before setting those eggs will improve hatchability. Excessive vibrations and jolting are the primary cause of embryonic malposition. So why is it that hens can store eggs in a nest of up to three weeks? Research has shown that the hens turn their eggs periodically, warm them up to 26°-27°C, plus add protection to the eggs from bacterial penetration by rubbing antibiotic' skin oils over them.

Correct temperature and humidity will influence rates of development and the correct sequences of development. Early in the incubation period this development is more easily disrupted. The effect of this disruption may not be seen until later in development, when important functions are unable to occur, due to abnormal structures or abnormal processing. This is most commonly seen as a failure at the time when pulmonary respiration is required to start. The result is late, dead-in-shell chicks.

Excessive temperature effects depends on the stage and extent of heat increase. Constant high temperatures results in overall poor development, with only a few eggs developing full term. Those eggs that do hatch, tend to hatch early, will be small and weak and often have unhealed navels or even a knob of yolk sac protruding. There will be minor malformations such as crooked toes and a high proportion of late, dead-inshell chicks. Greater than 2°C above the recommended temperature will kill all embryos at an early stage, with the characteristic blood ring being seen. Less than 2°C above the recommended temperature will produce some early, but mainly later, losses. Trying to adjust the temperature to correct problems will only worsen the developmental problems. Temperature increases late in development will be less dangerous as much of the development has already taken place and the chick is now just growing. Remember however, that at this stage, the chick is well developed and producing body heat of its own. This can compound any incubator temperature increase problems and result in weak chicks, although increased ventilation may compensate for this. Low temperature can also deform development but is less dangerous, its primary effect being delay in hatching. Perfectly normal chicks may be found to hatch up to two days late. The chicks are often large, soft and a little sluggish in getting going. Low temperatures can occur with regular door opening and handling. If the temperature is significantly low for the entire incubation period, many dead-in-shell chicks will be the result.

Humidity also has its optimum levels, but significant variation can occur without death, because the embryo can control its own water metabolism and compensate for minor inadequacies. Humidity problems can occur early or late in development. Early, low humidity will cause shrinking of the egg contents and this leads to problems with the chick's ability to uptake calcium for bone growth. There is usually a very high proportion of dead-in-shell chicks and the air-cells of the dead eggs are always too large. Surviving chicks are usually small and may die at a later stage. Early high humidity will result in a small air-cell and reduced use of albumen. The chick is often blobby, wet and weak and fails to hatch properly because excess fluids interfere with breathing. This will be seen in a high percentage of unhatched, but pipped eggs, with a live embryo imprisoned inside.

At hatching, but before pipping, a dry atmosphere is needed for entrance into the air-cell. After this, increased humidity is required to stop the membrane drying out. If the humidity is too low, the chick may stick to the shell membrane or to the residual albumen. Pheasant eggs can be particularly prone to this. Many of the early hatching chicks will get out quickly, but those that follow often have difficulties and when hatched, they have pieces of shell sticking to them or be strapped in their shells by tough membranes. Too low a humidity is a common result of opening the hatcher door on regular occasions, to see how the chicks are progressing.

If the water tray is allowed to run out for a short period (approximately four to six hours) before refilling, then the chick has a period in which it can compensate for the previous three to four days humidity levels, as the humidity in the incubator has now changed with emptying and refilling.

Turning of eggs on a regular basis is necessary to bring the growing embryo in contact with pockets of nutrients within the egg, as well as to stop sticking. Turning also stops the membranes from folding and bunching up and therefore interfering with gas and waste movement. Poor turning will not kill the embryo until it becomes large enough to produce excessive wastes. Turning the eggs should not occur in the same direction every time or one suspensory ligament (chalazae) will wind up and the other unwind. This will release the yolk from the membranes and kill the embryo.

## Suggested Reading

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- Robertson, I. S. The influence of turning on the hatchability of hens' eggs. *J. Agric. SciL: 57, 49*. 1961.
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**Total incubation time to hatch,  
time for transfer to hatcher  
and dry and wet bulb temperatures for common birds.**

Common Name	Incubation Conditions			Hatcher Conditions		
	Period (days)	Dry Bulb (°C)	Wet Bulb (°C)	Transfer at day	Dry Bulb (°C)	Wet Bulb (°C)
Canary	13-14	38.05	30-31.1	11	37.2	32.2-34.4
Chicken	21	37.5	30	18	36.9	32.2-34.4
Cockatiel	18-20	37.5	30-31.1	15-18	37.2	32.2-34.4
Cockatoo (various)	22-30	37.5	30-31.1	20-27	37.2	32.2-34.4
Conure (Sun)	28	37.5	30-31.1	25	37.2	32.2-34.4
Conure (various)	21-30	37.5	30-31.1	18-27	37.2	32.2-34.4
Dove	14	37.5	30	12	36.9	32.2-34.4
Duck (common)	28	37.5	30-31.1	25	36.9	32.2-34.4
Muscovy Duck	35-37	37.5	30-31.1	31-33	36.9	32.2-34.4
Finch (Zebra)	14	37.5	30-31.1	12	37.2	32.2-34.4
Domestic Goose	30	37.5	31.1	27	36.9	32.2-34.4
Geese (various)	22-30	37.5	31.1	20-27	36.9	32.2-34.4
Grouse	24-25	37.5	28.8-30	22	37.2	32.2-34.4
Guinea	28	37.5	28.8-30	25	36.9	32.2-34.4
Lovebird (various)	22-25	37.5	30-31.1	20-22	37.2	32.2-34.4
Macaw (various)	26-28	37.5	30-31.1	23-25	37.2	32.2-34.4
Mynah	14	38.05	30-31.1	12	37.2	32.2-34.4
Parakeet (various)	18-26	37.5	30-31.1	15-23	37.2	32.2-34.4
Budgerigar	18	37.5	30-31.1	15	37.2	32.2-34.4
Parrot (various)	18-28	37.5	30-31.1	15-25	37.2	32.2-34.4
Parrot (African Grey)	28	37.5	30-31.1	25	37.2	32.2-34.4
Chukar Partridge	23-24	37.5	31.1	20	37.2	32.2-34.4
Peafowl	28-29	37.5	30-31.1	25-26	36.9	32.2-34.4
Ptarmigan	21-23	37.5	30-31.1	18-20	37.2	32.2-34.4
Raven	20-21	37.5	30-31.1	17-18	37.2	32.2-34.4
Ring-neck Pheasant	24-25	37.5	30-31.1	21	37.2	33.3-35
Pheasant (various)	22-28	37.5	30-31.1	20-25	37.2	33.3-35
Pigeon	17-19	38.05	31.1	14	37.2	33.3-35
Bobwhite Quail	23	37.5	28.8-30	21	37.2	32.2-34.4
Japanese Quail	17-18	37.5	30-31.1	15	37.2	32.2-34.4
Swan (various)	33-37	37.5	30-31.1	30-33	37.2	32.2-34.4
Turkey	28	37.5	28.8-30	25	36.9	32.2-34.4
Emu	49-50	36.38	21.1-23.8	47	36.3	32.2
Ostrich	42	36.38	21.1-23.8	39	36.3	32.2
Rhea	36-42	36.38	26.6		36.3	32.2

## INCUBATOR DATA CHART

This is designed for Chickens(21Days) but can be adapted for any Specie.

Day #	Date	Turner Works <sup>1</sup>			Temperature		Wet Bulb	Water Checked	Candling	Remarks
		1	2	3	Room	Incubator				
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19		X	X	X						
20		X	X	X						
21		X	X	X						

This record is important. Keeping data will help prevent problems from developing during incubation.

<sup>1</sup> Check the turner three times each day except days 19 through 21. Eggs are not turned on these days. Or eggs have been moved to the Hatcher.