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Priam Psittaculture Centre

'Parrot Incubation'

Successful parrot egg incubation involves the appropriate management of quality eggs with appropriate incubation equipment. The following is a summary of some of the critical issues we have identified at our Specialist Captive Breeding Facility over recent years.

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1. Incubator Management

The incubator has five critical functions. Successful parrot egg incubation depends on the construction of an appropriate regime encompassing these five critical factors

- **Temperature**
- **Humidity**
- **Egg Turning**
- **Hygiene**
- **Airflow**

The variety of incubators available vary in how they regulate the above five parameters.

It is my opinion that incubation success will be 50% due to machine design and 50% due to management skills.

If we were to try and allocate the importance of skills in incubation management in zoos and aviculture, I believe the following would be the approximate break-up:

- Temperature Management 20%
- Humidity Management 10%
- Egg Turning Management 60%
- Hygiene Management 5%
- Airflow Management 5%

2. Useful Parrot Incubation Statistics & Management Regimes

- **Incubation Period:** Varies from species to species. For most parrots it is between 19 and 30 days**.**
- **Days to Pip:** Commonly in Parrots = Incubation Period less about 48 Hours
- **% Weight Loss Target to External Piping:** Commonly 13.5% to 15 % but a variation between 10% and 20% should not cause significant problems. In recent years I have been targeting a % weight loss to external piping of between 11% and 14% which I believe has produced more consistent and stronger chicks. Such chicks tend to have greater supplies of oxygen available to them at the critical time approaching hatching than the higher weight lost eggs.
- **Target Parrot Egg Incubation Temperature:** 37.2º C (99.0º F) for fan forced incubators. Acceptable variations would be about ± 0.5ºC but a greater fluctuating variation to this is not absolutely critical to chick survival.
- **Target Parrot Egg Humidity:** Variable but it is directly dependent on eggshell thickness and thus weight loss trends. We run incubators at different relative humidity, normally one at RH = 35-40% and one at RH = 70-80%. We move the eggs between these incubators throughout the incubation period, to achieve the desired weight loss trend we are targeting. When multiple incubators are not an option I would start small eggs at a RH = 50% + and large cockatoo/macaw/amazon eggs at 40%
- **Target Hatcher Temperature for Parrots:** 36.7ºC (98.0º F) ± 0.5ºC for fan forced incubators but again a fluctuating variation to this is not absolutely critical.
- **Target Hatcher Humidity for Parrots:** RH = 60% to 70% However, more and more every day I think we should be running hatching eggs at a RH relative to their weight loss trend over their incubation period i.e. high weight loss eggs at

high RH and low weight loss eggs at low RH. In recent years we have been using a RH=60% across all eggs with excellent results.

- **Allantoic Membrane Development Targets for Parrots:** Unquestionably the faster the allantoic membrane is developed to 100% coverage of the inner cell membrane, the more likely you will have a healthy, viable chick hatching. The faster the allantoic membrane is developed, the sooner increased supplies of oxygen are made available to the growing embryo and thus a stronger more viable chick is produced. Ideal development in parrots is 100% allantoic membrane coverage of the inner shell membrane area by 50% – 52% of the incubation period.

- **Preferred Parrot Turning Regimes:** Aggressive, high frequency turning is required until 100 % coverage of the inner cell membrane by the allantoic membrane is achieved which should be by about 50%-52% of incubation period. This is exactly as the parrot nestlog camera data is showing us. Then the turning regime should be changed to a gentler rocking of the egg with the aircell elevated to 45º above the horizontal axis. And this is the artificial way of copying the physics of the egg turning regime that occurs in nature.

    - We incubate using rollers with 'O' rings on alternate rollers. Eggs are positioned on the horizontal axis and turn 180º each turn, backwards and forwards, at a rate of about 96 times per day. This aggressive high frequency turning provides frequent flushing of the growing embryo with albumen, its source of nutrition, which seems to be needed because of the small yolks that parrot eggs have.

    - Subsequent turning should be less aggressive and preferably less frequent to prevent separation of the allantoic membrane from the shell, which leads to an airspace between the shell and the allantoic membrane. If severe allantoic separation occurs; it leads to severe inhibition of embryo growth and if it is in excess of 20% coverage of the inner shell surface it will normally lead to death of the embryo as it approaches hatching stage.

    - Furthermore, continuation of aggressive high frequency turning will prevent the correct positioning of the chick in the egg for hatching. We have found that in the second half of incubation it is best to put parrot eggs into an incubator with trays that rock the egg back and forth slowly. By placing the egg in the trays, positioned near vertical with the pointed end down, encourages the correct positioning of the chick at hatching and mal-positioning is almost completely eliminated. Normally at 100% allantoic membrane development I candle the egg and mark on the shell with a HB or 2B pencil, the aircell line. I then position the egg in a rocking incubator such that it is offset 45º to the vertical axis, pointing away from the greatest dip in the aircell line on the egg. As the egg approaches drawdown and hatching I will tilt the egg further away from the vertical axis and thus closer to its horizontal axis. Using such a turning regime, results in an

extremely high proportion of correct hatching positions i.e. hatchings where the chick internally pips into the air cell region, and then externally pips above the air cell and has its left eye against the shell on the left side of the egg if you are looking at the egg from its larger end.

- In incubators that only have trays rocking 90º back and forth, supplementary hand turning eggs a number of times each day often aids the rapid development of allantoic membrane. This extra hand turning seems to be more critical in the smaller parrot eggs and I would encourage extra hand turning at least 4 to 6 times per day.

- **Hatching a Parrot Egg:** As soon as external piping occurs, I weigh the chick to determine the weight loss to this stage and mark the current air cell line with a HB or 2B pencil. The hatching chick is then move to a Hatcher maintained at 36.7ºC (98.0º F) ± 0.5ºC and with a RH of 60%. The egg is position on the base of a soft tissue lined small container with a diameter approximately equal to twice the length of the egg. The externally pipped site is elevated to the highest possible position. Using the above incubation parameters, I have found that hatching assistance in recent years has almost been completely unnecessary.

3. Key Egg Incubation Formulas

Units of Measurement: (all to 3 or 4 decimal places)

- Length (L) -Centimetres
- Weight (W) -Grams
- Time (T) -Days
- Volume (V) -Cubic Centimetres
- Density (D) -g/cm^3/day

Calculation of an Incubation Time Period:

$$=\{[\text{Time (mins)}/60 + \text{Time (hours)}]/ 24\} + \text{days}$$

E.g. If Initial Start Time (T_1) = 1350 Hrs 6/1/97

If Time of Period (T_2) = 0715 Hrs 13/1/97

Therefore $T_1 - T_2 = [(10/60 + 10)/24] + 6+[(15/60 +7)/24]$

$= 0.424 + 6 + 0.302$

$= 6.726$ days

Estimated Egg Fresh Weight (when unknown):

= Length x Breath x Breadth x 0.548

Daily Weight Loss Target Aim:

= (Fresh Laid Weight x Desired % Loss to pip) / Number of Days to Pip

Estimated % Weight Loss Trend at Time T (t)

= {{[(Fresh Weight – Actual Weight at T(t)) / T(t)] x Estimate Days to Pip} / Fresh Weight} x 100

Egg Volume: = Length x Breadth x Breadth x 0.51

Egg Density: = Egg Weight/ Egg Volume

Estimated Daily Change in Egg Density:

= [Egg density at time T(1) – Egg Density at Time T(2)] / Time T(2) – Time T(1)

NB: Target Egg Daily Density Change should be a reduction of 0.006 g/cm^3 /day

NB: Normal Target Fresh Egg density = 1.075g/ cm^3

NB: Target Hatch Weight = Approximately 65% of Fresh Egg Weight

4. Footnote

Much of the information recorded here has been the results and conclusions drawn from extensive research carried out over the last 20 years on parrot incubation. Unquestionably our findings and results have been made possible due to collaboration with AB Incubators of the UK. The current premium machine they have developed, the AB NL 75 Mk6 fitted with rollers and "O" rings on every second roller, has given us excellent results across a wide range of species. This machine has extremely precise control over the core incubation parameters namely, temperature, egg turning and humidity. In the second half of incubation we currently use the comparatively cheap but excellent little incubator, the Brinsea Octagon 20 auto.

4. Egg Incubation Data Recording Sheet

See next page:

Egg Incubation Record Sheet

Species:_____ **Length (cm):** _____.
Flight: _____ **Breadth (cm):**_____.
Egg Number:_____ **Lay Date:**_____.
Fresh Weight (g):_____ **Collection Date:**_____.
Egg Volume (cm^3): _____ **Egg Condition at Collect:**_____.

Incubator Model: Serial No:
Incubation Parameters: DBT: RH: Turning Regime:
Notes:

Initial Start Day Correction Time Fraction Decimal:

Day #	Notes	Actual Weight (g)	Density (cm^3)	Vein Growth (%)	Date	Time

Expected Incubation Period: _____
Expected Days to Pip: _____

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