Technical handbook for the management of captive Egyptian vultures

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CERM - Endangered Raptors Centre

LIFE Egyptian vulture

LIFE16 NAT/IT/000659

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LIFE EGYPTIAN VULTURE (LIFE16 NAT/IT/000659)

Measures for the conservation of the Egyptian vulture in Italy and the Canary Islands
(Action A.2)

Project implemented with the contribution of the LIFE financial instrument
of the European Union

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Foreword

The action A.2 of the LIFE Project Egyptian vulture includes the drafting of an operative technical handbook for the management of captive Egyptian vultures which can be useful first to the Canary Islands Governement and Gesplan and secondary to other European organizations.

The handbook represents the result of 20 years' experience in the management of the largest Egyptian vulture captive stock in the world, hosted at the CERM Endangered Raptors Centre located in Rocchette di Fazio (GR). Up to 2017 46 specimens were born in the captive centre and since 2003 23 of them were released into the wild.

The Association CERM Endangered Raptors Centre

The Association CERM NGO manages the "Egyptian vulture Project" aiming at undertaking practical conservation measures in the attempt of preventing the extinction of the species in Italy, such as:

- development of captive breeding techniques;

- release into the wild of captive-bred fledglings/juveniles, thanks to the co-operation with Italian and European authorities, institutions and associations;

- management of a supplementary feeding point in a sensitive area.

The Association CERM manages, at the homonymous Centre, 42 Egyptian vultures of different age and origin (2018) and cooperates in the implementation of the LIFE project Egyptian vulture.

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General management

1. Facilities

The CERM, created within the LIFE Project Biarmicus, is provided with 18 aviaries, a cold storage for food and a service hut.

The aviaries are arranged in two groups and placed side by side; they each measure 7 m x 4 m x 3 m (L x W x H). Each aviary is equipped with perches, runways and a nest-box. They're separated by closed metallic panels.

2. Aviaries' video surveillance

The aviaries' video surveillance is an irreplaceable system for an adequate management of the vultures, specifically aimed at monitoring the pairs' behaviour in order to intervene in case of problems. The system should include:

- for each aviary, a colour IP Speed Dome PTZ (pan-tilt-zoom) camera with 18x zoom, Auto Focus Lens and IR Led (devices now available at a very low price);
- digital video recording system for IP 24/24 cameras with motion detection;
- high speed internet access for the remote control of the hosted pairs.

3. Regular management

Food remains are removed every day from the aviaries, the troughs are cleaned and refilled.

The aviaries are thoroughly cleaned weekly (by hand and by means of a rake) in order to remove pellets, material fallen from the nests, etc.

The grass covering the ground is regularly cut by hand. When the cutting is done by using an electric lawnmower, at low noise level, the more nervous specimens are temporarily placed elsewhere (even in pet carriers) not to stress them.

It's basic to avoid the presence of thorny plants in the aviaries (bramble, blackthorn, thistle, etc.), even if newly grown, because they could injury the vultures' feet and lead to the onset of serious diseases such as bumble foot.

During the breeding season the cleaning activities are reduced to the necessary minimum and the use of the lawnmower must be absolutely avoided: the grass cutting is carried out very quickly by hand while food and water are provided.

During the summer it's necessary to thoroughly clean the troughs with abrasive sponges without detergents, in order to avoid the growth of invasive algae.

4. Food and supplements

The food for the captive Egyptian vultures is mainly composed of rats and mice and, in a lesser proportion, by poultry. The provided pro-capite daily ration consists of about 180-200 gr of food.

A powdered supplement spread on the food is provided to the oldest individuals in order to favour articular functionality and reduce potential pains (based on Methylsulfonylmethane, glucosamine and chondroitin).

5. Monitoring of the beak and claws growth

Beyond the vultures' routine veterinary control it's important to frequently monitor the beak's length. Sometimes, in fact, the beak tends to grow too much, threatening the feeding capacity of the birds.

Therefore each time the beak seems too long, with its tip turning downwards, it's necessary to cut the surplus part. The operation is carried out by two persons. The first operator holds the vulture with the belly upturned, while surrounding it with one arm and holding it close to his body in order to avoid the opening of the wings. He also immobilises the feet so that the vulture will not injury itself with its claws. The second person immobilises the head from the back and keeps the beak closed after gently pushing the tongue inside.

Beak cutting

Next, the same operator starts cutting the beak tip using a pair of small bolt cutters (very sharp for avoiding to chip it); the operation is performed by cutting first one side of the exceeding part and then the other one, always maintaining the pointed shape of the beak and avoiding to cut it too much.

It's recommended to control the beak before the breeding season starts in order to avoid to intervene in the laying and incubating phase.

At the same time the status of the feet is also checked and the length of the claws is controlled. Should the claws appear very long it would be necessary to make them shorter.

Breeding

1. Nest preparation

Every aviary of the CERM has a nest-box measuring about 2 m x 1 m x 1 m (width x lenght x height). Inside every nest-box an angle limited by wooden

Nest-corner prepared at the CERM

poles (diameter of about 10 cm) forms a nest-area of about 70 cm x 70 cm.

At the CERM a first preparation of the nest-corners present in each nest-box is carried out in early February. The base of the nest-corner is covered with a layer of dry straw without molds and in perfect conservation conditions, spread with an abundant layer of uncarded sheep wool, clean and cut in small pieces with a maximum length of 4 cm.

It's important to cut the wool short to avoid it to be caught in the vultures' feet and, therefore, be removed from the nest. The sheep wool coming from old mattresses and pillows is perfect. The thickness of the straw and wool layer must not exceed the rim of the nest-corner.

At the end of the breeding season all the material present in the nest-box is removed and a thoroughly cleaning of the box is performed.

2. Other useful actions during the breeding season

Starting from late March small pieces of sheep wool are spread into the aviaries (outside the nest-box) so that the vultures can use them for preparing the nest.

At the beginning of the breeding season it's advisable to provide the potential pairs with a tub filled with muddy water (water mixed with red mud), so that they can take mud baths and colour their feathers.

It's important to remove possible small branches and other hard material from the aviaries because it could be brought to the nest and cause the breaking of the eggs.

3. Pairs' establishment

It's particularly difficult to obtain breeding pairs, due to several critical issues which are likely to arise. Among them the following ones:

- the partners don't get along, in other words they ignore each other or they're hostile towards each other;

- the partners show signs of courtship behaviour but the male becomes aggressive in an early or advanced phase of the breeding season. At the CERM, such a case involving some pairs, the males' aggressiveness started arising about 10-15 days after the beginning of regular copulations (the most visible display occurs when the male chases the female away from the nest but early signs can also be detected).

- the pair is quiet and seems to get along but it doesn't copulate even if the male makes mating attempts. The females seem to be indifferent and show weak signs of hostility or they escape even if they're not attacked.

In all these cases it's useless to leave the partners together in the next years.

4. Pairs' behaviour

During the breeding season the behaviour and the posture of the vultures provide unequivocal signs showing the compatibility or hostility between the partners.

Tight-knit pairs' behaviour

The tight-knit partners often stay next to each other, do reciprocal grooming (allopreening), they stay together close to the nest or work on its preparation (together o separated). The food is shared without any aggressive attitude.

Tight-knit pair

Normal male

A normal male stands with the back quite upright, puffy neck feathers and head feathers open like a crown. Sometimes he remains next to the female with an attitude of submission, he contracts the neck, lowers the head and brings it close to the female, with the back kept horizontal and the head feathers down and turned towards the back.
The vulture makes slow movements while standing close to the female.

Female available for copulation

Normal female

A normal female usually stands with her back "down", almost horizontal, contracted neck, rather puffy neck feathers and head feathers open like a crown. She approaches the male with such posture when she's available for copulation.
She can wait for the male in a crouching position, sometimes with the tale a little lifted.

Critical pairs' behaviour

Aggressive male. It has a very upright posture with extended neck and head, upright head feathers, walks with extended feet and a fast and resolute gait (goose-step). If the female approaches the nest she is chased, by mimicking short pecks or by making short attacks. Another typical behaviour is to pinch or pull one finger of the female feet.
All these signs lead the female to stop attending the nest within a couple of

days. The aggressive male, on the contrary, works continuously at the nest preparation and remains crouched in the nest for long periods.

Female with aggressive male. She rarely accesses the nest or she approaches it with care and only when the male is not nearby; she moves quickly away as soon as the male approaches. She never stands close to the male, even during the night.

Not available for copulation female with normal male. The male performs allo-preening but the female remains indifferent, with upright posture and extended neck; if the male tries to copulate, the female runs quickly away and she moves away each time the male goes near her. Nevertheless they can sleep together during the night. Sometimes the male, stressed by the continuous rejections, crouches and mimicks a fake copulation or, in other cases, takes a stone and tries to hatch it for some seconds.

Over the years several techniques have been used aiming at reducing the males' aggressiveness towards the females during the breeding period but all of them were unsuccessful:

- on the advice of Hans Frey, who used this method with the Bearded vultures, a hooded crow was placed in a pair's aviary, hoping that the male would turn his aggressiveness towards the crow;
- two nest-boxes were placed in the same aviary hoping that the male would defend only one of them as his territory, leaving the other one for the female;
- small windows were opened between an aviary and the next one, close to the frontal perch so that the males could see each other and therefore burn off their aggressiveness.


Confined aggressive male

In the breeding season 2018 a new technique was tested on four pairs. As soon as the males showed signs of aggressiveness they were moved to a small cage placed in the pair aviary where they couldn't see the nests. Five days later they were set free. This method seems to be successful as three males stopped being aggressive and the pairs returned to copulate. The fourth male continued to be aggressive but in this case the pair had never started copulating.

5. Potential pairs critical issues

Each specimen is unique. In general we realized that:

- males which have never bred, always showing signs of aggressiveness, can mate with the "right" female after having experienced several females before (never giving up hope!);
- the males usually incubate the eggs laid by their mate even if she has been removed from the aviary; some of them successfully rear the chicks as well;
- a female without a male doesn't incubate the eggs but eats them within a day after the male disappearance.

6. Eggs' laying and incubation

About 25 days after the beginning of the copulations a first egg is laid and it is usually followed by a second one within 5-6 days (in 2016 at the CERM an old female laid a fertile egg 15 days after the first one).

The eggs laid by the problematic pairs are artificially incubated and are replaced with a clay egg per nest. The clay egg must be placed after being heated to about 35°C in order to avoid it to be considered as food and tried to be eaten, given that Egyptian vultures like eggs very much.

The eggs can be left to a trustworthy pair for the incubation but since some years at the CERM we prefer to incubate them artificially, replacing them in the nest with clay eggs.

Anyway, when possible the eggs are left to be incubated by the parents for at least five days before moving them to the incubator because this could have positive effects on the hatching.

In such case, however, a pair is left incubating only one egg because, sometimes, a sort of competition arises between the partners. This can lead to a risky behaviour such as attempting to incubate one egg each, with the danger of an incorrect incubation or even the abandonment of one egg for a long time.

Female attacking her mate with a chick in the nest

Also the pairs which have a normal behaviour during the courtship and/or the mating period may have problems during the incubation and/or hatching. These are usually due to an anomalous behaviour of the females which may:

- violently attack the male during the incubation of the eggs or chicks. Such behaviour, observed in one pair at the CERM, could be caused by an excessive desire of the male to incubate the eggs and the chicks; by not allowing the female to relieve him, he triggers her aggression.
- break and eat the eggs just laid;
- eat live just hatched chicks (three cases which involved old females).

In two events the male ate the egg just laid by the female. In one of them the pair had shown a previous anomalous behaviour with the male attacking the female during the laying. In both cases the male had never worked at the preparation of the nest.

The females which display the aforementioned abnormalities maintain them in the next years so it's necessary to act consequently, collecting the eggs as soon as they have been laid or some days later and leaving the chick only to the care of the father (the mother can be removed from the aviary or placed in a cage inside the same aviary).

Regarding the females which lay for the first time in captivity, it's basic to continuously monitor the pair's behaviour through the video control system in order to:

- observe directly the moment of the laying in order to rapidly collect the first egg and replace it with a clay egg. This allows to safely check the female's behaviour and, later, the pairs' one.
- observe directly the moment of the hatching, locating the personnel near the aviary so that it can rapidly intervene if the female tries to eat the live chick. For stopping the female a loud noise can be produced, next the female must be removed from the aviary or isolated leaving the chick only to the father's care.

7. CERM's equipment for artificial incubation

- Three incubators
- Two brooders
- A flat candling lamp (homemade)
- A precision balance
- A digital calliper for measuring the eggs' size
- Three high precision digital thermometers
- Two glass thermometers for incubators
- An Egyptian vulture puppet (homemade, professional since 2018)
- Thin white towels to cover the chicks (for imitating the parental incubation)
- Uninterruptible Power Supply (anti black-out)
- Dummy eggs weighing about 100 gr

8. Preparation to artificial incubation

When possible the eggs are left to the parental incubation for at least 5 days and then moved to the incubator. If necessary they're moved to the incubator as soon as they are laid, anyway good results are achieved.

Before inserting the eggs in the incubator it's necessary:

- to sterilize the machine and check its working conditions for several days. For the sterilization a solution of alkyl-benzyl-dimethyl-ammonium chloride (20 mg/l of distilled water) is used. The same solution is used to refill the water tank which maintains the humidity;

Cleaning of an egg before its artificial incubation

• a gentle cleaning of the eggs is carried out, scraping away eventual excrement residues by means of a cutter and scrubbing them with some paper soaked in the above mentioned disinfectant solution;

• to indicate on each egg, with a soft pencil, the parents pair's number and the laying sequence (i.e. 7/2 = pair n. 7, second laid egg).

Dummy eggs

The dummy eggs are prepared using shells of unfertile Egyptian vulture's eggs filled with clay and polystyrene, materials which, in the right proportion, allow to obtain an egg with the ideal weight of 80/100 grams.

For preparing a dummy egg the following procedure must be carried out:

- the egg is emptied by making a hole in its large side and letting the content ooze out, the egg is then washed and left to dry for at least one day;

- a small quantity of clay is mixed with water to obtain a rather fluid mixture which is used to fill the egg just a little bit over its half. Next some small pieces of polystyrene, about 1/2 centimetre long, are inserted in the egg until the content reaches more or less 1/2 cm from the hole. Finally the shell is completely filled with the clay mixture, letting it ooze out from the hole.

When the egg has dried, the surplus clay is removed, the shell smoothed with sandpaper and painted with ordinary markers.

9. Incubation parameters

- Incubation period: 42-43 days.
- Temperature: 37,3° - 37.5° (37° after the chick has broken the shell).
- Humidity: about 45-50% (>65% after the chick has broken the shell).
- Turning during the daylight: manually 90° or 180° every 3 hours in the interval 8:00 - 23:00 (6 times).
- Turning during the night: automatically 90° every 3 hours in the interval 02:00 - 5:00 (2 times).

Cooling outside the incubator, for 10 minutes, 3 times during the daylight.

The eggs are marked with a red point and a blue one at the opposite end for a better monitoring of the turning and for avoiding errors.

Manual turning is always counter-clockwise.

10. Ideal eggs weight loss during incubation

The incubation period lasts about 42 days. During the artificial incubation it's crucial to monitor the eggs weight loss; the correct weight loss is secured by the adjustment of the correct relative humidity.

We use for referencing the ideal weight loss of 14% (± 1%) during 40 days.

An Excel program has been elaborated which enables the monitoring of the weight loss' trend on a table and a graph; it allows to adequately adjust the relative humidity of the incubator (never its temperature), increasing it if the weight loss decreases more than expected or reducing it if the weight loss is too low.

It's anyway important to make sure that the humidity adjustments don't produce effects on the trend of the eggs weight loss once exceeded 2/3 of the incubation period.

The following parameters (table n. 1) are inserted in the program:

1) data of the laying parents;

2) laying date;
3) egg weight at the collection time;
4) days elapsed between laying and collection;
5) the two egg's diameters, measured with a calliper.

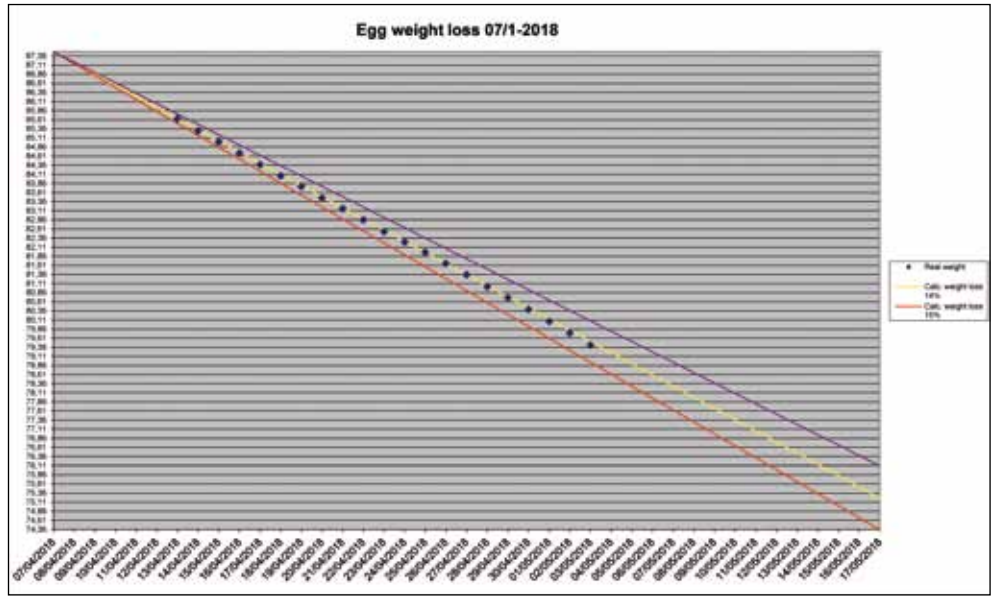
Table 1 - Necessary data to monitor the eggs weight loss

EGG WEIGTH & DENSITY LOSS TECHNIQUES						
Egg input data		Egg calculated data				
Egg code	7/1-2018	Pip date	16/05/2018		Weight loss	
Year	2018	Hatching date	19/05/2018	13%	14%	15%
Pair	7	Laying weight (gr)	87,48	87,48	87,48	87,48
Male	Salvatore	40 days weight (gr)	75,23	76,11	75,23	74,36
Female	Elena	Daily weight loss (gr)	0,31	0,28	0,31	0,33
Laying date	07/04/2018	Volume (cm^3)	82,36	Density loss		
Collection date	13/04/2018	Laying density (gr/cm^3)	1,0622	1,0622	1,0622	1,0622
Collection time	15.30	40 days density (gr/cm^3)	0,9135	0,9241	0,9135	0,9028
Days in the nest	6					
Collection weight (gr)	85,64					
Lenght cm	6,745					
Width cm	4,893					

Table 2 - Excel file to monitor the eggs weight loss

EGG WEIGTH & DENSITY LOSS TECHNIQUES PAIR: 7 EGG CODE: 7/1-2018

Days	Date	Temp. °C	Humidity %	Time	Real weight	Calc. weight loss 14%	Calc. weight loss 13%	Calc. weight loss 15%	Real density	Calc. density loss 14%	Calc. density loss 13%	Calc. density loss 15%
0	07/04/2018					87,48	87,48	87,48	0,00	1,06	1,06	1,06
1	08/04/2018					87,17	87,19	87,15	0,00	1,06	1,06	1,06
2	09/04/2018					86,86	86,91	86,82	0,00	1,05	1,06	1,05
3	10/04/2018					86,56	86,62	86,49	0,00	1,05	1,05	1,05
4	11/04/2018					86,25	86,34	86,16	0,00	1,05	1,05	1,05
5	12/04/2018					85,95	86,06	85,84	0,00	1,04	1,04	1,04
6	13/04/2018	37,3	45%	15.30	85,64	85,64	85,77	85,51	1,04	1,04	1,04	1,04
7	14/04/2018	37,3	46%	14.00	85,31	85,33	85,49	85,18	1,04	1,04	1,04	1,03
8	15/04/2018	37,3	46%	14.00	85,00	85,03	85,20	84,85	1,03	1,03	1,03	1,03
9	16/04/2018	37,3	46%	14.06	84,69	84,72	84,92	84,52	1,03	1,03	1,03	1,03
10	17/04/2018	37,3	46%	14.01	84,38	84,42	84,63	84,20	1,02	1,02	1,03	1,02
11	18/04/2018	37,4	47%	14.02	84,07	84,11	84,35	83,87	1,02	1,02	1,02	1,02
12	19/04/2018	37,4	46%	14.20	83,78	83,80	84,07	83,54	1,02	1,02	1,02	1,01
13	20/04/2018	37,4	47%	14.03	83,46	83,50	83,78	83,21	1,01	1,01	1,02	1,01
14	21/04/2018	37,4	48%	14.02	83,17	83,19	83,50	82,88	1,01	1,01	1,01	1,01
15	22/04/2018	37,4	48%	14.05	82,86	82,88	83,21	82,56	1,01	1,01	1,01	1,00
16	23/04/2018	37,4	48%	14.14	82,54	82,58	82,93	82,23	1,00	1,00	1,01	1,00
17	24/04/2018	37,4	47%	14.05	82,25	82,27	82,64	81,90	1,00	1,00	1,00	0,99
18	25/04/2018	37,4	47%	14.03	81,97	81,97	82,36	81,57	1,00	1,00	1,00	0,99
19	26/04/2018	37,4	46%	14.04	81,66	81,66	82,08	81,24	0,99	0,99	1,00	0,99
20	27/04/2018	37,4	43%	14.00	81,35	81,35	81,79	80,92	0,99	0,99	0,99	0,98
21	28/04/2018	37,4	41%	14.02	81,02	81,05	81,51	80,59	0,98	0,98	0,99	0,98
22	29/04/2018	37,4	43%	14.05	80,72	80,74	81,22	80,26	0,98	0,98	0,99	0,97
23	30/04/2018	37,4	41%	14.03	80,40	80,44	80,94	79,93	0,98	0,98	0,98	0,97
24	01/05/2018	37,4	41%	14.05	80,07	80,13	80,65	79,60	0,97	0,97	0,98	0,97
25	02/05/2018	37,4	41%	14.04	79,75	79,82	80,37	79,28	0,97	0,97	0,98	0,96
26	03/05/2018	37,4	45%	14.04	79,42	79,52	80,09	78,95	0,96	0,97	0,97	0,96
27	04/05/2018					79,21	79,80	78,62	0,00	0,96	0,97	0,95
28	05/05/2018					78,90	79,52	78,29	0,00	0,96	0,97	0,95
29	06/05/2018					78,60	79,23	77,96	0,00	0,95	0,96	0,95
30	07/05/2018					78,29	78,95	77,64	0,00	0,95	0,96	0,94
31	08/05/2018					77,99	78,66	77,31	0,00	0,95	0,96	0,94
32	09/05/2018					77,68	78,38	76,98	0,00	0,94	0,95	0,93
33	10/05/2018					77,37	78,10	76,65	0,00	0,94	0,95	0,93
34	11/05/2018					77,07	77,81	76,32	0,00	0,94	0,94	0,93
35	12/05/2018					76,76	77,53	76,00	0,00	0,93	0,94	0,92
36	13/05/2018					76,45	77,24	75,67	0,00	0,93	0,94	0,92
37	14/05/2018					76,15	76,96	75,34	0,00	0,92	0,93	0,91
38	15/05/2018					75,84	76,67	75,01	0,00	0,92	0,93	0,91
39	16/05/2018					75,54	76,39	74,68	0,00	0,92	0,93	0,91
40	17/05/2018					75,23	76,11	74,36	0,00	0,91	0,92	0,90
41	18/05/2018					74,92	75,82	74,03	0,00	0,91	0,92	0,90
42	19/05/2018					74,62	75,54	73,70	0,00	0,91	0,92	0,89



Graph 1 - Graph of the weight loss trend of one egg

Through these parameters the following data are automatically obtained:

1) weight at onset of laying;
2) 14% ideal weight loss and weight loss in the acceptable range of 13%-15%;
3) ideal weight after 40 days of incubation and weight in the acceptable range of 13%-15%;
4) a table and a graph reporting, in the 40 days concerned, the daily weights calculated at 13%-14%-15%;
5) the egg density at onset of laying and after 40 days (for statistic purpose).

The eggs are weighed every day at the same time in coincidence with one of the periodic cooling. The collected data are inserted in the table n. 2 in order to get a graph allowing a quick monitoring of the weight loss trend (graph n.1).

11. Eggs monitoring during incubation

With the exception of the moment of cooling and weighing, the eggs are handled as little as possible but, in any case, with care and wearing latex gloves. From the 15th day the egg can be candled every 5-6 days in order to check the


Egg candler

embryo growth and the growth and the tilt of the air cell.

Even if no air cell is visible it doesn't mean that the egg is infertile because sometimes the shell is very dark and, in such case, candling gives unclear results. Only an anomalous trend of the weight loss (less than expected) and a bad smell given off by the egg gives certainty of its infertility. When there is no certainty it's therefore appropriate to move the egg to another incubator so that it will not infect other eggs in case of its spontaneous break.

After 30 days of incubation it's possible to check if the egg is viable by gently resting it on a flat and smooth surface; while closely observing the egg, we gently tap it laterally in order to make it unstable. It will swing and then stop but if the embryo is viable the egg will continue moving autonomously with jerky motions for some seconds, due to the embryo movements.

In any case, if the egg doesn't move on its own we could be looking at a false negative because the embryo might not be very athletic!

12. Hatching

During the hatching phase it's important not to be anxious and impatient to see the chick coming out from the egg.

Only if necessary some assistance to the chicks must be provided, for example when the chicks take too much time to hatch or when they're very big (unable to rotate inside the shell) or when the eggs have an anomalous shape (i.e. oblong). The chicks certainly need to be assisted if they're malpositioned in the egg.

From the time the chick breaks the internal membrane until it escapes from the shell three days usually elapse.


Just hatched chick

First day: the chick enters the air cell, breathes and chirps (internal pip). Temperature decreases to 37°C, humidity is unchanged (45-50%), egg turning stops and the egg is placed on a piece of a soft terry towel.

Second day: the chick breaks the shell. Temperature is still at 37°C and humidity is increased to 65%.

Third day: the chick hatches. Temperature is at 37° C and humidity at 65%.

One hour later the shell's residues must be removed and the dry cord if needed is cut.

The operation must be carried out with care avoiding to stretch the cord if it's still attached to the shell. Next the navel is gently swabbed and disinfected.

The towel must be replaced with a clean one and covered with a paper towel.

13. Malpositioned chicks

At the CERM four cases of chicks which were malpositioned in the egg occurred (with the head towards the small end and the legs towards the large end, in other words upside down compared to the normal position). Three of them were assisted and successfully hatched; they had been able to pip at the small end giving us the opportunity to intervene.

How can it be realized that a chick has a wrong position in the egg?

By candling the egg about 39 days after the onset of the incubation the inner membrane separating the air cell from the chick appears irregular (warped or broken by the legs).

The chick pips the shell in the small end of the egg and earlier than expected (both internal and external pip). It's necessary to often check the shell carefully because the chick only opens a small hole which is not easy to detect (more often it consists of small cracks of the shell which can be more easily detected by touching).

Hole made by a malpositioned chick

The reasons for malposition can be several. In our case the cause was related to the automatic turning of the eggs which caused them to have the small end up, leading the embryo to be positioned in the wrong way, mislead by the anomalous tilt of the egg (process starting about 15 days before hatching).

Since 2016 the eggs have been manually turned in the daylight (every three hours), taking care to maintain them with the small end always downwards: since then no more cases of malpositioned chicks have occurred.

14. Assistance to malpositioned chicks

The incubator is regulated at 37°C of temperature and humidity exceeding 65%.

In order to avoid the death of the upside down chick it's necessary to very carefully free first its neck and then its head by removing tiny pieces of shell around the hole every half an hour and operating for no longer than five consecutive minutes avoiding to break the underlying membranes, by using scissors, tweezers and cotton buds soaked with cold or warm water. Next the egg is returned to the incubator to allow the underlying membranes to dry. At the next step tiny pieces of the membranes are removed but only if in the meantime they have dried and vessels have receded, otherwise the chick might bleed. Next the rest of the shell is carefully removed.

Intervention on a malpositioned chick

Once the neck and the head have been freed (the process takes about two days) the rest of the shell is left untouched so that it surrounds the remaining part of the chick body. In fact it's crucial for the chick to have the time to completely reabsorb the yolk sack.

During the intervention a wrong movement or the creation of a too big hole in the shell may cause the chick death, by harming the umbilicus area (disembowelling) or by exposing it at risk of septicaemia due to the infection of the uncompleted reabsorbed yolk sack.

Once the yolk sack has been reabsorbed and the umbilicus has closed, the chick, if necessary gently stimulated, will autonomously start the last phase of the hatching by pushing with its legs and the back of the head. As in the case of a regular hatching, one hour after the chick has come out from the egg, any residue must be removed and the dry cord, if necessary, has to be cut (see Hatching).

The whole process, between the shell crack and the hatching, takes about 3 days.

For information on how to assist refer to https://www.backyardchickens.com/articles/step-by-step-guide-to-assisted-hatching.64660/

15. Management of incubator hatched chicks

4-5 hours after hatching the chicks are moved to a brooder, where the temperature is settled at 37°C to be decreased in the following days of about 1/2° C per day. It's important to carefully check the chicks' reaction to these adjustments. Humidity is kept over 60% and will be slowly decreased over the next few days to reach 50%.

In order to avoid the hip dysplasia (splayed legs) the chicks are placed in small concave containers lined with small wool pieces creating a sort of nest; a paper towel is laid on the wool and very often changed. It's important that the legs are always close to each other and that they do not open (the chicks must not be placed on smooth and flat surfaces).

The chicks are covered with a thin white towel imitating the parents' body; in this way they get used to the gentle pressure of the towel and willingly accept the possible incubation by foster parents.

It's important to keep in mind that:

- if a chick incessantly cheeps it is not fine;
- a chick curled up and not active may be cold;
- a chick stretching his neck and legs is hot.

Warning: too much heat seriously harms the chicks.

16. Chicks' management and feeding

The chicks are fed for the first time about 6 hours after hatching, as soon as they start to peck around keeping the head upright.

They are fed with meat pieces more or less every three hours or when they seem to be hungry. However it's important not to overfeed them especially

during the first days of life, when the digestive system has to get used to the new feeding regimen.

They must never be fed with food from the refrigerator (they would die!); cold food must always be brought to room temperature (i.e. by keeping it in the palm of the hand, protected by a latex glove).

During the first days of life the chicks are fed with small pieces of mouse and rat, bones and fur removed.

When the chicks can master their neck (trembling is gone) it's possible to give them some water with caution, preferably before feeding them. A "false" beak retaining some water drops is used: the chicks peck at it and are able to swallow some water. Syringes must not be used because there is the risk of choking the chicks. Just a few days after hatching the chicks drink a lot.

Egyptian vulture puppet

At the age of 7/10 days they can take small pieces of food placed in front of them.

In order to avoid that incubator hatched chicks get imprinted on humans several actions are undertaken.

First of all the contact with the keepers is avoided, especially when the chicks are between 5 and 15 days old. When an Egyptian vulture pair or a single male are available for the adoption, the

A chick while feeding

A chick while drinking

chicks are moved to the nest within 5 days of age.

Otherwise all the chick's management operations must be carried out with the operator body adequately disguised (covered with a vest, mask and dark glasses) and in silence, wearing on the arm which supplies food and water to the chick a puppet with the shape of a neck and head of an adult Egyptian vulture.


Chicks moved to a nest

17. Moving the chicks to the aviaries and their adoption

Whenever possible, a chick hatched in the incubator is hand-reared for 1-5 days and then moved to the parents' or to a male's nest (biological or foster ones). Half shell of an Egyptian vulture egg is placed in the nest with the chick; later the clay egg which has been incubated by the parents or by the male and the half shell are removed.

Sometimes the eggs are placed in the nest while hatching, when the chick is chirping inside the egg but this method is used only when the biological or foster parents or single fathers can be trusted.

If the chick has to be hand-reared for a long time because there are no available foster parents, it's better if it can see one or more adults. Therefore an adult can be temporarily placed close to the brooder or the chick can be placed in a small cage inside the adults' aviary, when its age and the external temperature allow it.

In such case small pieces of food are daily placed near the cage in order to attract the adults and make it easy for the chick to see them. It's advisable to have an adult male in the cage because males are usually not aggressive towards the chicks and, actually, they're curious and likely to get close to them.

Wherever more rearing pairs are available, older chicks may replace younger ones in the nest and vice versa, to avoid to hand-rear them between 5 and 15 days of age.

When reliable parents or single individual are already rearing, one or more chicks at the age of at least two weeks can be added to the nest.

In these cases, especially when the ages are very different, it might be useful to temporarily install a low separation net which can be removed if the chicks will get used to a peaceful cohabitation.

The net serves only to avoid risky contacts between the chicks and to favour a quiet socialization. The net, if rapidly installed, doesn't usually cause problems to the adults which can easily circumvent it to reach the chicks placed at the two sides. Of course these operations can be carried out only under regular video control.

The fledglings are ready to be released at the age of about 80 days; if it's expected to release them in the following years it's necessary to move them to aviaries which are completely closed in order to reduce the contacts with the keepers as much as possible. It's especially important that they don't associate food availability with humans; for this reason food has to be supplied by a tube. Otherwise they might approach humans, with an high risk of being killed.


A fledgling at the age of 80 days

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