PHEASANT

Reproduction

The reproduction of an avian species in captivity is the moment of the truth - and always exciting. It is almost like the final test. One does not only have to understand the adults but also the eggs, the chicks, the juvenile birds, in fact the complete life cycle of the bird to achieve at least some results, and what is more, he must be very lucky that nature and luck go hand in hand, if not, there will be no chicks and he has to wait for the next year to come.

MATING

INCUBATION

REARING

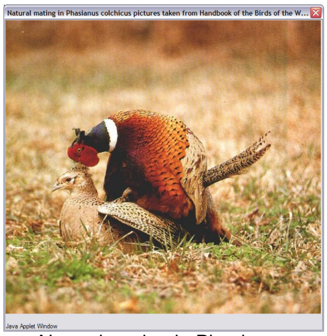
1. Mating

1.1 NATURAL MATING

1.1.1 Natural mating and its postures in exotic pheasants

1.1.1.1. Introduction

Natural mating in exotic pheasants is the reproduction method which is most favored by aviculturists around the world. Natural mating deals with the breeding of offspring from heterosexual encounters by natural means. For this, the male(s) and female(s) are put together in a confined environment (= aviaries) and are due to mate without the involvement of any artificial means. This reproduction method is most favored because of its well-known display performances , which are mostly orchestrated by the male . Admittedly, there is not much work involved by man, except for maintaining the adult stock birds.

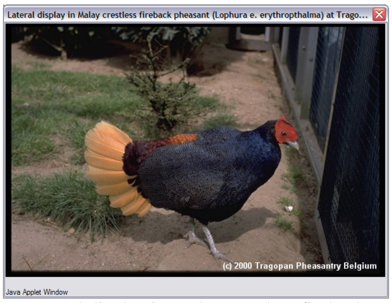


Natural mating in Phasianus colchicus pictures taken from Handbook of the Birds of the World by Del Hoyo

1.1.1.2. Some natural display postures in exotic pheasants

Major male display of most exotic pheasants include the below mentioned postures. These are well documented by the display and mating of one pair of Malay peacock pheasant (Polyplectron malacense), photographed in the aviaries of the author in Belgium in April 2000.

1. Waltzing : In this display one wing is lowered and the male advances past or around his partner. It corresponds to what has been described by many investigators as "lateral display".



Lateral display in Malay crestless fireback pheasant (Lophura e. erythropthalma) at Tragopan Pheasantry Belgium April 2000

Wing flaping in Malay crestless fireback pheasant (Lophura e. erythropthalma) at Tragopan Pheasantry Belgium April 2000

Wing whirling by one freshly imported male Siamese fierback pheasant (Lophura diardi) at the Tragopan Pheasantry in Belgium

2. Wing flapping : In this highly variable display, in which the wings may be moved silently or flapped noisily, including clapping sounds made by the wings striking one another overhead. This display is also known as "wing-whirring', which is very well-known in silver pheasant, firebacks, longtaileds, but not in argus, peacock pheasant, or ruffed pheasant.

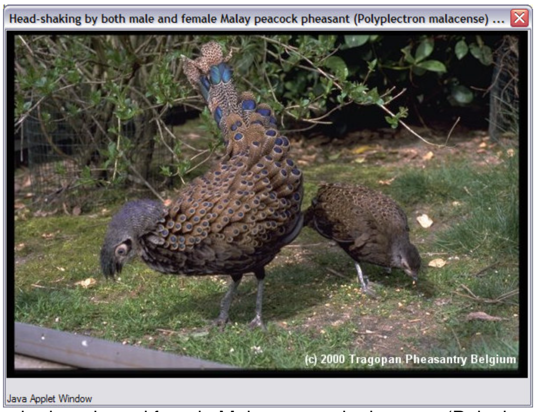
3. Tidbitting : In this display the male pecks at the ground or scratches at the ground while giving food calls. In peacock and argus pheasants actual items of food may be picked up and dropped, or may be held in the bill when the food call is uttered.

Posture of male Malay peacock pheasant (Polyplectron malacense),
including crest erection and tidbitting (fronto-lateral display)

4. <u>Feather-ruffling</u> : In this display, the crest, neck, breast and body feathers in general may be variably raised or ruffled. In peacock pheasants the entire dorsal plumage is often raised.

Posture of male Malay peacock pheasant (Polyplectron malacense),
including crest erection and tidbitting (lateral display)

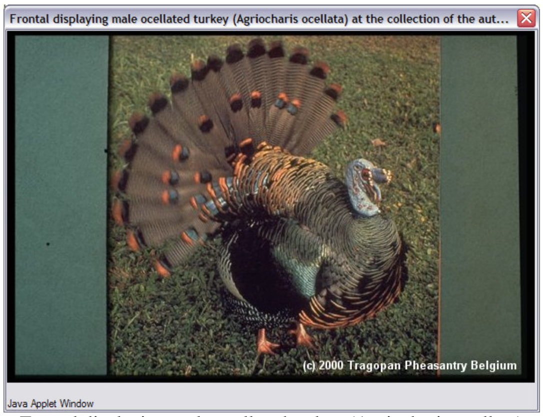
5. <u>Head-shaking</u> In Malay peacock pheasant the head is vigorously shaken with circular movement. we have noticed this display behavior also in the females of Temminck's and Cabot's tragopan, white and brown eared pheasants.



Head-shaking by both male and female Malay peacock pheasant (Polyplectron malacense)
before copulation at Tragopan Pheasantry Belgium April 2000

6. Tail-tilting, Tail spreading or tail wagging : tail exhibition and of specialized tail coverts, as in Malay peacock pheasant, are common aspects in the lateral and frontal display behavior of this species, as in many other related species.

Side display in Malay peacock pheasant (Polyplectron malacense)
at Tragopan Pheasantry Belgium April 2000



Frontal displaying male ocellated turkey (Agriocharis ocellata)
at the collection of the author in Belgium

7. Frontal display with tail-tilting and/or bilateral wing lowering, is a major display performance, which reaches its peak peacock pheasants and in peafowl.

Frontal display with bi-lowering wings in Ocellated turkey male (Agriocharis ocellata)
at the collection of the author in Belgium

8. Wattle, comb or facial engorgement. Nearly all pheasants utilize the exhibition of temporarily enlargements of facial skin as sexual or aggressive signals; the Bulwer's wattled pheasant from Borneo and the Himalayan Tragopans represent the culmination of this trend, whilst in others such as blood and peacock pheasants it is scarcely noticeable.

Frontal displaying male Blyth's tragopan (Tragopan blythi)
at Tragopan Pheasantry Belgium

Headstudy of one displaying male Bornean crested fireback pheasant
at Tragopan Pheasantry Belgium

Erecting of bib by hand in one male satyr tragopan
at Tragopan Pheasantry Belgium

Wattle engorgement in one male Cabot's tragopan
at Tragopan Pheasantry Belgium

Facial engorgement in male Bulwer's wattled pheasant
in Volgelpark Walsrode in Germany

Phasianus colchicus colchicus

9. <u>Cornering</u>. This display is evidently an important precopulatory display in the genus Gallus and Lophura. There is a direct male approach towards the female from behind, with his head high and his neck feathers variably ruffled.

10. <u>Crouching</u>. This female display, essentially a submissive posture, also serves as a specific invitation for copulation. In all pheasant species it takes a similar form, with the bird resting on her tarsi, her wings partially spread, and her head slightly raised. No specific copulatory or postcopulatory displays appear to be present among pheasants, though the usual postcopulatory feather adjustment and wingflapping is common, especially among females.

Posture of male Malay peacock pheasant,
including crest erection and tidbitting (lateral display)

11. <u>Short-flight display</u>. All tragopans perform short-flight displays to elevated perches, and of course they they also have elaborate display postures associated with exhibition of their normally hidden gular lappets and 'horns'. Most of these males utter loud advertising calls, sometimes in conjunction with noisy wing flapping displays or any other posturing.

Frontal view of displaying male Cabot's tragopan (Tragopan caboti)
at Tragopan Pheasantry in Belgium

1.1.1.3. Breeding exotic pheasants and natural mating

Once the birds have been acquired, which preferably should be of the same year, and the purchases made, say in October or November, they should be introduced to the breeding pen. Members of many pheasant species, such as the longtaileds, firebacks, koklass, true pheasants, etc.. will be in full color in 9-10 months and also be ready to breed the first year. Even in those species which normally come into breeding condition in two years, such as tragopans, peacock pheasants, eared pheasants and some other, many specimens will be found in color and ready to breed earlier.

Since all pheasants do breed in the spring and summer months, it is desirable that the birds meant for breeding are introduced into their pens as early as possible, definitely by November or so, in the Northern hemisphere. This will enable the birds to settle down in the pen before the breeding season and also allow them to know each other and to form a bond.

For breeding, the pair or the new combination should be compatible. The breeder should carefully study the expected behavior of the birds in the pen and see whether the new birds are acceptable to each other or not. Instances are known where a particular bird was not acceptable as a mate and no breeding took place and when the partner was changed, breeding was immediately initiated. In difficult cases, both the male and the female may be introduced together to a pen which is new to both. The principle is well known and especially well demonstrated in zoo animals of various kinds when an animal has marked out its territory which will be defended against all intruders, including man.

1.1.1.4. Spatial requirements for exotic pheasants kept under natural mating conditions

The size of the pen and shelter is an important consideration and it will depend upon several factors - the amount of land available, the number of birds, and the single most important factor - the depth of your pocket. As some pheasants, like monal, eared pheasants and cheer are captive diggers, they require a larger pen as compared to others like peacock pheasants, golden and Edward's and Swinhoe, which can be happy in a smaller pen. It is as our friends Dr. Suresh and Mr. Raghavendra from India write in their book "Pheasants of India and their aviculture" : "As it is true for many things in life, so it is for pens, a big good one will always beat a small good one". It is that many birds can be kept in a pen of modest size, but for satisfactionary breeding results, the bigger the pen, within reasonable limits, the better the results. We can classify pens, according to size, into three groups
- about 40 square meters as large, for instance 10x4 meters
- about 20 square meters as medium, for instance 10x2 meters
- about 10 spuare meters as small, for instance 5x2 meters

Species which need large aviaries are monals, koklass, argus, cheer, eared pheasants, peafowl

Indian peafowl

Species which need medium-sized aviaries are blood, tragopans, gallopheasants, long-taileds,

Displaying male Temminck's Tragopan at the colection of Francy Hermans

Species which can cope with small aviaries are peacock pheasants, junglefowls, ruffed pheasants

Male Chrysolophus pictus

1.1.1.5. Stock birds : "wild-caught"versus "captive-bred" stock and their aviaries

A comparative study of the aviary designs in the West (western Europe and North America) with other collections in the world shows that several aviary systems have been tried out during the last 25 years in order to improve the breeding results with captive pheasants. In this process suitable aviaries have been developed both for wild taken stock as for captive raised pheasants as well. Basically, there are three approaches to the problem, all with their own limitations.

1.1.1.5.1.Traditional method

The first method is to collect wild caught birds and release them in a small aviary without any preparations except for food and water. For obvious reasons this is the easiest approach since it involves very little investment by way of men and material . However, once released in their new environment the birds may have difficulty in settling down as wild taken pheasants can be very neurotic. Secondly, the birds have the tendency to stress each other because there is not sufficient cover and in the process disturb one and another constantly. This method was adopted in most of the collections before 1984 in the West , when smooth importation of freshly wild-taken stock from Asia was still possible. This method is still being used in most places we have visited in Asia, the pheasant's native habitats. Wild-caught pheasants need several years before they start adapting to this environment, and before they might start breeding.

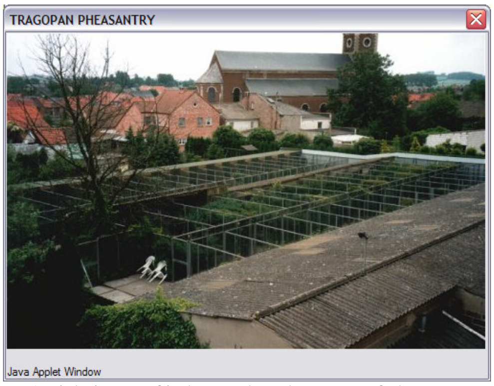
Mr. Raghavendra Singh from Lucknow, India, hand-feeding one male Swinhoe pheasant

Bornean argus pheasant (Argusianus argus grayi) 2 males in small cage in Eastern Kalimantan, Indonesia (traditional method)

1.1.1.5.2. Natural method

The second method is to collect wild caught and/or captive-bred birds and release them in a small aviary without any preparations except for food, water and sufficient cover. This approach is in fact an advanced version of the one we have described in the first example except for the fact that sufficient cover and protection is foreseen under the form of vegetation, which is planted in their new environment. In this way new microclimatic advantages are created in the artificial surroundings which wild-taken and captive pheasants do need so much to seek for shade and cover. The main drawback of this technique is that it takes at least two years before the vegetation has fully grown up and provides sufficient cover for the breeding birds. In such aviaries the stock birds are all kept together , in one pair or in one group. They keep of course their neurotic character , especially the wild-caught birds, but obviously feel well and breed successfully due to the safer environment. An other drawback of this procedure is the dense vegetation that might disturb a normal humane control of the birds.

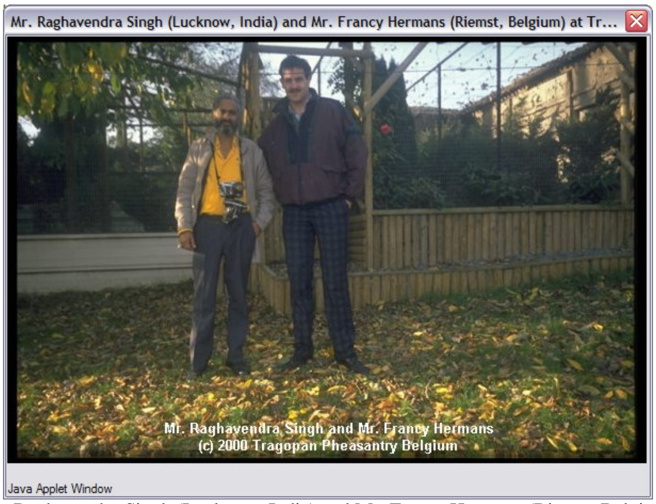
Modern aviary meant for the rearing of the young birds during the summer till the fall at the Tragopan Pheasantry in Belgium



Aerial picture of indoor and outdoor pens of pheasants

Male Bornean Crested Fireback Pheasant (Lophura Ignita Rufa) in central corridor system of series of rectangular pheasants aviaries.

View of inside corridor in the indoor pens meant for walking and servicing of the pens.



Mr. Raghavendra Singh (Lucknow, India) and Mr. Francy Hermans (Riemst, Belgium) at Tragopan Pheasantry Belgium

1.1.1.5.3. A.I. method

The third method, which has been used more often than others lately, requires placing captive bred stock in a small pen, not bigger then 8x2 meter for 1 male or 1 female for artificial insemination. The basic idea is to have a holding area to which the A.I. pheasants are confined for a period of time so that they gradually tame down and become handsome. The aspect that is considered here is the expected behaviour of the birds. It is well-known that if pheasants have been bred in captivity, specially in an incubator, chicks might get imprinted on man and subsequently they come to associate man with feed and not as a predator to be shunned. In this approach it is essential that the birds get rite of their natural instincts, specially in recognizing their natural enemies, most of all man. This method of keeping and breeding was first described by Yamashina (1976) for copper pheasants in Japan and has since then been practised with variable success in several other places in the world. Experience, however , learns that the main drawback of this procedure is in the fact that males and females might not recognize each other as social partners anymore as they are adapted or mal-imprinted on human beings. In such a design females might produce a reasonable number of eggs. The males on the other hand accept their keepers as surrogate sexual partners and hence do not copulate satisfactionary with the females. This way of keeping exotic pheasants has been practised by us in Belgium with tragopans, coppers and silvers and has given us satisfactionary results The stock birds in our facilities were acquired from captive-bred stock by means of hatching eggs and or young birds collected from the captive-bred stock birds, incubated in artificial incubators and raised by man.

Traditionnal aviary system, suitable for A.I.
and holding non-domested pheasant at the Tragopan Pheasantry in Belgium

Aerial view of aviary system being used for A.I.
and holding captive-bred exotic pheasants at the Tragopan Pheasantry in Belgium

Aerial view of aviary system being used for A.I.
and holding captive-bred exotic pheasants at the Tragopan Pheasantry in Belgium

View of modern built aviary system for exotic pheasants
at the Tragopan Pheasantry in Belgium

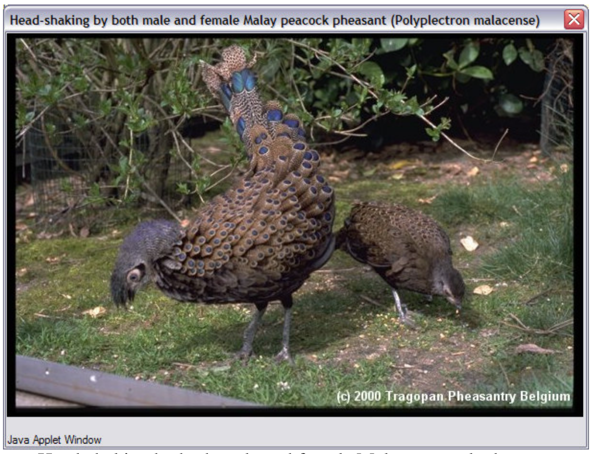
1.1.1.6. Photo gallery natural mating

<u>Malay peacock pheasant (Polyplectron malacense)</u>

Feather-ruffling in Malay peacock pheasant

Side display in Malay peacock pheasant

Feather-ruffling in Malay peacock pheasant



Head-shaking by both male and female Malay peacock pheasant

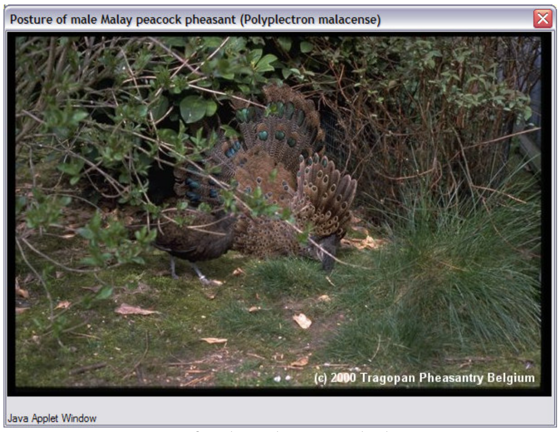
Frontal display in Malay peacock pheasant

Side display in Malay peacock pheasant

Tail exhibition in Malay peacock pheasant

Posture of male Malay peacock pheasant

Posture of male Malay peacock pheasant



Posture of male Malay peacock pheasant

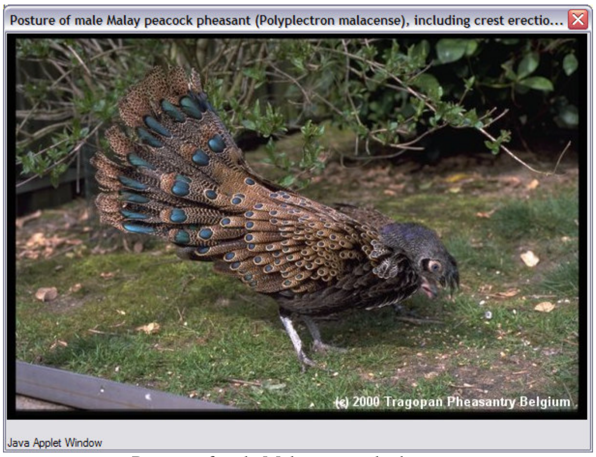
Frontal display in Malay peacock pheasant

Frontal display in Malay peacock pheasant

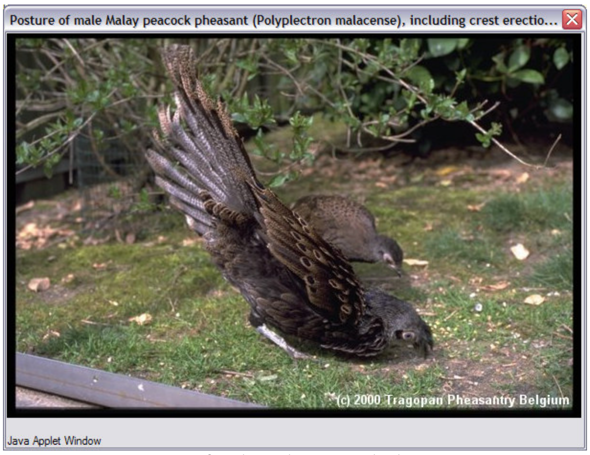
Posture of male Malay peacock pheasant

Crouching female Malay peacock pheasant

Submissive and invitating female Malay peacock pheasant for copulation



Posture of male Malay peacock pheasant,
including crest erection and tidbitting (lateral display)



Posture of male Malay peacock pheasant,
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Major male display of most exotic pheasants include the below mentioned postures. These are well documented by the display and mating of one pair of Malay peacock pheasant (Polyplectron malacense), photographed in the aviaries of the author in Belgium in April 2000.

1.2 ARTIFICIAL MATING

1.2.1. Artificial insemination (A.I.) in non domesticated pheasants and other related birds

1.2.1.1. Introduction

Artificial insemination (A.I.) is a special reproduction technique whereby semen of the male is taken by artificial means and inseminated into the reproductive tract (="oviduct" in birds) of the female to achieve optimum fertility figures. A.I. is a practical propagation tool which combines cooperative and massage methods to semen yield and egg fertility. Semen characteristics are useful indicators of semen quality, however, the most reliable test is fertility rate in the eggs.

A.I. in non-domesticated pheasants has been studied and carefully practiced only in the course of the last 25 years, both in North America and Western Europe, and in Japan as well. A.I. has long been used extensively in many farm animals, such as the domestic chicken and turkey.

1.2.1.2. Need for A.I. in exotic pheasants and other gamebirds

A.I. in exotic pheasants and other gamebirds has been developed to overcome the problem of high numbers of infertile eggs and incompatibility of male and female due to wrong behaviour and/or physical handicap/trauma.

In some species, such as for instance in the copper pheasants (Syrmaticus soemmerringi) , the male might be so aggressive that he may seriously injure the female or even kill her, sometimes after having mated with her. In white eared pheasant (Crossoptilon crossoptilon) , there might be a behavior problem resulting in high infertility. In some rarer tragopans in western captivity , such as Cabot's (Tragopan caboti) and Blyth's (Tragopan blythi) , it often happens that the males do not come into sexual peak condition when mating with the female, leaving the number of fertile eggs much to be desired. In Lewis Silver Pheasant (Lophura nycthemera lewisi) males might be extremely wild and not pay enough attention to the female during the breeding season resulting in a high number of infertile eggs. In some cranes and bustard species there is the well-known phenomenon of "single-imprinting on human beings", when kept in close vicinity with humans and not recognizing their conspecifics as sexual partners to copulate with.

A.I. will become more important in the captive propagation of exotic pheasants and other captive birds in the near future due to the lack of suitable males, especially for the endangered species due to CITES, and the deleterious effect of inbreeding in captivity. A.I. is a practical tool to increase the total number of different genetic combinations in a much shorter time span as is for instance possible via natural mating. The genetic influence of one male in a population can be increased by using his semen to sire young from several females each season. Conversely, semen from several males can be used to increase female fertility.

1.2.1.3. Pros of A.I.

1. A.I. is a method which allows the maximum use of a limited amount of good sperm that may be available due to the shortage of males in breeding condition and in good semen production. Also, it is not necessary for the male and the female to be compatible, i.c., a bonded pair is no longer essential. It must, however, be borne in mind that A.I. is only possible when the male is able to produce an adequate quantity of good quality semen and the female is producing ova.

2. Birds meant for natural mating are housed in comparatively big aviaries but a small pen is preferable for birds to be used for A.I.. The birds have to be caught very frequently, at least 1 or 2 times per week during breeding season, to carry out the procedure and a big pen means so much more chasing before the birds are caught. This stress might result in poor egg and semen production. It is very desirable to have both the male and female meant for A.I. kept separated from each other well before the onset of the breeding season, only having vocal and visual contact, and are given the breeder diet to bring them into top breeding condition.

3. Many investigators (Maru et al. 1968) (Howe&Howe 1981), Lai (1985) and others, who have used this propagation t technic in pheasants have reported a much higher percentage of fertile eggs than were obtained using the normal procedure and therefore this procedure is much to be recommended when it is necessary to obtain an increased supply of fertile eggs.

4. A.I. allows the handler to get a much better picture of the clinical condition of the birds he or she is working with, which might enable the breeder to have a better understanding of the bird's health, behavior and reproduction potential.

5. A.I. allows the breeder/handler to take control over the reproduction potential of a species in captivity and reduce the risk with high numbers of infertile eggs . Birds having special treats can be more easily be propagated by taking only these as A.I. candidates.

1.2.1.4. Cons of A.I.

1. A.I. is a complicated propagation tool and not many aviculturists nowadays know how to apply the technique in the correct way. The practical application of A.I. in exotic pheasants is a difficult business because :

1. A.I. looks simple (see the pictures), but the contrary is rather the truth. Only men and women with the right "finger"touch, love for the birds under their control and correct expertise, have proven that A.I. is a feasible propagation tool in exotic pheasants and other birds .

2. of the wild nature of most exotic pheasants, Tragopans, longtaileds, Firebacks, etc... are no chickens or turkeys, to be handled. Most exotic pheasants come easily under a certain amount of stress, which adversely affect the correct application of the A.I. technique.

3. comparatively small volumes of semen that are being produced, when in sexual peak condition. Volumes of 50 up to 100 µl per ejaculate are the greatest volumes we have been

able to collect in exotic pheasant, whereas in chickens, turkeys and cranes this is much higher (500 microliter spermatozoa per ejaculate)(David H. Ellis, George F. Gee, Claire Mirande (1996) Van Voorst A., Pit R., Haije U.(1990) Lake, P.E. & Stewart, J.M. (1978)

4. freshly collected spermatozoa of non-domesticated pheasants only survive for a short time after ejaculation when not preserved in a protective medium . Our experience demonstrates that with the current diluents spermatozoa only survive for 30 minutes under microscope or in the collecting and insemination devices, whereas in chickens, turkeys, cranes sperm may survive for something like 24 hours and more using the right extenders.

5. of the physical condition of most non-domesticated pheasants, Chickens and turkeys are heavy muscled birds, whereas our pheasants are thin and are getting easily damaged. On top of this, they have lots of feathers which always sit in the way when doing A.I.

2. Two persons are needed, one for trapping and holding the bird and one for doing A.I. Both have to be familiar with the procedure and must be willing to invest a major portion of their time into it.

3. A.I. is a labor-intensive procedure compared to natural mating. Propagating a species by means of A.I. means that both have to make themselves available on regular basis during the breeding season, which usually last for something like 8 weeks,

4. the double number of aviaries are needed as under natural mating conditions as both the male and the female are best kept separate from each other.

5. A.I. is expensive because one needs to have the correct equipment at his/her disposal ; microscope, microtransferpettors, extenders, specula, etc..

6. All birds meant for A.I. must be trapped each time A.I. is done, so at least once or twice per week.

7. There are no guarantees with this procedure . It is not because A.I. is being done on a species in captivity that all eggs will be fertile.

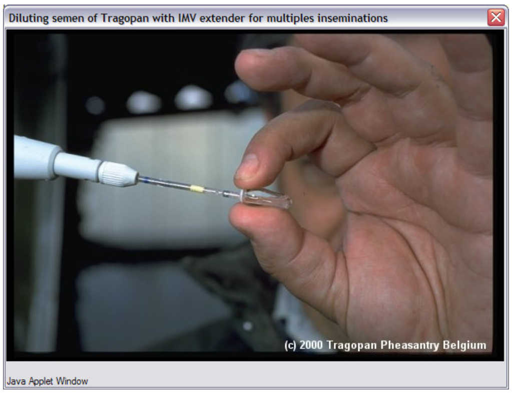
1.2.1.5. The A.I. procedure

A. SEMEN COLLECTION (pictures)

Semen is collected using the co-operative massage technique as shown in the various pictures. One person holds the male with one hand and everts the phallus with the other while a second person collects the semen using a Brand microtransferpettor of 200 µl.

1. Trapping the satyr tragopan male by the first handler
2. Gently squeezing the lower back to stimulate co-operation and sperm ejaculation
3. Co-operative massage to induce sperm ejaculation
4. Sperm ejaculation in male satyr tragopan. good semen looks milky but sometimes only a little clear fluid which is only lymph is produced, Sometimes semen might be contaminated with feces.
5. Semen collection using a Brand 200 µl microtransferpettor

B. SEMEN TRANSFER AND DILUTION (pictures)



Freshly collected and concentrated semen is being diluted using IMV Guineafowl diluent to extend the volume of spermatozoa ejaculate to be used for insemination. Diluted semen is transferred to several other clean transferpettors for later use.

1. IMV Guinefowl is sterile and has the correct osmolitic pressure and pH to preserve the viability of the spermatozoa meant for A.I.
2. 5 micro-transferpettors are being prepared having diluted semen solution, each meant for the insemination of one female.

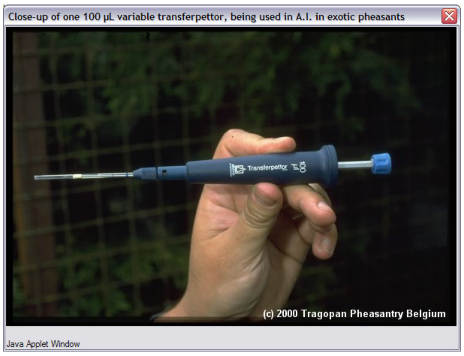
C. SEMEN INSEMINATION (pictures)

1. All females meant for A.I. must be trapped and crated in separate boxes before semen collection because of the proven short life span of spermatozoa during the procedure and to enhance the success for quick insemination.
2. All females should be inseminated as quickly as possible. No females are being massaged

as for the males.
3. Opening the cloaca of the hen using the speculum without causing injury. Insemination is done intracloacal, using deep intravaginal inseminations. For this, the hen should not co-operate to prevent her from causing damage to her reproductive tract.
4. The vagina, the distal end of the oviduct, appears as a a red rosette on the left wall of the urodeum.
5. With practice, the inseminating device can be inserted into the vagina during the few seconds it is visible.
6. Next, the plunger of the transferpettor is pushed to deposit the semen into the oviduct.
7. Placing semen directly in the oviduct is the preferred insemination technique in exotic pheasants.
8. Deep vaginal insemination is preferred for non-domesticated pheasants for optimum fertility figures.

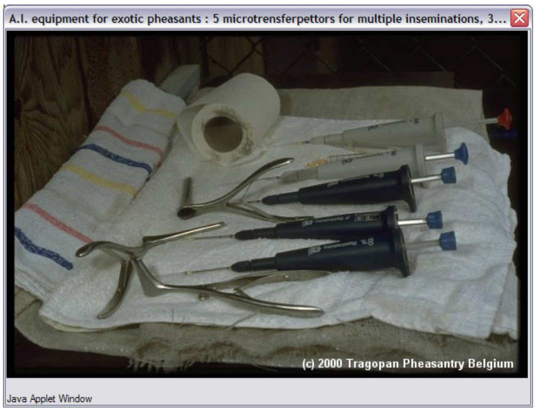
1.2.1.6 Equipment and facilities needed for artificial insemination in exotic pheasants

At the time of writing this web site, certainly over 1000 inseminations of pheasants have been made by us with few problems using the below mentioned materials. Artificial insemination should only be attempted on rarer birds when the handlers have a complete understanding of the mechanics involved. There are enough dangers inherent in the procedure to warrant caution and careful consideration. Practice on quails, chickens, pigeons or other birds is an important prerequisite.



1. Transferpettors or displacement mircropipettes of 100 and 200 microliters from Brand GmbH + Co in Germany have proven to be suitable collecting devices for us to perform A.I. on exotic pheasants because only small volumes of viable sperm are being produced and almost no spermatozoa are getting lost during the A.I. procedure (which is not the case using other capillary tubes). These micro-transferpettors of 100 and 200 µL are being used to collect, transfer, dilute the semen and to inseminate the female. Many investigators do not recommend the use of thin walled capillary tubes for inseminations as they may break and puncture or cut the oviduct in the female. It is therefore important when using this equipment that the necessary caution is being taken and that the female is not stimulated to co-operate during the insemination. The capillary tube of this insemination device is inserted 2 to 3 centimeters into the oviduct and the semen is expelled by depressing the plunger.

2. <u>Nasal specula</u> : The use of nasal specula of different sizes provides a mechanical advantage for the hen while undergoing A.I. and greatly reduces the risk of uncontrolled eversion and hence of damage of the oviduct in the hen.



3. <u>Diluents</u> : Small semen volumes can be increased using chicken and/or guineafowl extenders, which are readily available on the market for the bio-industry. The diluents we have been working with are these from IMV in France meant for guineafowl. Normal average volumes of sperm in non-domesticated pheasants are between 50 and 100 µl. Such volumes can be diluted up to 4 times and being used for multiple inseminations. It is possible to inseminate 8 hens at a time with semen being collected from one good ejaculate.

4. <u>Microscope</u> : It is wise to check semen quality habitually under a microscope so as to familiarize yourself with the quality of sperm being used for A.I. and to understand the effectiveness of the storage methods. Sperm motility and morphology is being checked under the microscope.on regular basis. Sperm count will appear inadequate when compared to that of poultry. This is normal, and at a magnification at which the tails are just visible (450X), a dozen motile spermatozoa in the field indicates an acceptable count. Semen quality varies from bird to bird and throughout the season with individuals.

5. <u>Cryo-preservation</u> : The long term holding of semen by freezing or some other method would be the ultimate solution to an effective artificial insemination program. Current research with the freezing of chicken semen has resulted in a 50 percent survival of spermatozoa cells. This is the most encouraging development of which we are aware. We have not stored any sperm yet longer than 30 minutes after the ejaculation. New preservation techniques are now being developed in different places in the world and we

hope to preserve semen of valuable semen donors by deep-freezing. It is hoped that effective methods for long-term storage of small semen volumes, as apparent in non-domesticated pheasants, will be perfected in the near future.

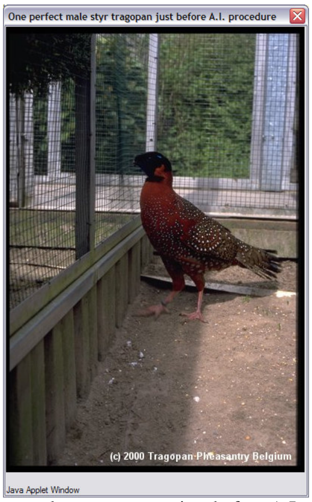
6. <u>Aviaries meant for A.I.</u>. We recommend to use only the small type of aviaries where each bird is kept individually. This is done for easy trapping and handling and keeping stress levels at a minimum while doing A.I. on the birds. The preferred aviary system have been described in the section facilities and in natural mating (A.I. method).

7. <u>A.I. facility.</u> We have constructed a small A.I. unit where we undertake the A.I. procedure. This unit has fluent water and electricity available at all times and serves as a shelter for the handlers during rainy weather. This facility is located mid in the center of the pheasantry as to reduce the impact of handling and moving the A.I. birds from and to their holding pen.

1.2.1.7 - PHOTO GALLERY ARTIFICIAL INSEMINATION by Francy Hermans, Belgium April 2000

1. <u>Satyr Tragopan (Tragopan satyra)</u>

Male satyr tragopan
in outdoor pen just before trapping and handling



One perfect male styr tragopan just before A.I. procedure

Correct restraining and perfect stress management
by second handler of one male satyr tragopan

Correct handling of one male satyr tragopan
just before A.I. procedure

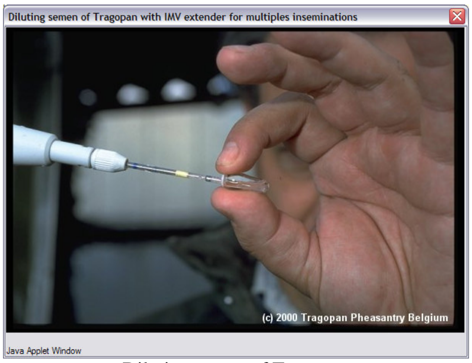
Co-operative massage and stimulation
by first handler of one male satyr tragopan

Headstudy of one male satyr tragopan

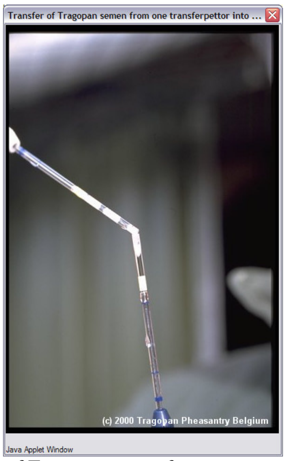
Co-operative massage and stimulation
by first handler of one male satyr tragopan

Semen ejaculation and collection
by second handler in satyr tragopan

Semen ejaculation and collection
by second handler in satyr tragopan



Diluting semen of Tragopan
with IMV extender for multiples inseminations

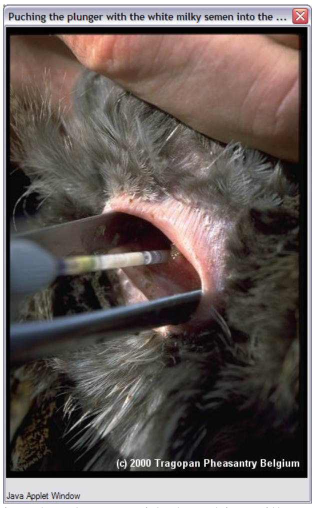


Transfer of Tragopan semen from one transferpettor
into an other multiple inseminations

Searching for the cloacal zone in hen satyr tragopan

Everting the cloacal zone in hen satyr tragopan
using a speculum

Everting the cloacal zone in hen satyr tragopan



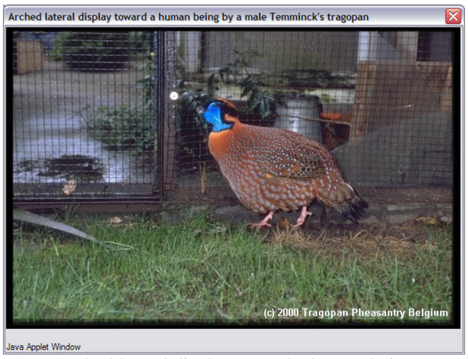
Puching the plunger with the white milky semen
into the distal end of the oviduct in satyr tragopan

Everting the cloacal region in female satyr tragopan
for artificial insemination (white semen and insemination is clearly
visible)

Deep intravaginal insemination in female satyr tragopan

2. Temminck's Tragopan (Tragopan temmincki)

Adult male Temminck's tragopan displaying on his perch

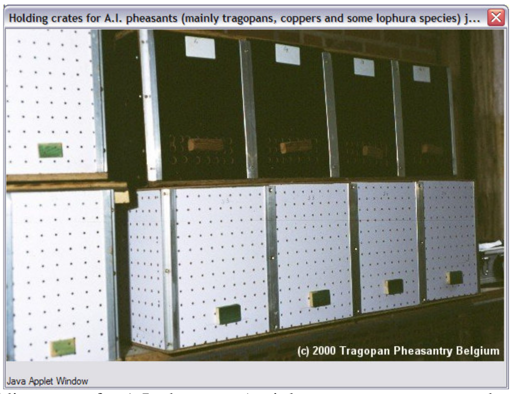


Arched lateral display toward a human being
by a male Temminck's tragopan

Positioning and preparing one male Temminck's tragopan
for co-operative massage technic necessary to accomplish ejaculation

Ejaculation, semen collection in one male Temminck's tragopan
at Tragopan Pheasantry Belgium

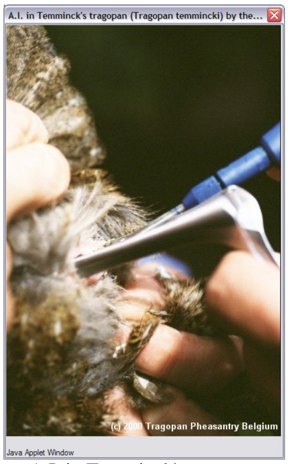
Ejaculation, semen collection in one male Temminck's tragopan
at Tragopan Pheasantry Belgium



Holding crates for A.I. pheasants (mainly tragopans, coppers and some lophura species)
just before insemination at Tragopan Pheasantry Belgium

Second handler taking one hen Temminck's tragopan
from her cage for A.I. at Tragopan Pheasantry Belgium

A.I. in Temminck's tragopan
by the author at Tragopan Pheasantry Belgium



A.I. in Temminck's tragopan
by the author at Tragopan Pheasantry Belgium

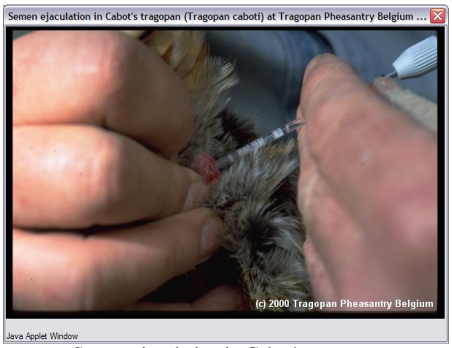
3. <u>Cabot's Tragopan (Tragopan caboti)</u>

One male Cabot's tragopan
just before manipulation

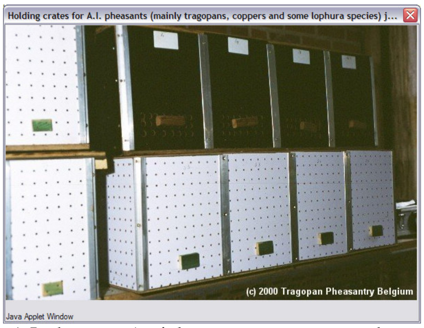
Semen ejaculation in Cabot's tragopan
at Tragopan Pheasantry Belgium (April 1999)

Semen ejaculation in Cabot's tragopan
at Tragopan Pheasantry Belgium (April 2000)

Semen ejaculation in Cabot's tragopan
at Tragopan Pheasantry Belgium (April 1999)



Semen ejaculation in Cabot's tragopan
at Tragopan Pheasantry Belgium (April 1999)



Holding crates for A.I. pheasants (mainly tragopans, coppers and some lophura species)
just before insemination at Tragopan Pheasantry Belgium

Second handler taking one hen Cabot's tragopan
from her cage for A.I. at Tragopan Pheasantry Belgium

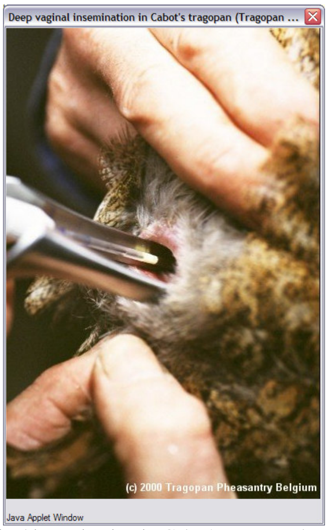
Second handler bringing one hen Cabot's tragopan
in the correct position for A.I. at Tragopan Pheasantry Belgium

Second handler taking one hen Cabot's tragopan
from her cage for A.I. at Tragopan Pheasantry Belgium

Second handler taking one hen Cabot's tragopan
from her cage for A.I. at Tragopan Pheasantry Belgium

A.I. in Cabot's tragopan by the author
at Tragopan Pheasantry Belgium

A.I. in Cabot's tragopan by the author
at Tragopan Pheasantry Belgium



Deep vaginal insemination in Cabot's tragopan by the author
at Tragopan Pheasantry Belgium

A.I. in Cabot's tragopan by the author
at Tragopan Pheasantry Belgium

A.I. in Cabot's tragopan by the author
at Tragopan Pheasantry Belgium

A.I. in Cabot's tragopan by the author
at Tragopan Pheasantry Belgium

Second handler reducing stress in one hen Cabot's tragopan
immediately after successful A.I.
at Tragopan Pheasantry Belgium

Second handler reducing stress in one hen Cabot's tragopan
immediately after successful A.I.
at Tragopan Pheasantry Belgium

3 young Cabot's tragopan produced by A.I.
at the collection of the author in Belgium

Nice looking captive-bred male Cabot's tragopan produced by A.I.
at the collection of the author in Belgium

4. Lewis Silver Pheasant (Lophura nycthermera lewisi)

Headstudy of one male Lewis silver pheasant

Headstudy of one male Lewis silver pheasant

Correct handling of one male Lewis silver pheasant
just before A.I. procedure

Dorsal view of one male Lewis silver pheasant
just before A.I. procedure

Stimulation of male Lewis silver pheasant by first handler

Stimulation and ejaculation of semen
in one male Lewis silver pheasant by first handler

Milky white semen by one male Lewis silver pheasant

Semen collection by second handler
in Lewis silver pheasant

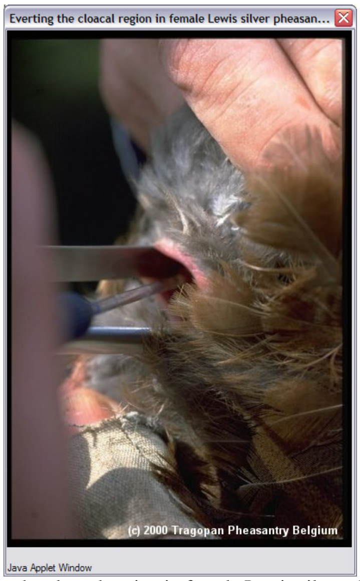
Crate for holding multiple females for artificial insemination

Crate for holding multiples females for artificial insemination

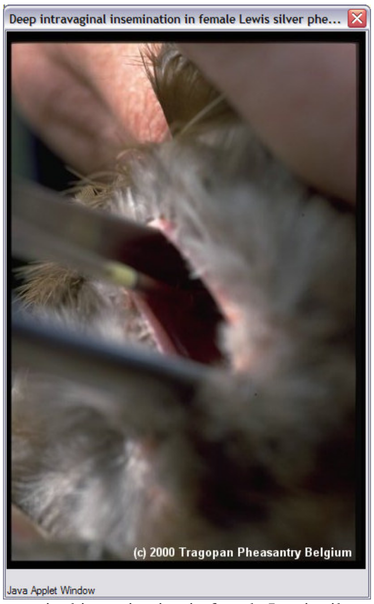
Transfer of semen of Lewis silver pheasant
using microtransferpettors for multiples inseminations

Preparation of one hen Lewis silver pheasant
for artificial insemination

Everting the cloacal region in female Lewis silver pheasant
for artificial insemination

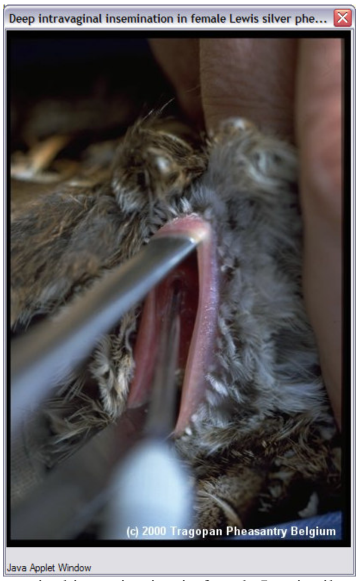


Everting the cloacal region in female Lewis silver pheasant
for artificial insemination



Deep intravaginal insemination in female Lewis silver pheasant

Deep intravaginal insemination in female Lewis silver pheasant



Deep intravaginal insemination in female Lewis silver pheasant

Correct holding and perfect stress management
by second handler of one hen Lewis silver pheasant

Correct holding and perfect stress management
by second handler of one hen Lewis silver pheasant

5. Copper Pheasant (Syrmaticus soemmerringi)

One prime A.I. candidate Soemmerring's copper pheasant

Bringing the male Soemmerring's copper pheasant
in the correct position for A.I. by the first handler

Co-operative massage and stimulation by first handler of one male Soemmerring's copper pheasant

Semen ejaculation in Soemmerring's copper pheasant

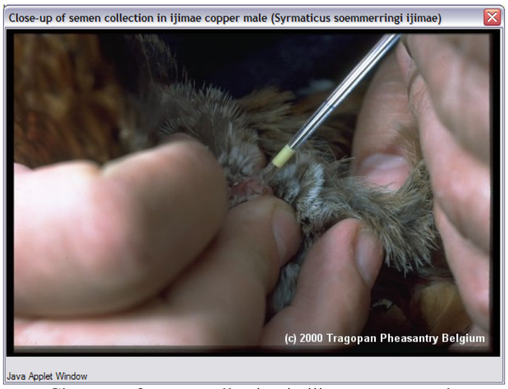
Semen ejaculation in Soemmerring's copper pheasant

Holding one male ijimae copper pheasant for co-operative massage and sperm collection

Holding one male scintillating copper pheasant for co-operative massage and sperm collection

Headstudy of one male scintillating copper pheasant

Co-operative massage, ejaculation ans semen collection in ijimae copper male



Close-up of semen collection in ijimae copper male

Co-operative massage, ejaculation and semen collection in ijimae copper male

Co-operative massage, ejaculation and semen collection in ijimae copper male

Positioning and correct preparation for co-operative massage, ejaculation and semen collection in ijimae copper male

A.I. in ijimae copper hen

Deep intravaginal insemination in ijimae copper hen

Everting the cloacal region in ijimae copper hen

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2. Incubation

2.1. Introduction

Incubation is the term used to describe the process of applying heat to an egg so that the embryo contained within develops into a chick. Aviculturists of today have three options regarding the incubation of eggs and the procedure accordingly differs somewhat in each case. Each option has some advantages and some disadvantages as compared to the other two. These options are as follows :

1. incubation and hatching by the hen pheasant (=natural incubation),

2. incubation and hatching by a broody domestic hen (=natural incubation by a surrogate mother),

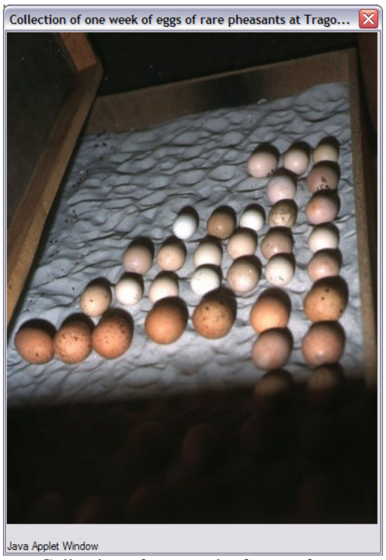
3. incubation and hatching by artificial means (=incubation with electronic incubators).

2.2. Egg handling

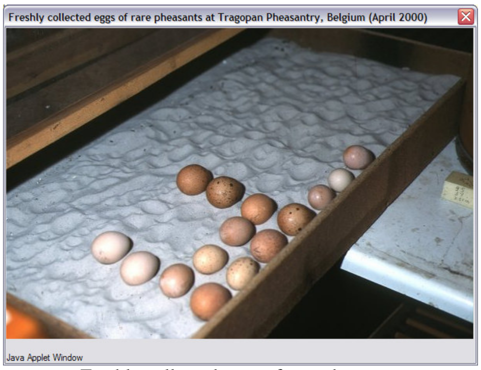
It is not difficult to appreciate that the egg is a very delicate life system. The developing embryo, with its associated membranes and blood vessels, lives in a fluid environment and is therefore not rigidly fixed to any supporting structure. Extreme care must be taken, therefore, whenever handling fresh hatching eggs, to ensure that the embryo and its associated parts are not injured. Rapid and jerky movements must be avoided, as abrupt changes in motion can cause membranes or blood vessels within the egg to tear. If we move eggs by vehicle to the incubation facility, they must be protected from vibration and jarring by setting them in foam rubber. Moreover, the eggs should be transported as early in incubation as possible, before the vulnerable blood vessel network starts to develop. Cleanliness is also important, and the one who takes care for the transport of the eggs should do everything possible to prevent the transfer of pathogens to the egg and/or incubator as well as prevent the build-up of body oils on the shell with repeated handling.

2.3. Egg storage

Most rare pheasant eggs which have received NO INCUBATION can be stored for several days while retaining high probability that they will hatch. An exemption on this rule are the eggs of peacock (Polyplectron sp.) and Argus pheasant (Argusianus sp.) , which we believe are best incubated immediately after laying. We recommend that pheasant eggs be stored only if proper storage conditions are available and that they be stored for as short a time as possible, but no longer than seven days. Proper storage temperature is 15 Celsius degrees at relative humidity of 75-80%. Proper position for an egg in pre-incubation storage is subject to debate. We have odd success storing rare pheasant eggs with their large end in horizontal position and turning them through 180° at least twice daily.



Collection of one week of eggs of rare pheasants
at Tragopan Pheasantry, Belgium (April 2000)



Freshly collected eggs of rare pheasants
at Tragopan Pheasantry, Belgium (April 2000)

Collection of one week of eggs of rare pheasants
at Tragopan Pheasantry, Belgium (April 2000)

2.4. Natural incubation

Natural incubation is the incubation performed by a bird, be it a pheasant that laid the eggs, a surrogate pheasant parent, or some type of nesting chicken. The hen pheasant can be left with the job of incubation and hatching the eggs, and subsequently brooding them also. Many hens will do a very satisfactory job since their instincts for these processes have not yet been erased due to domestication as has happened in many poultry. The main advantage of this procedure is that one does not have to worry about the correct temperature and relative humidity, turning of the eggs and the preservation of the instincts in the succeeding generations. Also, there is less contact with man and the chances of being adversely imprinted are reduced. The chicks are called to food by the hen and they start feeding, without any problems. The preservation of the instincts including those related to breeding and the natural fear of and vigilance against man are factors which may be of importance if the progeny are to be released in the wild subsequently.

Incubating hen Cabot's Tragopan (Tragopan caboti) in the wilds in China


Birth of one Blyth's tragopan (Tragopan blythi)
in one separate hatcher at the Tragopan Pheasantry


Tragopan hen with 3 chicks in captivity in the West
(by Rekemit "Kermit" Wood, Vermont, USA)

If a female parent will not incubate the eggs, which is usually the case with many pheasant species in captivity, or also when the eggs are pulled sequentially to enhance laying, then the eggs ideally should be placed with a surrogate parent to obtain the initial seven to ten days of natural incubation. Various aviculturists, however, have reportedly used chickens and ducks for incubation with varying degrees of success, including, unfortunately, several broken eggs. It are in particularly those species, which lay soft-shelled eggs, such as for instance the peacock pheasants (Polyplectron sp.), where artificial incubation is to be recommended, to avoid broken eggs.

Sometimes when a hen Tragopan gets broody we leave the eggs of the last clutch in her basket for natural incubation. We have had several occasions where both satyr and Temminck's hens successfully incubated their eggs and raised their chicks to maturity. For this, however, it is important that the male is removed from the hen and her chicks as he might disturb the incubating female constantly and/or the young chicks once they start looking for food.

2.5. Artificial incubation

<u>Small incubators for exotic pheasant and other gamebird eggs</u>

Frontal view of 3 Grumbach forced air incubator (2 for incubation and 1 for hatching (above))

We have been using electronic incubators, both still-air and forced-air, as a routine matter, since we began keeping and breeding exotic pheasants and gamebirds. We believe we have a better control on the various parameters, affecting proper incubation, such as temperature, relative humidity, turning of the eggs, diseases and hatching. There is no denying the truth that the aviculture of common, rare and endangered pheasants in Western Europe and Northern America has come only on full swing when new and reliable "small-scale incubators, with a capacity of 100 up to 200 pheasant eggs" were made available. This was particularly the case during the last twenty five years. There is a wide variety of incubators available in the avicultural marketplace "in the West", and undoubtedly there are many that are suitable for incubating galliform eggs. We have consistently used the "Grumbach" forced-air incubators, the model Compact S84. This type is used for incubating as well as hatching and is a desirable unit for a number of resasons. It is specifically designed for counter-top operation and therefore uses little space. It is easily cleaned, constructed from plastic materials, and is fairly easy to use once the operator becomes familiar with the idiosyncrasies of each unit. We have also been working with the

"Multihatch" forced-air incubators, but in a lesser extend, as they can not be used for counter-top operation and the control of temperature and humidity in such machines can not be checked and regulated as easily as for instance in the Grumbach incubators.

We have found that the success of small incubators lies in their being located in a suitable room, where temperature and humidity do not change that much. We have installed most of our incubators in our cellar where both the temperature and humidity remain practically the same year round. Also, there is a good ventilation with fresh air providing the right environment for artificial incubation.

Artificial incubation is convenient when there is a constant supply of steady voltage

In general, when there is a steady voltage of the mains supply AND the voltage fluctuations are only very small, then artificial incubation is far more practical than natural incubation. Low and very high voltages affect both the electronic instruments and the electronic thermostats as well and lead to poor incubation results. We have experimented that electronic incubators are far more practical than broody hens, because of the convenience of the operation and the more precise regulation of the temperature and humidity. For this, however, it is important one has access to a reliable incubator. Many aviculturists in the West use an electronic incubator exclusively for incubation and hatching since, with our advanced technology, we have things under better control than for instance aviculturists in Asia.

There is no doubt that an electronic incubator will not break an egg, nor trample a chick and that the control of disease is very much easier than with broody hens. Nevertheless, in countries like India, Indonesia, China, etc... where the wild pheasants live, there is not always a permanent supply of electricity. Also, for the purchase of a small incubator an aviculturist there has to invest large amounts of monies to afford such equipment. Thus, from the purely economic point of view, the broody hen is still much to be preferred in Asia, both in the tropical countries as in the Himalayas as well.

Number of incubators needed

The number of incubators needed is dependent on the number of eggs to be incubated. We commonly operate as many as 4 incubators and five hatchers simultaneously to handle a season total of something like 300 up to 400 eggs. It is recommended that at least three incubators be available for even the smallest breeding project. In this way one can be used as an incubator, one as a hatcher, and a spare is then available to operate at another relative humidity level or to use when one of the other units is being cleaned.

2.6. Understanding the egg meant for artificial incubation

The two most critical factors in incubating an egg artificially are incubation temperature and proper egg weight loss from the time it is laid until it hatches. Egg weight loss can be in part controlled by regulating the incubator humidity. Eggs from all species of birds should lose 18% of the fresh egg weight by the time they hatch.

Temperature :

Proper incubation temperature is critical for ensuring the maximum hatchability of the eggs as well as the best physical condition of the chicks that hatch. Variation from the optimum temperature affects growth rate and incidence of embryonic mortality and deformity. Use of suboptimal conditions is evidenced by poor hatching success or by chicks hatching with unretracted yolk sacs, poor vigor, and developmental problems. We have successfully hatched galliforms eggs in "Grumbach and Multihatch" forced-air incubators maintained at temperatures ranging from 37.6-37.8 degrees Celsius. The optimum temperature seems to be 37.7 degrees Celsius.

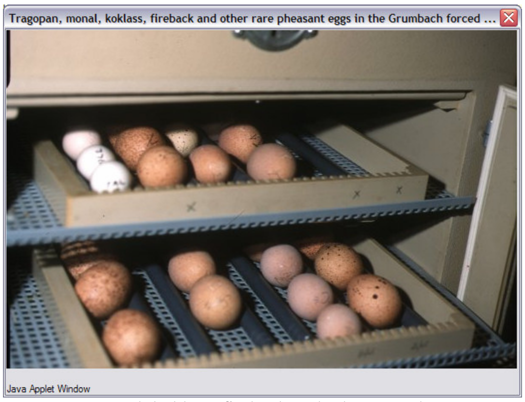
We have found that developing eggs are very vulnerable to overheating but are somewhat less affected by short periods of cooling. Safe incubator operation therefore requires a double temperature control system consisting of a primary and secondary, or override, thermostat. The primary thermostat is simply the thermostat which normally controls the incubator temperature. The secondary thermostat, which is adjusted 0.5 Celsius degrees higher than the primary, will assume control of the heating element if the primary should fail, thus protecting the eggs from being overheated.

Measuring the correct temperature in the incubator is an other very important aspect of the incubation procedure. We use both mechanical (=both alcohol and mercury) and electronic thermometers to do this job right. It is our experience that mechanical thermometers do work the best and give the most reliable data. Therefore that we do calibrate the digital instruments on basis of our standard mechanical thermometers.

Humidity :

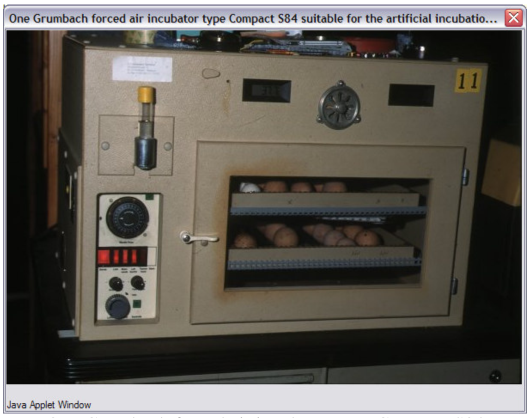
Proper control of the incubator humidity is also critical for successful hatching of artificially incubated eggs to reach the correct weight loss. Please consult the book Game Bird Breeders Handbook (1993) by Allen Woodard, Pran Vohra, & Vern Denton for any greater details on the egg weght loss for galliform eggs. The Grumbach forced-air incubators come factory equipped with a humidistat which regulates the relative humidity in the incubator. The level of humidity inside the cabinet can be maintained automatically by the use of the humidistat which controls the evaporation of tiny water drops in the water vessel, which are taken with by the air flow, which passes over the surface of its water contents and transports these to the incubation cabinet, containing the eggs.

Tragopan, monal, koklass, fireback and other rare pheasant eggs
in the Grumbach forced air incubators at Tragopan Pheasantry, Belgium



Tragopan, monal, koklass, fireback and other rare pheasant eggs
in the Grumbach forced air incubators at Tragopan Pheasantry, Belgium

Tragopan, monal, koklass, fireback and other rare pheasant eggs
in the Grumbach forced air incubators at Tragopan Pheasantry, Belgium



One Grumbach forced air incubator type Compact S84
suitable for the artificial incubation of most rare pheasant eggs
at Tragopan Pheasantry, Belgium

For the eggs of most pheasants, 48-50% relative humidity inside the forced-air incubator would be all right. Some aviculturists, however, prefer to have a slightly lower humidity at the beginning and a slightly higher lever at the middle and at the end of the incubation period. The incubation period (days) for eggs of various pheasant species and other gamebirds are different. These have all been well described in literature and for any greater details on these we do advice the reader to consult the book Game Bird Breeders Handbook (1993) by Allen Woodard, Pran Vohra, & Vern Denton.

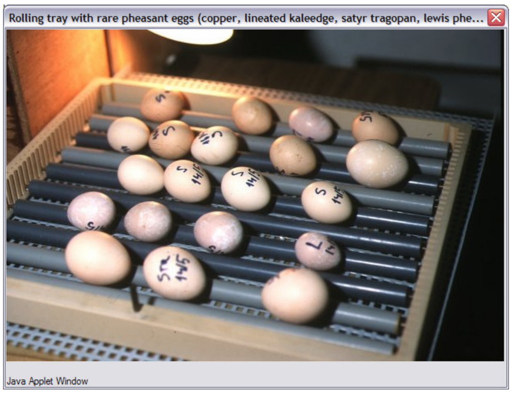
Measuring the correct humidity in the incubator is a very important consideration. A good dial hygrometer is necessary to monitor the percent relative humidity in the incubator. We have found that many dial hygrometers tend to lose their adjustment over time, and we recommend, therefore, that they be recalibrated several times during the incubation season. There is no denying the truth that the present digital hygrometers, which can be bought in the avicultural marketplace are far more precise instruments than the old mechanical hygrometers. Whatever value it reads while in the incubator can be said to be satisfactory as long as the egg's rate of weight loss is correct. A change in incubator humidity will still be reflected by the hygrometer regardless of its calibration. If several hygrometers are used, however, it will be less confusing to calibrate them all and thereby standardize all the readings.

Synthetic hygrometers, mechanical thermometers and small plastic and metal legbands for proper identification of new born chicks of rare pheasants at Tragopan Pheasantry, Belgium

<u>Hygiene</u> :

Strict hygiene is a vital part of good and successful incubation. We clean all incubators before the beginning and at the end of each breeding season using a good disinfectant. Also, the eggs are disinfected before putting them in the incubators, so they can not easily transmit pathogen organisms to the incubation room. For this we fumigate the incubation room and incubators using potassium permanganate crystals and formaldehyde. In recent years, we have hatched many chicks in forced-air incubators. One has to be extremely careful with the build up of "fluff" on the fan in the incubator. It is necessary to clean each incubator down thoroughly after each hatch. Disease control in the incubation room and units is only possible when applying good hygienic and health standards. It is not difficult to understand that under the above mentioned environmental conditions , not only the embryo's in the eggs do grow well, but also the micro-organisms which are transported with the eggs.

<u>Turning of the eggs</u> :



Egg-turning during incubation is important as it prevents the developing embryo from sticking to the shell membranes, a problem which develops if the egg lies too long in the same position. A survey of the poultry literature indicates that for optimal hatchability an egg should be turned at least eight times every 24 hours. Many incubators with automatic turning mechanisms , including the Grumbach's, turn the eggs once every hour or so as installed by the breeder. Regardless of the number of times an egg is turned each day, the interval between turning should be evenly spaced thoughout the twenty-four hour period. In addition, the eggs would be turned in alternate directions, as turning in only one direction will increase embryo mortality. Eggs can of course be turned by hand if desired, but maintaining regular turning intervals is frequently difficult if one is not always around twenty-four hours per day to monitor the incubators. Automatic turning is, therefore, an important feature of the incubator. We automatically turn the eggs in the Grumbach incubators at least 4 times per day. The "Grumbach" turning-mechanism consists of a sliding grid assembly and an enclosed motor-gear assembly, as shown in the various pictures.

Candling :

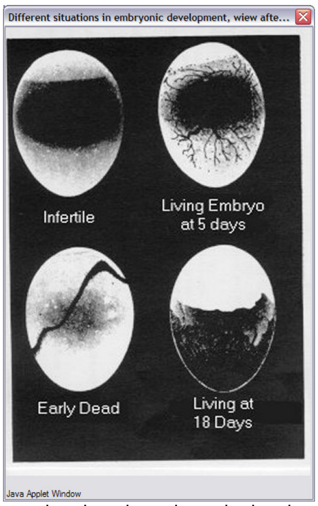
Candling is a technique which facilitates observation of the inner contents of an egg without opening the shell. Useful not only to determine fertility and the extent of incubation, candling can provide information about the condition of the egg shell and air cell as well as the condition and position of the embryo.

Home-made egg candler with one A.I.Tragopan egg during artificial incubation

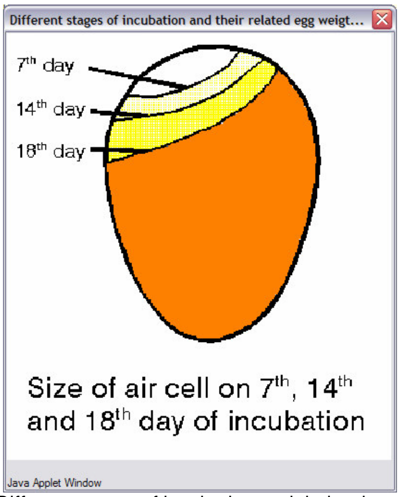
Home-made egg candler with one A.I.Lewis pheasant egg during artificial incubation

If an egg is held against light, the developing embryo, with its blood vessels and the air cell at the broader end are seen. The examination becomes easier if a small light-box, made of either wood or metal carrying a 40 watt electric bulb and a small window appropriate to the size of the egg is used in a full-darkened room. The blood vessels can be seen as thin red lines after about 72-84 hours of incubation. All infertile eggs will appear clear and these are to be rejected from the incubator, as also eggs with cracked shells. We perform candling on regular basis (at least 2 times per week) to keep track of the change air-cell and ultimately on the egg weight loss. However, candling is more an art than a science and much can be learnt from experience.

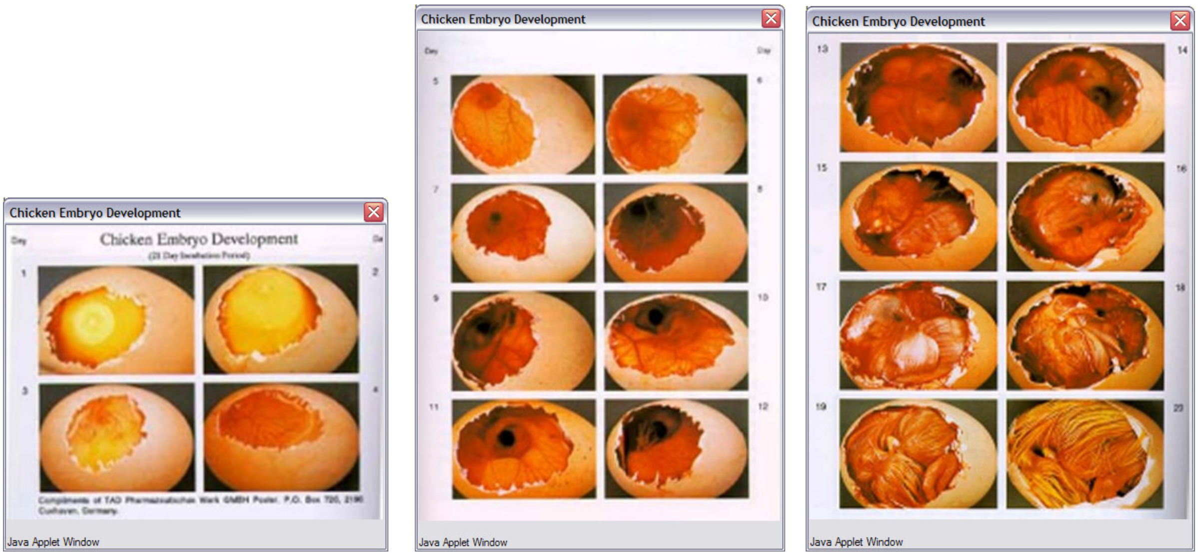
Candlers are commercially available but plans for home-made models can also be found in some books written for the lay poultry breeder. If a home-made candler is constructed, it is best to use a light bulb no larger than 40 watts to prevent the egg from being exposed to excessive heat.



Different situations in embryonic development, view after candling



Different stages of incubation and their related egg weigth loss and change in air cell chamber



Chicken Embryo Development
These pictures has been taken from the book [Game Bird Breeders Handbook (1993) by Allen Woodard, Pran Vohra, & Vern Denton].

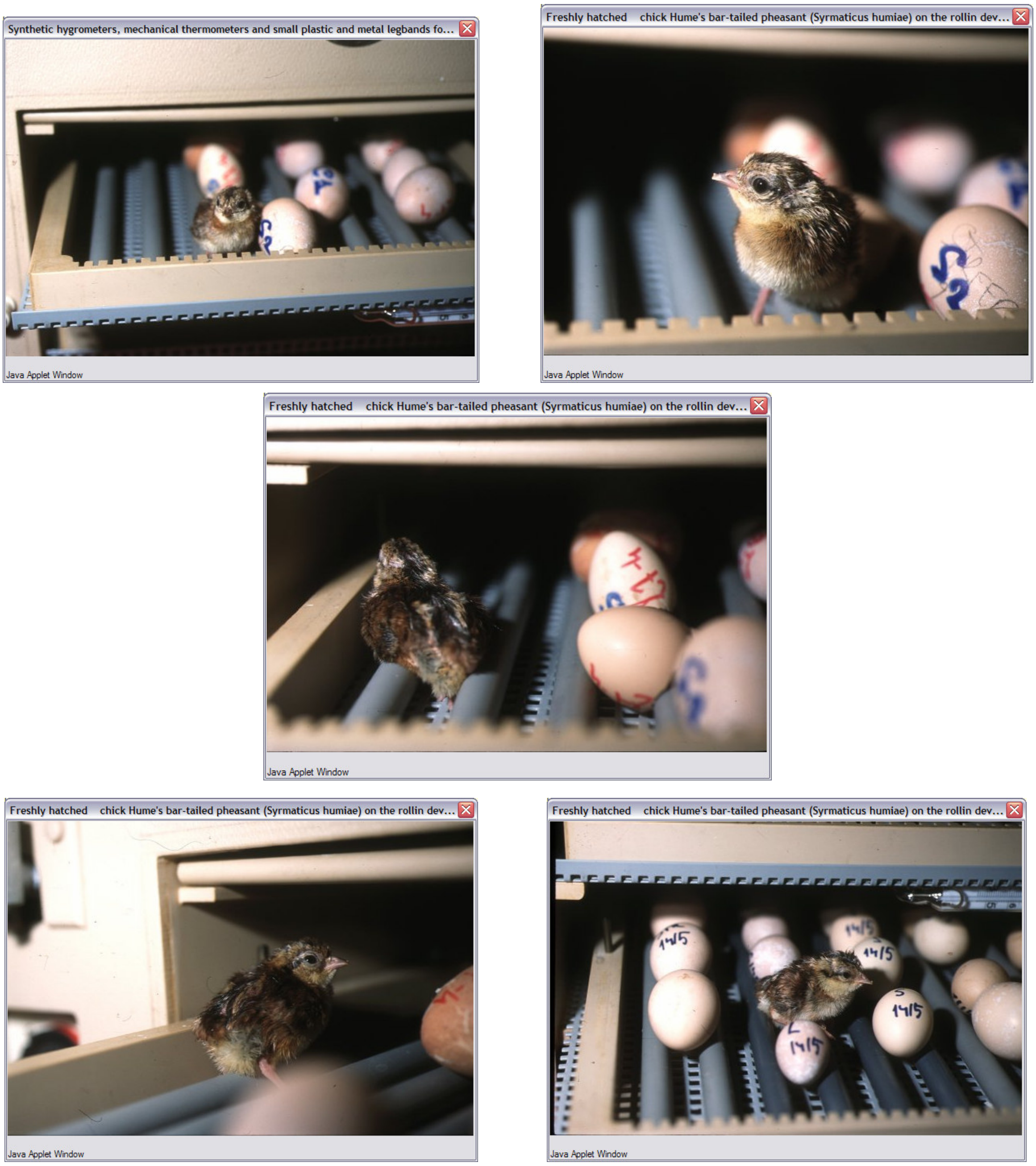
2.7. Hatching

A hatcher is a modified incubator used to incubate the eggs during the interval from pip to hatch. We hatch eggs both in a "Grumbach Compact S84" incubator, modified as described for incubation, and in self-made still-air incubators. The "pip" is the first stage in the actual hatching process and is define as the first crack in the shell made by the embryo. Approximately 24 to 48 hours before the egg pips, candling reveals that the air cell expands and gradually starts to extend down one side of the egg. this change in the air cell is called "draw-down". When "draw-down" begins, it is no longer necessary to turn the egg. Normally the pip, when it occurs, it will be located in the air cell. It is not unusual for the embryo to vocalize before pipping. In all pheasant species, the pip is very easy to see and appears as a small uplifted portion of shell. Occasionally, however, little or no lifting is visible, though candling will reveal a crack that an be felt if one's finger is gently passed over it. After the egg has pipped, it is moved from the incubator to the hatcher unless additional weight loss is desired.

The hatcher is normally operated at a relative humidity of 70-80%. We use an incubator temperature of 37.4 degrees Celsius which is slightly below incubator temperature.

At birth the chicks of all pheasant and gamebirds are wet with its down matted.

New born chicks tragopan (satyr, cabot's, temminck's and blyth's) at Tragopan Pheasantry, Belgium



Freshly hatched chick Hume's bar-tailed pheasant (Syrmaticus humiae) on the rollin devices of one Grumbach Compact 84 forced air incubator at Tragopan Pheasantry, Belgium

2.8. Proper record keeping

Proper record keeping of the eggs laid, eggs made available for incubation, eggs hatched can be done by the use of incubation cards. The eggs, laid in a time span of one week, are being collected in the pheasantry. Before putting these in the incubators, they are all marked so we can keep track of their further development while in the incubators.

It is fundamental to keep proper records for all the eggs being laid during the breeding season for good incubation management. Eggs, regardless whether they are used for artificial or natural incubation, these should be clearly marked with an alcohol pen with the date of hatch expected, the species, the number of aviary or of the pair, which laid the egg, It is important to know the family relationships of the eggs and consequently of the chicks, being born , to guarantee healthy genetic pairings in the pheasantry.