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The training of drakes for semen collection

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Summary

One hundred and seventy-two drakes of two genera (Muscovy and Pekin), at various ages, were trained for semen collection over three breeding seasons. The laying Muscovy female is used as the teaser since she is receptive to both the Muscovy and Pekin drakes. The training process exploits a number of innate and conditioned reflexes in the drakes. During the initial training and subsequent active collection period, the drakes learn to overcome the external and internal inhibitions by the arousal and gratification of their sexual urge. Pretraining management had a significant effect ($P < 0.001$) on the training success of the Muscovy males. Males which came into contact with the collectors at 16 weeks and at puberty had a success rate of training of 91.7 p. 100 and 83.3 p. 100 respectively compared with 16.7 p. 100 for adult flock males. For the Pekin, however, the effect of pre-training management was not significant.

Introduction

Natural mating between Muscovy (*Cairina moschata*) × Pekin (*Anas platyrhynchos*) results in poor fertility (KALINA, 1958; WATANABE, 1959; TAN, 1971; CASSAGNE *et al.*, 1973; STEKLEN'OV, KROMIN and GAVRISH, 1976). Artificial insemination (AI) is a logical alternative. The massage and manual methods (ONISHI and KATO, 1955; WATANABE, 1959, 1961; KAMAR, 1962) and electro-ejaculation (WATANABE, 1957, 1961) have been used on the Muscovy drakes with limited success. NISHIYAMA, NAKASHIMA and FUKIHARA (1976) collected semen from four Pekin drakes with an artificial vagina similar to that used for farm animals. The average semen volume/ejaculate and sperm concentration was 0.39 ml and 9.46×10^9 /ml respectively. These figures are much higher than the figures reported in the literature for semen characteristics of Pekin drakes collected either by massage (KAMAR, 1962; CHELMONSKA and GALUSZKOWA, 1966; PINGEL, 1972) or electro-ejaculation (Chelmonska, GALUSZKA and LISIECKI, 1962). However, NISHIYAMA, NAKASHIMA and FUKIHARA (1976) did not give

any information on the training of the Pekin drakes for semen collection and its success rate. Similarly, there is no information in the literature on this topic for Muscovy males. However, for the practical use of AI there is a need for a detailed description of the method used for semen collection and the training procedure which allows for a reliable use of the males.

I. — *Sexual Behaviour in Ducks*

The sexual act itself consists of stages which may be regarded separately for analysis although there is a continuity between them. The following five stages may be readily distinguished in the drake :

1. Courtship.
2. Mounting and positioning.
3. Evagination of the penis and stimulation of the female.
4. Intromission, erection and ejaculation.
5. Post-coital display.

The completion of the mating act as a whole and its stages, depends upon the sexual libido and the mating technique of both the individuals involved.

I. — *Courtship*

Courtship tends to be elaborate and lengthy for birds which form pairs (LORENZ, 1951; WOOD-GUSH, 1954, 1956). It serves to excite the female (SCHUTZ, 1965) as well as being self-stimulatory for the male (KERRUISH, 1955).

In the Pekin, mating is preceded by courtship, although in a reduced form compared to its ancestor, the Wild Mallard, but mating is always preceded by head pumping.

Muscovys do not form pairs in the wild state, the males being promiscuous (LORENZ, 1953; DELACOUR, 1964). Little or no courtship occurs before mating. However, as an adaptation to the behaviour of the Muscovy drake, the receptive duck will crouch and remain in that position when the drake makes a grab at her.

2. — *Mounting and positioning*

The drake mounts and seizes the nape of the duck. It then positions itself exerting a massage-like motion with its feed upon the ilio-femoral region of the duck. The weight of the male, together with the massage action, pushes the vagina of the duck towards its vent.

3. — *Evagination of the penis and location of the vagina*

While exerting the massage motion on the duck's back, the male also evaginates its penis from a membranous fold in the ventral wall of the cloaca (WATANABE, 1961). The drake then swings its tail in from the left side of the duck and with pendulum movements, stimulates and locates the slightly evaginated vent.

PLATE I

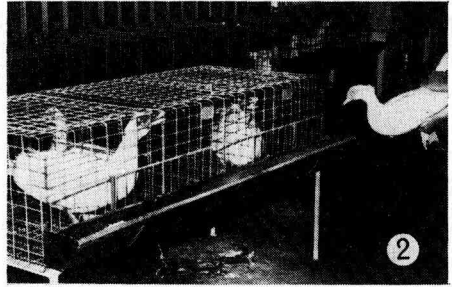
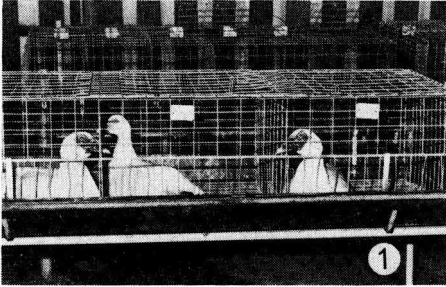


PHOTO 1. *Muscovy males in non excited state*

PHOTO 2. *Muscovy males showing excitement when approached by collector with duck*

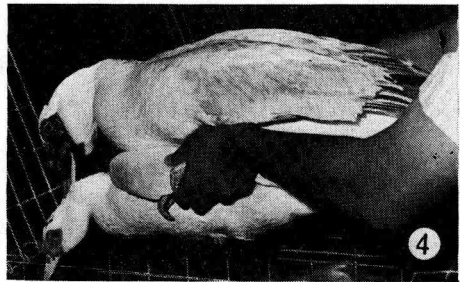
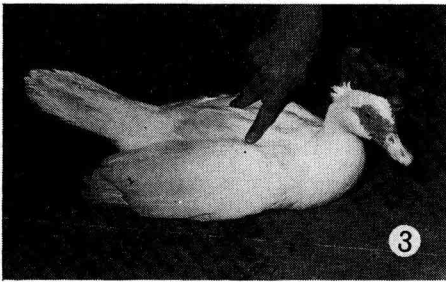


PHOTO 3. *Receptive Muscovy female in crouching position*

PHOTO 4. *The Muscovy duck together with the drake on its back is lifted up during a major adjustment of position*

4. — *Intromission, erection and ejaculation*

After a few thrusts, intromission occurs with the drake falling to its left side. The spiral penis becomes erect simultaneously as it penetrates the vagina, followed immediately by ejaculation. WATANABE (1961) stated that erection occurs before intromission but my observations do not confirm this.

5. — *Post-coital display*

After ejaculation, the Pekin male usually displays bridling and « nod-swims » around the duck (LORENZ, 1951) followed by preening. Post coital display may occur before preening for the Muscovy - he strides with partially open wings around or away from the mated duck, rubbing his head and neck on his shoulders.

II. — *Semen Collection with Trained Drakes*

a. — *Choice of teaser ducks*

Laying Muscovy females or those about to lay are used as teasers as they are receptive to both Pekin and Muscovy males. The receptive females will crouch and remain in that position when the male makes the grabbing movement or when pressure is applied to her back (Plate 1, Photo 3). However, it is seldom possible to use the Pekin duck in this role since Mallard-type ducks will crouch and remain in that position only after courtship. In addition, teaser ducks need to be large enough to support the males (especially for the heavy Muscovy), otherwise collection becomes difficult, if not impossible.

b. — *Introduction of the teaser*

After the introduction of the teaser, any exploratory or courtship behaviour of the male should not be interrupted. The drakes are generally more sensitive at this stage than at any of the following stages of mating to any inhibitory factors or sudden movement of the collector. Once the male has mounted and positioned himself, any adjustments to make collection easier are made by the collector. The most convenient position for semen collection is to have the mounted pair in the centre and directly below the opening of the cage. This is done by shifting the duck gently together with the male where a minor adjustment is required. In the case of a major adjustment, the duck, together with the male on its back, is lifted to the required position (Plate 1, Photo 4). At no time must the male be handled or lifted away from the duck.

Often the excited Muscovy male will try to seize the female before it is introduced into the cage, baring its claws and flapping its wings. This makes it impossible to place the teaser at the centre of the cage - hence the need for a major adjustment of position. The smaller and less aggressive Pekin requires only a minor adjustment since the teaser may be placed at the most convenient position for collection. This is fortunate as the Pekin male seldom tolerates being lifted in this manner.

PLATE 2



PHOTO 1. *Collection tube together with the thumb and forefinger of the operator stimulating the duck's cloaca*



PHOTO 2. *Drake ejaculating into the collection tube*

c. — *Semen collection*

As soon as the Muscovy male swings its tail from the left to locate the duck's vent, the collection tube is introduced - or, in the case of the Mallard-type ducks, as soon as the male is properly mounted since it ejaculates very rapidly after mounting. The collection tube, which consists of a thick glass centrifuge tube (length 101 mm, external diameter 36 mm, internal diameter 29.5 mm) is held close to the duck's cloaca at an angle of approximately 45° (Plate 2, Photo 1). The thumb and forefinger of the operator simulates the duck's cloaca. The collection tube is brought close to the male's cloaca as he tries to locate the female's vent. While the male is exerting the pendulum movement, he must not swing beyond the depression formed by the thumb and the forefinger, otherwise he will ejaculate outside the collecting tube. Neither should the collection tube be placed too close to the male's cloaca as it causes the male to thrust repeatedly without intromission and ejaculation. If repeated, the drake may develop internal inhibitions.

After a few thrusts, intromission occurs (Plate 2, Photo 2). As the drake ejaculates, gentle pressure is applied on the penis with the thumb and forefinger. This ensures a good collection and minimizes contamination with faeces and uric acid. Unlike most domestic animals, temperature and pressure of the collection tube are unimportant to the drake. However, the collection tube is usually maintained at 35° - 38° in winter and spring to prevent cold shock.

The mean semen volume, concentration and number of spermatozoa/ejaculate of forty 13-month-old Muscovy males was 1.08 ± 0.06 ml, $1.93 \pm 0.13 \times 10^9$ /ml and $2.086 \pm 0.229 \times 10^9$ respectively.

When repeated thrusting has become a habit, the male is allowed to mate naturally to prevent the development of internal inhibitions. However, where a male has thrust repeatedly and then ejaculated, the semen is frequently contaminated with faecal material. Furthermore, with repeated thrusting, the volume of semen collected is usually low.

III. — *Training of the Drakes*a. — *Settling in*

Muscovy drakes are caged separately and learn within one-two days that they are not vulnerable to attack from males on either side. Males are usually brought in on the same day since a timid male placed next to an established male may not mate at all. Although the Pekin drakes are not as aggressive as the Muscovy males, they too are caged separately to prevent homosexual raping of the subordinate male.

b. — *The training process*

As soon as the collector is able to move around the cages without upsetting the drakes (i.e. the Muscovy remains quiet and undisturbed, or the Pekin does not jump excessively) training commences. The female Muscovy is introduced into the cage. If the male mounts, it is allowed to copulate with the collector standing close behind. After mating the female is removed. For a wary but keen male (most Pekin males fall into this category) the collector must stand at

a distance acceptable to the male while he mates. Where no response is obtained, or mounting only is attempted, the female is left with the male for the day.

The response of the drakes to training varies considerably. The collector must move quietly and patiently, adapting to the temperament of the drakes.

After 2-3 successful matings the drake will associate the collector with sexual gratification. He comes excited as soon as he sees the collector approaching with the teaser duck (Plate 1, Photos 1 and 2). At this point the drakes are ready for semen collection.

Where a male has ejaculated on three consecutive occasions or on three out of four attempts, it is classed as a successful candidate. The interval between consecutive training periods is 1-2 days. To reinforce the drake's newly-acquired skill, two further training periods are given to it within a week. A male is classed as a failure if he did not respond when the teaser was introduced on three separate occasions or did not remain mounted as the collector approached with the collection tube.

IV. — *Experimental: The Effect of Pre-Training Management on the Success Rate of Drakes Trained for Semen Collection*

During the process of training males for semen collection, I have observed that males which were in contact with the collector at an early age were more responsive to the training process. To test this, an experiment was designed to study the effect of pre-training management on the success rate of training.

Material and methods

One hundred and thirty-two Muscovy males were subjected to three different management regimes prior to training. These were :

Regime A - 60 males reared in close contact with the collectors from 16 weeks of age.

Regime B - 36 males which come into contact with the collectors at puberty.

Regime C - 36 males (1 year old) which came into contact with the collectors as adults.

For the Pekin males these were :

Regime A - 10 males reared in the collector's presence from 9 weeks of age.

Regime C - 15 males (1 year old) which came into contact with the collector as adults.

Young males (16 weeks old for the Muscovy and 9 weeks old for the Pekin) were reared with females in pens where they were in close contact with the collectors. The young drakes were caged separately as soon as they showed signs of sexual activity (22-24 weeks for the Muscovy and 19-21 weeks for the Pekin). Males brought in directly from Kelmscott Farms Pty Ltd were immediately caged separately. The training for semen collection with the collection tube commenced as soon as the drakes had settled down and accepted the presence of the collector. This usually took 2-3 days for Muscovy males and 5-6 days for

Pekin males which had prior contact with the collectors and 4-6 days and 8-10 days respectively for males brought in from Kelmscott Farms.

Feed (Finisher and Breeder rations respectively) and water were offered *ad libitum* to the young birds and breeders.

Results

Pre-training management had a beneficial effect on the success rate in the training of males for semen collection (Table 1). The success rate for Muscovy males in Regime A and Regime B was significantly greater than in Regime C ($X^2 = 61.40$; $P < 0.001$), but the difference between Regimes A and B was not significant ($X^2 = 1.00$ NS).

TABLE 1

Effect of pre-training management on the success rate in drakes trained for semen collection

Effet des conditions d'élevage sur le taux de réussite des collectes de sperme chez le canard

A = contact avec l'expérimentateur lors de la fin de la période de croissance des mâles.

B = contact avec l'expérimentateur à la puberté.

C = contact avec l'expérimentateur à l'âge adulte (1 an).

Regime	Total No. of Birds		Success (Nos)		Failure (Nos)	
	Muscovy	Pekin	Muscovy	Pekin	Muscovy	Pekin
A	60	10	55 (91.7 %)	8 (80.0 %)	5 (8.3 %)	2 (20.0 %)
B	36	—	30 (83.3 %)	—	6 (16.7 %)	—
C	36	15	6 (16.7 %)	9 (60.0 %)	30 (83.3 %)	6 (40.0 %)

Discussion

The training procedure and the success rate of training, especially with the young males of both genera, indicate that this method of semen collection may be used for routine AI of ducks. In the past, the large scale production of Muscovy × Mallard-type hybrid has been hampered by the lack of a reliable method of semen collection from Muscovy males. ONISHI and KATO (1955) and WATANABE (1959) reported that Muscovy males do not respond to massage. KAMAR (1962), however, managed to collect semen from the Sudani (Muscovy) drakes by the massage technique. But KAMAR did not give any information on the success rate of training. In Taiwan, where this hybrids is produced in large numbers, HUANG and CHOW (1974) have successfully collected semen from Muscovy males with teaser ducks, but manual manipulation is required to evaginate the drake's penis. This method was first reported by ONISHI and KATO (1955). However, ONISHI and KATO (1955) and HUANG and CHOW (1974) did not give any quantitative information on the reliability of their method of semen collection.

For the two breeds, the earlier the young males come into contact with the

collector, the greater the success rate during training. In addition, with the Muscovy males, the training may be shortened without greatly affecting the success rate (Regime A). However, these young males were often awkward for the first collection and some may even attempt to mount the teaser from an improper position. This was not evident in the Pekin males which had 2-3 successful natural matings.

With the young males of both breeds, those classed as failures usually showed no response. With the older males, 14 p. 100 of the Muscovy and 50 p. 100 of the Pekin attempted to mount or mounted the teaser but retreated to the corner of the cage whenever the collector approached them.

The relationship between the drake and the collector appears to involve two stages. Up to the point of collection the drake appears to be identified with an individual collector. However, after a number of matings, the majority of trained drakes will mate for any experienced collector since they have associated the collector with sexual gratification.

Although the number of Pekin males in Regime C was small, they had a greater success rate than the Muscovy males. I have observed that Pekin males have greater libido than Muscovy males of the same age. It may account for their ability to overcome the internal and external inhibitions and be successfully trained.

The volume and concentration of the semen reported in this paper is generally much greater than that reported in the literature for Muscovy males. ONISHI and KATO (1955) and HUANG and CHOW (1974) obtained volumes of 0.82 ml and 1.17 ml, and concentrations of 0.58×10^9 spermatozoa/ml and 1.34×10^9 spermatozoa/ml respectively. In addition, KAMAR (1962) reported that the semen volume and sperm concentration of Muscovy Males obtained by massage was 0.18 ml and 3.63×10^9 /ml respectively. But this very low volume and highly concentrated semen is probably an artifact of the collection technique *per se*.

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Résumé

Méthode de collecte du sperme chez le canard

La mise en œuvre de l'insémination artificielle chez le canard est particulièrement utile pour l'obtention d'hybrides Pékin \times Barbarie. Les techniques classiques de massage utilisées chez les oiseaux, de même que l'électro-éjaculation ne permettent pas d'obtenir régulièrement une semence de qualité satisfaisante. La méthode proposée consiste, comme chez les mammifères domestiques, à réaliser la collecte alors que la réaction sexuelle du mâle est provoquée par la présentation d'une femelle réceptive. L'éjaculation complète est obtenue par pression du pouce et de l'index lorsque le pénis du mâle est évaginé. Le sperme est recueilli dans un tube maintenu à température convenable. Le volume moyen est $1,08 \pm 0,06$ ml, la concentration $1,93 \pm 1,13$

$\times 10^9$ et le nombre total $2,086 \pm 0,229 \times 10^9$ spermatozoïdes (40 mâles Barbarie adultes collectés une fois chacun).

Le choix de la femelle stimulus, les conditions d'élevage des mâles (cages individuelles) et surtout l'entraînement à la présence de l'observateur semblent essentiels à la réussite.

Une expérience portant sur 132 mâles Barbarie montre qu'un contact précoce et fréquent avec la personne qui effectue les collectes conditionne le succès : lorsque les mâles sont en contact avec l'expérimentateur à partir de l'âge de 16 semaines, ou à la puberté, 83 et 91 p. 100 d'entre eux, respectivement, peuvent être récoltés, contre seulement 16 p. 100 lorsque le contact n'a lieu qu'à l'âge d'un an. Les améliorations obtenues par contact précoce sur un faible échantillon de mâles Pékin sont moins marquées et non significatives, le taux d'échecs passant de 40 à 20 p. 100.

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