



## SPERM SEXING

### Introduction:

Sexual differentiation includes the development of the gonads, internal and external genital tract. Maleness or femaleness can be characterized in three ways:

1. Genetic sex: whether the sex chromosomes are XY or XX.
2. Gonadal sex: whether the gonads are testes or ovaries.
3. Phenotype genital sex: whether the person looks like a male or female.

### 1. GENETIC SEX

Genetic sex is determined by the sex chromosome XY in males and XX in females.

- During the first 5 weeks of gestational life; the gonads are indifferent or bipotential, they are neither male nor female.
- At approximately gestational week 7 in genetic males; the gene product of the sex-determining region of the Y chromosome (SRY gene) causes the testes to begin developing.
- At gestational week 9 in genetic females (in the absence of the SRY gene); the ovaries begin to develop.

Therefore, genetic sex normally determines gonadal sex and the gonads appear in males slightly before they appear in females.

### 2. GONADAL SEX

Gonadal sex is defined by the presence of either male gonads (testes) or female gonads (ovaries). These gonads comprise germ cells and steroid hormone-secreting cells. The testicles consist of three types of cells:

- **Germ cells:** produce spermatozoa.
- **Sertoli cells:** synthesis of a glycoprotein hormone called *antimullerian hormone*.
- **Leydig cells:** synthesis testosterone.



The ovaries also consist of three types of cells:

- **Germ cells:** produce Oogonia. The Oogonia are surrounded by granulosa cells and stroma, and in this configuration, they are called oocytes.
- **Theca cells:** synthesis progesterone.
- **Granulosa cells:** together with the theca cells synthesize estrogen.

### 3. PHENOTYPIC SEX

Phenotypic sex is defined by the physical characteristics of the internal and external genital tract.

- In males: the internal genital tract includes accessory sex glands, vas deference, and epididymis, and the external genital tract includes the scrotum and penis.
- In females: the internal genital tract includes fallopian tubes, uterus, and vagina, and the external genital tract includes the clitoris, labia, or vulva.

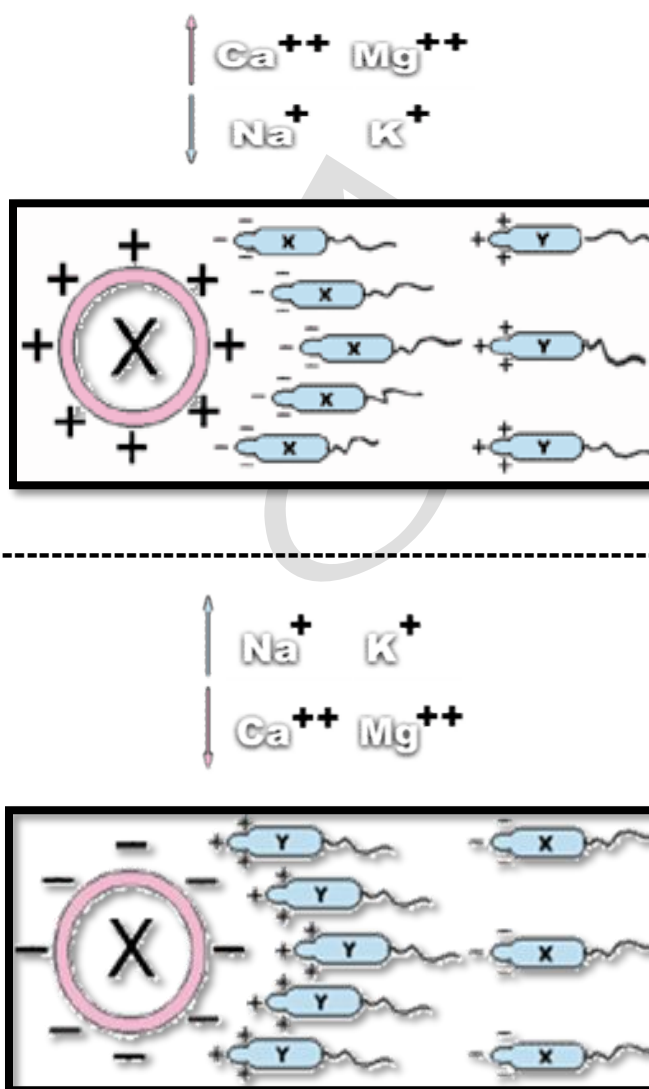
### ANCIENT BELIEFS TO SEX DETERMINATION

1. **Greeks and Pharaohs (old Egyptians):** Male fetuses are stored on the right side (right testes) of the male and the female on the left (left testes).
2. **Taiwan civilization:** Marriage of a fat man and a slim woman produces females. Marriage the slim man and a fat woman produces males.
3. **Old Indians:** Eating stables, meat, salted fish and pickles helps in the production of males.
4. **Old Chinese:** Marriage at binary days increases the percentage of males, while in the odd day's increases the percentage of females.

## Sex determination before breeding methods

### 1. Determining sex before pregnancy by nutrition:

The nutrition of a dam, at least two months before pregnancy, can affect the appropriate the fetus you want. The nutrition principle provides for four important nutrients in nutrition: calcium, magnesium, sodium, and potassium. If you want a female, you should follow nutrition based on increasing magnesium and calcium levels in your body. It is best to follow this method to accompany the method of timing mating to be guaranteed results.





## 2. Determine the time of mating or insemination:

If the mating occurs within two or three days before the ovulation, the chances of pregnancy by a female become very high, but if the mating coincided with the same time the ova out of the ovary.

The sperm that carry the male chromosome (Y) is fast but weak, while the sperm carrying the female chromosome (X) is slow but strong. If mating and ova are ready, male sperm will be fertilized by their speed, either if the ovum is not present; the male sperm die quickly, giving way to female sperm to fertilize the ova for its ability to live longer.

## 3. Use acid and base medium properties:

A dam who wants to be pregnant with a female can use the mixture of white vinegar (acidic) and water as a vaginal lotion before mating, and the basal mean is the most suitable for the female sperm of the female chromosome. The sperm cell should carry the male chromosome, and then the sodium bicarbonate mixture should be washed with water.

## New methods of sperm sexing:

### 1. Centrifugal Counter Current Distribution (based on Density Characteristics):

There is a difference in density between X chromosome spermatozoa and Y chromosome spermatozoa to be only  $0.0007 \text{ g/cm}^3$ ; hence, this feature was also not suitable to be exploited as a characteristic to sex sperm.

### 2. Swimming Patterns under Laminar Flow

This method was based on that the Y chromosome spermatozoa swim differently and more quickly than X chromosome spermatozoa in a column of flowing media. The viability of this technique is questionable as only 10 % of the total number of spermatozoa placed in the system could be recover.

### 3. Free Flow Electrophoresis (Counter Current Galvanic Separation):

It is based on the possibility that the electric charge on the surface of X chromosome spermatozoa differs from that of Y chromosome spermatozoa, uses an electric field to separate spermatozoa into the two major classes.

The selection can be further enhanced by the application of a suitable microampere current that will attract Y chromosome spermatozoa to the anode and X chromosome spermatozoa to the cathode.

Inseminations with semen separated by this technique yielded unacceptable results. A birth rate of 50% female calves in inseminations was carried out on 1185 animals using semen enriched in X chromosome spermatozoa. Another disadvantage of this technique was an associated reduction in motility of the sperm after being subject to electrophoresis.

