International Journal of Advanced Research in Biological Sciences
ISSN: 2348-8069
www.ijarbs.com
(A Peer Reviewed, Referred, Indexed and Open Access Journal)
DOI: 10.22192/ijarbs Coden: IJARQG (USA) Volume 9, Issue 2 -2022

Review Article

DOI: http://dx.doi.org/10.22192/ijarbs.2022.09.02.010

Potential and Possibility of Artificial Insemination in Poultry: A Review article

[1]Shambel Taye and [2]Wondmeneh Esatu
[1]Ethiopian Institute of Agricultural Research (EIAR),
Debre Zeit Agricultural Research Center, P.O. Box: 32, Bishoftu, Ethiopia
[2]International Livestock Research Institute (ILR), Addis Ababa Ethiopia
Corresponding author, Email: *olyaadshambel@gmail.com*

Abstract

The purpose of this review paper is to evaluate the opportunities for synthetic insemination in the poultry enterprise and the way it may be used. Assisted reproduction technologies, like as Artificial insemination, assist to boom chicken production and productivity by allowing for the usage of genetically superior cockerels with high productivity. Artificial insemination has been utilized in commercial chicken production, initially in Israel because of the size variations among male and female turkeys, natural mating is problematic, resulting in low fertilization. The extent of semen vital for insemination is regularly much less than 0.1 ml, with no less than one hundred to two hundred x106 possible sperm per insemination within the hen's vaginal canal. Biologically, after semen is deposited in the oviduct, it travels up the oviduct to the sperm storage gland, that is placed on the junction of the vagina and the shell gland. Unlike mammalian males, who have their reproductive organs outside of the body cavity, the avian male reproductive system is completely inside the bird, simply anterior to the kidneys. As a result, spermatogenesis happens at a temperature of 41 in birds, against to 24-26 Celsius ranges in mammals' scrotum. The common semen ejaculate quantity measured was 0.6 ml, with the cockerel generating among 0.1 and 1.5 ml per ejaculation. At different periods, different cockerels of the same species produce varied quantities of semen and also based on frequency of masturbation action. The quality of the spermatozoa is a more important limiting factor than the number of times they are inseminated. Generally, in poultry industry synthetic insemination is useful technology in reduction of production cost immediately through decreasing the range of cocks required, resolving compatibility issues with inside of the broiler management, manage of venereal infections, and in addition to its breeding value.

Keywords: Artificial insemination, Chicken, Natural mating, Semen

Introduction

Reproduction is the first and most important requisite of livestock breeding. Assisted reproduction technologies, likes synthetic insemination, help to increase chicken production and productivity by allowing for the use of genetically superior cockerels with high productivity. This lowers the cost of chicken production by reducing the number of cockerels required for the production of male gametes (Benoff et al., 1981). Ivanov, who investigated artificial insemination in domestic farm animals such as poultry, began pioneering efforts to establish artificial insemination as a practical process in Russia in 1899. (Ivanov, 1922).This method was successfully utilized in birds for the first time almost a century ago, when

Ivanov created viable chicken eggs using semen collected from a cockerel's ductus deferens (Ivanow, 1907).

To achieve the best fertility in chicken, the artificial insemination procedure requires superior quality semen that should be inseminated extremely close to the sperm storage tubules in the female. Synthetic insemination has been utilized in commercial poultry production since the 1950s, first in Israel and Australia, then in the United States (Moultrie, 1956). Because of the simplicity of collection and the proximity of hens in big breeding farms, Artificial insemination is commonly utilized with freshly collected semen. Since the 1960s, artificial insemination has been the most important component of turkey reproduction, and it is almost solely employed for commercial flock production. Due to the size differences between male and female turkeys, natural mating is problematic, resulting in low fertilization of heavy, broad-breasted types, necessitating the use of artificial insemination in commercial production (Donoghue and Wishart, 2000).

According to Aisha and Zain (2010), synthetic insemination in poultry is the technique of collecting male avian sperm and introducing it to females for the intent of fertilizing eggs. Synthetic insemination usually requires less than 0.1 ml of semen, with a minimum of 100 to 200 viable sperm per insemination within the hen's vaginal canal (Gordon, 2005). Biologically, after semen is deposited in the oviduct, it travels up the oviduct to the sperm storage gland, which is located at the junction of the vagina and the shell gland. Spermatozoa then travel up the oviduct to the second storage site. The passage of an ovum into the infundibulum stimulates spermatozoa actively and fertilization of ovum by one sperm takes place (Aisha and Zain,2010). The main purpose of this review paper is to assess the potential and application of artificial insemination in poultry industry.

Male chicken reproductive physiology

Unlike mammalian males, who have their reproductive organs outside of the body cavity, the avian male reproductive system is fully inside the bird, just anterior to the kidneys, and linked to the dorsal body wall (Brooks, 1990). As a result, spermatogenesis occurs at a temperature of 41 degrees Celsius in birds, opposed to 24-26 degrees Celsius in mammals' scrotum (Nickel et al., 1977). One of the most fascinating aspects of birds is that their sperm can survive at body temperature. Male reproductive organs are found on the exterior of the body because mammalian sperm does not survive at body temperature (Brooks, 1990).

Gonadotropin Releasing Hormone (GnRH) secretion from the hypothalamus, Luteinizing Hormone (LH) and Follicle Stimulating Hormone (FSH) secretion from the anterior lobe of the pituitary, and release of gonadal steroids all contribute to sperm production. LH stimulates the production of progesterone, which is then transformed to the male sex hormone testosterone, via acting on the Leydig cells in the testes (Senger, 2003). Testosterone is required for spermatogenesis in the seminiferous tubules, but high amounts of LH cause the Leydig cells to become unresponsive (Senger, 2003). Sperm development can be divided into three processes: spermatocytogenesis, spermiogenesis, and spermiation. The weights of the testes were more closely associated with body size than with the level of Sperm production. The first step of spermatogenesis takes place on the perimeter of the spermatogonia-lined seminiferous tubules (Zlotnik, 1947). Spermatogonia are diploid mitotically proliferating cells that create spermatocytes and maintain a steady population of stem cells for spermatogenesis.

The seminiferous tubules in birds are structured as a network of interconnected ducts that discharge into the rete testis after the semen is formed (Tingari, 1972). A coiled tube, the vas deferens, emerges from each epididymis and travels posteriorly, attaching to the dorsal body wall until terminating in a tiny phallus in the cloaca (Nickel et al., 1977). The vas deferens, like the whole duct, enlarges just before its termination and acts as a storage place for spermatozoa. Each vas deferens has a tiny papilla at the end that ejects the sperm into the cloaca (Nickel et al., 1977). Several tiny folds in the ventral cloaca get engorged with lymphatic fluid and protrude during sexual stimulation, generating a trough-like structure to control the passage of semen (Nishiyama, 1955). Earlier spermatozoa leaves the rete tubules, structural differentiation is assumed to be complete (Tingari, 1973). Because sperm motility is obtained in the vas deferens, early investigations indicate that sperm extracted from the testis or epididymis of the cock were capable of producing fertility at a very low level. Total transit time from the testes to the terminal region of the vasa deferential has been estimated to be between 1 and 4 days (Munro, 19). Semen is a mixture of sperm cells and lymph fluid (Nishiyama, 1955).

Secondary sexual characteristics in Cockerel

Secondary sex characteristics are acquired as roosters mature as a result of hormonal secretions from the testes, which are regulated by gonadotrophin secretion from the anterior pituitary gland and gonadotrophin releasing hormones (GnRH) secretion from the hypothalamus (Etches, 1996). Comb, plumage, and wattle development are examples of male secondary sex characteristics. Although capons and masculinized females will make poor attempts to emulate the intact male, androgens are also responsible for the full production of the rooster's unique voice (Etches, 1996).Androgens are required to induce growth of the comb and wattles in roosters. In both sexes, the development of the comb coincides with increased plasma concentration of androgens (Etches, 1996). Mashaly and Glick (1979) speculated that dihydrotestosterone may be more important than testosterone in driving comb growth. Rath et al. (1996), on the other hand, found that testosterone increased comb weight.Cocks typically begin producing sperm at the age of 16 weeks, however the fertilizing potential of the sperm is limited. As a result, cocks as young as 22 or 24 weeks are used for semen collecting. Whi pearly white is the natural color of fowl sperm. Males of heavy breeds can generate 0.75 to 1 ml of sperm, whereas light breed males can produce 0.4 to 0.6 ml. A man can be utilized for semen collection three times a week with a one-day break between each session. Although daily sperm collection will not affect fertilization capacity, the volume of sperm collected will be low.

Semen Characteristics in Chicken

Semen is made up of spermatozoa and seminal plasma. Fowl sperm is often quite concentrated (3 to 8 billion spermatozoa per ml for broiler fowl). This is due to birds lacks extra reproductive systems, resulting in a limited amount of seminal plasma. The seminal plasma is produced by the testes and excurrent ducts. After ejaculation, a lymph-like fluid of cloacal origin may be added to the semen in various amounts. When clear fluid is added to sperm after ejaculation, it acts as an activating medium for previously non-motile spermatozoa, ensuring their passage from the deposition to the sites of sperm storage tubules in the utero-vaginal junction of the hen’s oviduct. The average semen ejaculate amount measured was 0.6 ml, with the cockerel producing between 0.1 and 1.5 ml per ejaculation (Cole and Cupps, 1977). At different periods, different cockerels of the same species produce varied quantities of semen (Anderson, 2001). Using the abdominal massage technique, the average volume ejaculated is around 0.25ml (Gordon, 2005). The average spermatozoa concentration is 3.5 million per milliliter of sperm. Sperm movement characteristics include straight-line velocity, curved velocity, and average path velocity. Burrows and Titus (1939) revealed that a link between the size of the testis and the volume of semen produced. From 16 to 44 weeks of age, males with the largest testes produced the most semen (de Reviers and Williams, 1984). Big males, in general, have large testes, hence broiler breeder males generate more sperm than Leghorn males (de Reviers and Williams, 1984).

The quality of the spermatozoa is a more important limiting factor than the number of times they are inseminated. Semen volume and concentration, sperm viability, and sperm motility are typically used to define the quality of avian sperm (Parker et al., 2000). Brown and McCartney (1983) showed, however, that neither the volume of semen collected nor the weight of the testes had any effect on egg fertility or hatchability. In natural mating flocks, fertility relates irregularly with sperm concentration and volume**.** (Wilson et al., 1979). The quality of sperm is also affected by how they are handled and how long they are stored (Wishart, 1995). Sperm motility, sperm metabolism, and the fraction of defective or dead sperm have all been linked to fertility (McDaniel and Craig, 1959).

Semen collection Techniques from Cocks

A clean semen sample of sufficient volume is required on a regular basis to properly perform artificial insemination. The oldest method of semen collection required the cockerel to mate with a hen, after which the hens were killed and the semen was surgically removed from the oviduct. In turkeys, domestic fowls, guinea fowls, quails and pheasants quails), and pheasants, the erection of the copulatory organ and the ejaculation reflex occur simultaneously in response to massage, and the majority of the spermatozoa are obtained in the first ejaculate(Lake and Stewart, 1978, Marks and Lepore, 1965).

In light breeds of chicken, the average volume of semen per collection ranges from 0.05-0.50 ml, while in heavy breed males, it ranges from 0.1-0.9 ml (Lake and Stewart, 1978). The volume of semen in light-weight turkeys is 0.08-0.30 ml, while it is 0.1-0.33 ml

in heavy-weight males (Lake and Stewart, 1978). The capacity of spermatozoa from chickens up to three years old to fertilize is the same; however, the volume of spermatozoa diminishes with age.

To ensure good quality semen, male birds must be routinely trained for semen collection for several days prior to the actual date of artificial insemination application. Therefore, feed should be stopped 12 hours before semen collection to ensure clean semen collection samples. It's vital to remember that the fraction of naturally degenerating spermatozoa in the vas deferens grows as the time between semen collections gets longer. This is due to the re absorption of spermatozoa (Tingari and Lake, 1972). Semen should be collected from males at a certain frequency during the mating season to ensure a steady supply of good quality semen, though this varies by breed and species. The optimum output of spermatozoa was maintained at a thrice weekly frequency (alternating days), resulting in good fertility in chickens (Lake and Stewart, 1978).

Semen Evaluation

The examination of semen quality serves two purposes: first, to guarantee that only males producing high-quality sperm are kept on the farm, and second, to evaluate the concentration of spermatozoa and the volume of semen. This enables estimates to be done for the proper dilution to produce 80-100 million spermatozoa per insemination dose. Using sperm concentration to calculate the quantity of sperm per insemination dosage and as a measure of sperm quality has various advantages (Senger, 2003). The typical sperm concentration in domestic cockerel sperm of 5 billion sperm cells per milliliter (Gordon, 2005), whereas Hafez and Hafez (2000) reported 3-7 billion sperm cells/ml. Sperm motility is an indicator of live sperm and of the quality of the semen sample.

Fresh and diluted sperm are used to test sperm motility, which is usually done under a light microscope (Hafez and Hafez, 2000). In domestic fowls, sperm motility is a major factor of fertility (Donoghue et al., 1998). The visual examination of sperm must, however, be overlooked (Peters et al., 2008). A good-quality semen sample is thick and pearly white in color (Cole and Cupps, 1977), and any other color indicates contamination; for example, yellow and green-colored semen indicate faecal or urine contamination (Lake, 1983). The presence of blood is indicated by a brownish red pigment or a reddish color (Etches, 1996).Domestic fowl semen, on the other hand, varies in consistency from a dense opaque suspension to a watery/transparent fluid (Mohan and Moudgal, 1996). The morphology of spermatozoa can be used to assess the quality of sperm. Blesbois (2007) described that a technique for examining the morphology of cockerel sperm using eosin-nigrosin staining. Traditionally, sperm evaluation has been done by a laboratory technician peering under a microscope and manually counting sperm, progressing motility (typically given a value ranging from 1 to 4), and sperm quality (generally given a grade ranging from 1 to 4) and morphology of spermatozoa (damage and defects). These observations were entirely personal.

In chickens, the CASA system was used in combination with a phase contrast microscope (Nikon Eclipse model 50i; negative contrast) and Sperm Class Analyzer software to quantify sperm motility and concentration. Straight-line velocity (VSL), curvilinear velocity (VCL), and average path velocity were among the sperm movement characteristics studied by CASA. Based on their general velocity, spermatozoa were classified as slow (10 m/sec), medium (10-50 m/sec), or rapid (>50 m/sec).

Hen insemination synthetically

Semen is frequently deposited in the shallow location in the hen's vagina during natural copulation. For optimum fertilization of eggs laid daily in succession by hens throughout the following week, it is required to evert the distal section of the oviduct (vagina) and deposit the semen to a depth of 2-4 cm during artificial insemination. Chicken sperm is usually inseminated at a depth of 2-3 cm in the vaginal canal (Artemenko and Tereshchenko, 1992). The actual insemination of the hen can be conducted by two people after good semen samples have been obtained (Quinn and Burrows, 1936). One person applies the proper pressure on the left side of the abdomen so that the hen turns inside outher vaginal orifice through the cloaca. At the same time, the semen is deposited by the second person to a depth into the vaginal orifice concurrently with the withdrawal of pressure on the hen's abdomen. Insemination can be done with sterile straws, syringes or plastic tubes.

The sperm is kept here for several days or weeks before being used in the fertilization process. According to Hafez and Hafez (2000), sperm spends a very brief time in the female tract in mammals, but can

remain much longer in the oviduct in hens and turkeys before fertilizing the egg yolk cell (up to 32 days in chickens and 70 days in turkeys). Spermatozoa will migrate from the SSTs to a second storage location (sperm nests) at the junction of the magnum and infundibulum in the upper section of the oviduct (Aisha and Zain, 2010). The entrance of an ovum into the infundibulum causes spermatozoa to be released from sperm nests for fertilization to occur (Aisha and Zain, 2010).

Timing of Insemination

In both artificially and naturally mated hens, the time-of-day insemination is performed has a major impact on fertility. The occurrence of hard-shelled eggs in the uterus of hens in the evening is uncommon. As a result, inseminations in the afternoon or evening produce higher fertility than those in the morning (Christensen and Johnston, 1977; Aisha and Zain, 2010). The presence of hard-shelled eggs in the uterus of hens at or near the time of AI results in a reduction in fertility. The majority of spermatozoa inseminated in chickens and turkeys within 1-3 hours after oviposition are removed by the contraction of the vaginal involved in the process of oviposition (Brillard and Bakst, 1990).

Dose and Frequency of Insemination

Egg fertility in domestic chickens is affected by the age of the bird, the number of sperm, and the type of hen either broiler or layer (Talebi et al., 2009). By the age of 52 weeks, turkey spermatozoa had lost 20% of their motility. According to these researchers, males who had AI between 32-35 and 39-42 weeks of age had better fertility rates than those who had it after 44-47 weeks of age (93.90 and 97.50 percent vs. 81.80 percent fertility respectively). The quality of male sperm has diminished throughout the course of 44-52 weeks. Semen quality was higher in 35–42-week turkey males than in 63–73-week turkey males (Slanina et al.,2015).Young chickens inseminated at weekly intervals with moderate sperm doses (125 million) had high fertility (93.3 percent), but large sperm doses (250 million) in old hens were unable to maintain fertility at a similar level to young hens(Brillard and McDaniel,1986). This indicated that older chickens had a higher incidence of sperm loss in sperm host glands than younger hens.

Factors affecting semen production in male chicken

The collection, quality, and fertility of birds' sperm are affected by their age, season, lighting schedule, body weight, diet, management, and spermatogenesis (Mohan et al., 2016). Individuals from different strains and breeds, as well as different poultry species, have inherent variances in semen production (Lake, 1983). With the exception of mammals, cockerel sperm is typically immotile before ejaculation (Hafez and Hafez, 2000). Various factors can influence sperm production (Anderson, 2001) and a thorough understanding of cockerel reproduction physiology is essential to appreciate male fertility. The male's sperm production can be influenced by a variety of external and internal factors. The pituitary, testes, and to some extent extrinsic factors influence male reproductive activities. External factors affecting cockerel reproductive efficiency can be divided into two categories: direct influence of diet, management, and normal physiological processes that regulate spermatogenesis, and factors that influence the degree to which the male will respond to the massage technique during semen collection (Maule, 1962).

Applicability of Artificial Inseminationin Poultry

Artificial insemination is a valuable approach to enhance the reproductive success of birds, especially broiler breeders and turkeys with low fertility due to their huge body weight. Despite the fact that AI is a well-developed technique in cattle, it is less so in poultry due to the lack of a standard method for storing poultry sperm for a lengthy period of time. Semen can be collected and utilized for insemination immediately using current processes, with or without dilution, utilizing semen diluents at a 1: 2 ratios. One cock's sperm can inseminate 5 to 10 hens, depending on the volume and concentration of sperm. The process of synthetic insemination entails vaginal eversion and semen deposition.Artificial insemination is used extensively with freshly collected semen. It is used more intensively for turkey breeding because mating is difficult due to large size. Freshly collected chicken semen was among the first type of semen to be frozen. However, cryopreserved poultry sperm are less fertile and freezing poultry sperm still is experimental. This procedure consists of collecting semen from males and inseminating into females. The major use of Artificial insemination is in heavy birds whose fertility is generally low under pen mating. It is also practiced when the layers are kept in cages.

Adopting artificial insemination. as well as service of a valuable male can be extended can increase fertility. The practice of Artificial insemination requires some training on the part of both operator and the male. It is a valuable technique in avian species. It is ordinarily practiced when the flock presents an apparent fertility problem. Better fecundity has been obtained by the use of artificial insemination, better in many instances, than that obtained by natural mating. The artificial insemination of domestic fowl is not widely used on commercial farms.

Merits of Artificial Insemination Over Natural Mating

Artificial insemination has long been viewed as a beneficial tool in the chicken industry (Benoffet al., 1981). One of the advantages of this technology over natural mating is the efficient use of males. As a result, the cost of artificial insemination is cut in half right away by reducing the number of cocks needed (Benoffet al., 1981). Artificial insemination may become effective in broiler breeder management and in resolving compatibility concerns if broiler breed fertility continues to diminish due to male selection for growth and compatibility issues between large and small breeds (Reddy, 1995). In addition to its breeding utility, artificial insemination is important in the prevention of venereal infections.

Artificial insemination can make the most of better male's services by using semen diluent, which is not achievable with natural mating. From an economic standpoint, diluents minimize the number of males necessary for artificial insemination, resulting in lower feed costs, as well as reduced space, maintenance, and operating costs. Natural mating limits the number of males to females to roughly 1:10, however artificial insemination allows breeders to serve 100 hens from a single male. Males were used more frequently as a result of this. Fresh sperm (5.34 x 109 sperm/ml) taken from a cockerel (0.5 ml) can be inseminated in to 70 hens every day following dilution with CARI diluent (1:6), giving 38 million sperm per dosage for synthetic insemination(Mohan and Sharma (2017). Fertility rates of over 90% or higher can be reached in these ways around 280 hens could be covered by using a single male on alternate days (four times a week), whereas natural mating preserved the cockerel to hen ratio at 1:8. In avian species, Artificial insemination produces more fertile offspring than normal mating (Mohan et al., 2016).Even though natural mating can result in good fertility, rates can be improved even more by including artificial insemination into the reproductive process (Gee et al., 2004). Because of the benefits of overall fertilization rate and hatchability, the cost per unit of day-old chicks hatched is reduced (Brillard, 2003). If avian artificial insemination approaches are expanded to endangered birds, similar benefits in terms of reproductive success can be envisaged.

Conclusion

Artificial insemination (AI) technology has allowed for the rapid spread of genetic material from a small number of exceptional males to a huge number of females in the chicken industry. To ensure the optimum fertility, the artificial insemination procedure in chickens requires exceptional quality semen that should be inseminated extremely close to the female's sperm storage tubules.Depending on the volume and concentration of sperm, one cock's sperm can inseminate 5 to 10 hens. Synthetic insemination can boost poultry fertility as compared to traditional mating. A clean semen sample of sufficient volume is required on a regular basis to execute artificial insemination correctly.Finally, assisted reproductive techniques have a wider use and the potential to reduce costs while increasing geometrically productivity and production in case of size difference between male and female chickens.

References

Anderson J (2001). The semen of animals and its use for artificial insemination. Green world publishers

Aisha, K. and Zain, U.A., 2010. Artificial Insemination in Poultry. *Department of Pathology, University of Agriculture Faisalabad, Pakistan*.

Benoff, F.H., Rowe, K.E., Fuquay, J.I., Renden, J.A. and Arscott, G.H., 1981. Effect of semen collector on semen volume and sperm concentration in broiler breeder males. *PoultryScience*, *60*(5), pp.1062-1065.

Burrows, W.H. and Titus, H.W., 1939. Some observations on the semen production of the male fowl. *Poultry Science*, *18*(1), pp.8-10.

Brown, H.B. and McCartney, M.G., 1983. Effects of dietary restriction on reproductive performance of broiler breeder males. *Poultry Science*, *62*(9), pp.1885-1888.

Brooks DE (1990). Biochemistry of the male accessory glands. In: Llamming, G.E (ed.), Marshall's Physiology of Reproduction. Reproduction in the Male. Edimburgh, UK: Churchill Livingstone; 2: 569-690.

Blesbois E, Seigneurin F, Grasseau I, Limouzin C, esnard JB, Gourichon D, Coquuerelle G, Rault P and Tixier-Boichard M (2007). Semen cryopreservation for ex situ management of genetic diversity in chicken: creation of the French avian cryobanks. Poultry Science, 86, 555-564.

Cole HH and Cupps PT (1977). Reproduction in domestic animals.3rd Ed. New York. Academic press. pp. 195.

Christensen, V.L. and Johnston, N.P., 1977. Effect of time of day of insemination and the position of the egg in the oviduct on the fertility of turkeys. *Poultry Science*, *56*(2), pp.458-462.

Donoghue, A.M. and Wishart, G.J., 2000. Storage of poultry semen. *Animal reproduction science*, *62*(1-3), pp.213-232.

Donoghue AM, Holsberger DR, Evenson DP and Froman DP (1998). Semen donor selection by in vitro sperm mobility increases fertility and semen storage in the turkey hen. Journal of Andrology, 19:295–301.

Etches RJ (1996). The male. Reproduction in poultry, 1st ed., RJ Etches, ed. Cab, 458, 208-233.

Gee, G.F., Bertschinger, H., Donoghue, A.M., Blanco, J. and Soley, J., 2004. Reproduction in nondomestic birds: physiology, semen collection, artificial insemination and cryopreservation. *Avian and Poultry Biology Reviews*, *15*(2), pp.47-101.

Gordon I (2005). Reproductive technologies in farm animals. CABI Publishing UK. Ch.1: 16-28.

Hafez B and ESE Hafez (2000). Reproduction in Farm Animals. 7th ed. New York. Lippincott Williams and Wilkins, USA.

Mohan, J., Sharma, S.K., Kolluri, G. and Dhama, K., 2018. History of artificial insemination in poultry, its components and significance. *World's Poultry Science Journal*, *74*(3), pp.475- 488.

Moultrie, F., 1956. A new technique for the artificial insemination of caged hens. *Poultry Science*, *35*(6), pp.1230-1234.

Maule JP (1962). The semen of animals and artificial insemination. Common Wealth Agricultural Bureau, England.

Lake PE and Stewart JM (1978a). Preservation of fowl semen in liquid nitrogen - an improved method. British Poultry Science, 19: 187–194.

Lake PE (1983). Factors affecting the fertility level in poultry, with special reference to artificial insemination. Agricultural Research Council, 39 (02): 106-117

Tingari, M.D., 1972. The fine structure of the epithelial lining of the excurrent duct system of the testis of the domestic fowl (Gallus domesticus). *Quarterly Journal of Experimental Physiology and Cognate Medical Sciences: Translation and Integration*, *57*(3), pp.271- 295.

Tingari, M.D., 1973. Observations on the fine structure of spermatozoa in the testis and excurrent ducts of the male fowl, Gallus domesticus. *Reproduction*, *34*(2), pp.255-265.

Nickel, R., Schummer, A., Seiferle, E. and Sack, W.O., 1977. Body cavities. In The viscera of the domestic mammals (pp. 2-20). Springer, New York, NY.

Nishiyama, H., 1955. Studies on theaccessory reproductive origansin the cocks.

Tingari, M.D., 1972. The fine structure of the epithelial lining of the excurrent duct system of the testis of the domestic fowl (Gallus domesticus). *Quarterly Journal of Experimental Physiology and Cognate Medical Sciences: Translation and Integration*, *57*(3), pp.271- 295.

Tingari, M.D., 1973. Observations on the fine structure of spermatozoa in the testis and excurrent ducts of the male fowl, *Gallus domesticus*. *Reproduction*, *34*(2), pp.255-265.

Rath, N.C., Huff, W.E., Balog, J.M. and Bayyari, G.R., 1996. Effect of gonadal steroids on bone and other physiological parameters of male broiler chickens. *Poultry science*, *75*(4), pp.556-562.

Reddy RP (1995). Artificial insemination of broilers: economic and management implications. In: Bakst, M.R

Slanina, T., Petrovičová, L., Miškeje, M., Kňížat, L., Mirda, J., Lukáč, N., Trandžík, J., Petrovičová, I. And Massányi, P. (2015) The effect of diluent, temperature and age on turkey spermatozoa motility in vitro, Journal of Applied Animal Research 43 (2): 131-136.

Senger PL (2003). Pathways to pregnancy and Parturition. (99164-6332) 2nd Ed. Pullman, Washington, US.

Parker, H.M., Yeatman, J.B., Schultz, C.D., Zumwalt, C.D. and McDaniel, C.D., 2000. Use of a sperm analyzer for evaluating broiler breeder males. 2. Selection of young broiler breeder roosters for the sperm quality index increases fertile egg production. *Poultry science*, *79*(5), pp.771-777.

Peters SO, Shoyebo OD, Ilori BM, zoje MOO, Ikeobi CON and Adebambo OA (2008). Semen quality traits of seven strain of chickens raised in humid tropics. International Journal of Poultry Science, 7: 949-953.

Quinn JP and Burrows WH (1936). Artificial insemination in fowls. Journal of Hered, 27: 31– 37.

Wishart GJ (1995). New approaches to evaluating male and female fertility. In: Bakst, M.R., Wishart, G.J. _Eds.., Proc. 1st International Symposium on the Artificial Insemination of Poultry. Poultry Science Association, Savoy, IL, pp. 207–223.

Zlotnik, I., 1947. The cytoplasmic components of germ-cells during spermatogenesis in the domestic fowl. *Journal of Cell Science*, *3*(3), pp.353-366.

Access this Article in Online

Website: www.ijarbs.com

Subject: Veterinary Sciences

Quick Response Code

DOI:10.22192/ijarbs.2022.09.02.010

How to cite this article:
Shambel Taye and Wondmeneh Esatu. (2022). Potential and Possibility of Artificial Insemination in Poultry: A Review article. Int. J. Adv. Res. Biol. Sci. 9(2): 90-97.
DOI: http://dx.doi.org/10.22192/ijarbs.2022.09.02.010