Acta Scientific Veterinary Sciences (ISSN: 2582-3183)

Volume 6 Issue 4 April 2024

Editorial

# Anti-Müllerian Hormone (AMH): A Candidate Endocrine Marker for Fertility Assessment Programme in Farm Animals

**Avijit Haldar***

*ICAR-Agricultural Technology Application Research Institute (ATARI), Indian Council of Agricultural Research, Bhumi Vihar Complex, Block- GB, Sector- III, Salt Lake, Kolkata, India*

***Corresponding Author:** Avijit Haldar, ICAR-Agricultural Technology Application Research Institute (ATARI), Indian Council of Agricultural Research, Bhumi Vihar Complex, Block- GB, Sector- III, Salt Lake, Kolkata, India.

**Received:** September 28, 2023

**Published:** March 01, 2024



Fertility is a vital economic trait in the farm animals and an important measure for determining the animal's productivity. As a result, it is critical to understand the factors that influence fertility and provide an information on animal's reproductive life span. The common con¬cept of female reproductive life span assumes that the decline of reproductive potential or quantity and quality of oocyte/ follicle pool gives an estimation of age-dependent loss of female fertility. Ovaries suffer much more serious effects of aging than any other tissues of the female body. During the aging process, both the number and quality of the oocytes in the ovaries diminish and reach to a point beyond that no more viable offspring is produced with the cessation of the related endocrinological activities, entering the menopause in females. In women, menopause shows the complete termination of the reproductive life. However, menopause like stage has not been coined in livestock species.

There is an opinion of a fixed primordial follicle pool in ovaries called ovarian reserve to better understand ovarian aging. This ovarian reserve decreases gradually with increasing chronological age within expected ranges. The age-related reduction of ovarian follicular reserve is a major determinant of reproductive aging. However, the quantity of follicles and oocytes is highly variable throughout the reproductive life spans of females. Hence, it puts forward a challenge to appraise an individual female's reproductive poten¬tial for economic purpose in farm animals.

Initial follicular phase serum levels of follicle stimulating hormone (FSH), inhibin B, and estradiol are measured earlier to assess an individual's ovarian reserve. Age-related reduction in the number of oocytes leads to a decline in estradiol and inhibin B levels, as a result of which FSH levels rise. However, these markers indicate the classical hypothalamus-pituitary-gonadal feedback loop and therefore, are not independent of each other. Hence, the routine use of these hormones is not reliable for fertility assessment programme. Currently, it has been found that anti- mullerian hormone (AMH) secretion is proportional to the follicle population and is not dependent on other hormones, especially gonadotropins, and is expressed by granulose cells of pre-antral and early antral fol¬licles of ovary during the female reproductive life span at a constant level regardless of the cycle, making AMH a direct endocrine marker in assess¬ing the age-related decline of the ovarian follicular reserve.

AMH is a member of the transforming growth factor beta (TGF-β) family of growth and differentiation factors signalling through a BMP-like pathway, in the ovary. The molecular weight of AMH is 140 kDa, corresponding to 553-575 amino acids. It is a dimeric glycoprotein consisting of two identical subunits linked by sulfide bridges and characterized by the N-terminal dimer (pro-region) and C-terminal dimer (TGF-b domain). The AMH protein is encoded by the AMH gene which is located in chromosome 7 in cattle, horses and goats; chromosome 5 in sheep; chromosome 9 in buffalo; and chromosome 2 in pig. The AMH gene has been characterized in cattle, buffalo, sheep and goats.

The vast majority of studies on AMH have been documented in rodents and human. In female mammals, AMH shows a positive linear correlation to antral follicle count and represents a highly reliable endocrine marker of the ovarian follicular reserve. There is a promising use of AMH as an endocrine marker for ovarian follicular reserve, ovarian aging and ovarian responsiveness in assisted reproductive technology (ART) in the field of human reproductive biology. Unlike human beings, the reference range for AMH for defining the age of ovarian senescence and/ or ovarian functional status at any point of age in different livestock species is required. Circulating AMH concentration in young adult dairy heifers has been found to be a simple reliable biomarker to predict produc-

tive herd life and select good embryo donors in embryo production programs in dairy cattle. Since AMH levels are strongly correlated with the ovarian follicular reserve, serum AMH levels may a good candidate for the assessment of fertility potential in farm animals. Hence, estimation of AMH levels in animals can benefit the selection of animals. In addition, AMH may also be used as a diagnostic marker for ovarian functional disorders in domestic animals. Indeed, AMH levels are increased in women with polycystic ovary syndrome (PCOS); however, this question, with certain conditions, such as cystic ovarian syndrome, anoestrus, repeat breeding condition etc have not yet been studied in farm animals