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A nti-M u llerian hormone (AMH), also known as Mullerian inhibiting substance (MIS), is a glyco-protein of 140 kDa belonging to the transforming growth factor beta family, that is expressed only in the gonads (Cate et al., 1986). In contrast to other members of the family, which exert a broad range of functions in multiple tissues, the principal function of AMH is to induce regression of the Mullerian ducts during male sex differentiation at the time of embryonic development. In the ovary, AMH is of key importance. It inhibits the recruitment of primordial follicles into the pool of growing follicles, and it decreases the responsiveness of growing follicles to follicle-stimulating hormone (Durlinger et al., 2002).

Presently, AMH is the best endocrine marker of the ovarian follicular reserve in human, mouse, and recently it has been revealed that the AMH is also a reliable endocrine marker of the population of small antral gonadotropin responsive follicles in the cow (Rico et al., 2009). Over the past 10 years, attention has been focused on AMH in humans in the context of assisted reproductive technologies (ART). Numerous clinical studies have shown that, low plasma AMH concentrations are indicative of ovarian ageing and conversely, women with polycystic ovary syndrome have high AMH concentrations (Fallat et al., 1997). Presently, AMH is the endocrine marker that best predicts the number of oocytes retrieved in response to an ovarian stimulatory treatment in ART.

The development of a highly reliable test based on measurements of AMH concentrations in plasma for selecting cows that can produce high number of transferable embryos would represent an important advancement
in multiple ovulation and embryo transfer technology (MOET). In this perspective, the crucial question is the optimal time during the estrous cycle at which a blood test should be performed. However, changes in plasma AMH concentrations during the estrous cycle have not been assessed in the bovine species. The only data available concerning AMH endocrine levels during ovarian cycle have been obtained in the human species and that data remain controversial. Some studies have shown that no consistent fluctuations in AMH levels occur throughout the menstrual cycle (Hehenkamp et al., 2006 and La Marca et al., 2006), whereas other studies have reported higher AMH levels in the follicular phase (Sowers et al., 2010).

During the bovine estrous cycle, two to four sequential waves of terminal follicular growth occur, each producing a dominant follicle capable of ovulating, if luteal regression occurs, variations in AMH concentrations during emergence and regression of the follicular waves remain to be established (Fortune et al., 2001).

In cattle, circulating AMH concentration can help field veterinarians to predict antral follicular population (AFP) in the ovaries. In addition, studies performed in the last decade have also indicated that, cows with lower number of antral follicle counts have lower fertility (Mossa et al., 2012). Since, circulating AMH is an indirect measure of ovarian reserve, represented by the size of the ovarian follicle pool, later studies have explored the use of AMH to predict field fertility in cattle (Ribeiro et al., 2014; Jimenez-Krassel et al., 2015). However, the value of AMH on predicting field fertility may vary according to the type of reproductive management employed in the farm, since it appears that AMH was not associated to field fertility in cows breeding following the use of timed AI protocols (Ribeiro et al., 2014).

Anti-Mullerian Hormone is produced by granulosa cells of all primordial, primary, secondary follicles, as well as antral follicles up to 4 to 5 mm diameter and reflects the total number of healthy follicles within the ovaries. The function of AMH in females is to regulate or limit the recruitment of primordial follicles into folliculogenesis, by reducing the responsiveness to these follicles to follicle stimulating hormone. Anti-Mullerian hormone production decreases after antral stage follicles reach the 4 to 5 mm stage, allowing these follicles to regain responsiveness to follicle stimulating hormone and undergo final maturation (Visser et al., 2006).

However, the question arises as to how early in development, AMH can be measured as an indicator of fertility. Identification of heifers with low or high fertility at birth or weaning would be advantageous to producers for making management decisions. If measure of AMH at weaning could predict subsequent fertility, this would
not only reduce replacement heifer costs, but also identify less fertile heifers at an age that would allow their marketing as stocker-feeder cattle at a more optimal time.

Moreover, circulating concentrations of AMH are positively associated with number of follicles or antral follicle count (AFC), ovarian function and fertility. Approximately 25% of cows have a relatively low AFC and low AMH concentrations. Determination of AMH concentration in young adult dairy heifers may be a simple diagnostic method to predict herd longevity and that AMH may be a useful genetic marker to improve breeding schemes to enhance longevity of dairy cows. (Jimenez-Krassel et al., 2015). Although AMH concentrations are highly variable among animals, as per follicle numbers, there are day-to-day alterations in AMH concentrations, which are relatively static during reproductive cycles within individual heifers (Ireland et al., 2008), as also reported for cows. Anti-Mullerian hormone (AMH) is an endocrine marker that can help predict superovulatory responses to treatments administered to cows for embryo production. However, the optimal time of the estrous cycle at which a blood test should be performed for a highly reliable prognosis has not yet been established. In cattle, circulating AMH concentration can help field veterinarians to predict AFP in ovaries (Rico et al., 2009, 2011).

However, a number of recent publications and ongoing studies are in a pursuit to determine whether circulating levels of AMH are correlated with fertility. This review summarizes recent information concerning AFP and its association with AMH, and the possibility of utilizing AMH as a marker for reproductive technologies and ultimately to enhance cattle fertility (Baruselli et al., 2015).

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