CHAPTER 1

INTRODUCTION

Sheep is traditionally a poor man’s companion. It is most docile and earliest domesticated among farm animals for basic needs of food and clothing. Sheep are unique among domestic livestock as they are reared for a variety of purposes and can be maintained under diverse environmental conditions, utilizing uncultivable waste lands and weeds from fields. They contribute to the sustenance of man by supply of food and raw material for clothing. Certain breeds of Indian sheep possess qualities such as high resistance to diseases and resistance to heat and water stress, qualities that are not found in exotic breeds.

India has large and diverse genetic resources of sheep with third highest world sheep population of more than 65.06 million according to 19th Livestock census (Anonymous 2012). There are about forty well defined breeds of sheep in India, besides some lesser known breeds out of which Gaddi are found mostly in valleys of Himachal Pradesh and Jammu and Kashmir State. Total sheep population in Himachal Pradesh is 8,04,871 and of these 70 percent population is of Gaddi breed.

Gaddi sheep is one of the important livestock breed of northern temperate region of India. It is an old breed with obscure origin presumed to have descended from ancient Asiatic sheep and brought to this area by Gaddi tribes. This breed of sheep derives its name from the community that rears it. The animal is adapted to survive at high mountainous ranges with the altitude varying from 3500 to 5000 feet above mean sea level. The area is mostly cold and arid. The population is spread over Chamba, Kangra, Kulu, Bilaspur, Simla, Kinnaur and Lahaul and Spiti districts of Himachal Pradesh. They are economically important for the local tribes of this region who obtain hair (wool) and meat by rearing these animals.

Testis is a primary male sex organ performing both exocrine and endocrine functions. The knowledge of normal development of testes is very important, as it is essential for clinical evaluation of abnormalities in sexual differentiation in domestic animals. Any disturbance in the development and maturation can lead to low reproductive efficiency or even infertility in animals and may reflect as unrecognized defects in the histogenesis of male gonad during critical organizational periods. The differentiation of the testes is a complicated process and involves a number of different mechanisms at
various stages of development. Along with testis, the epididymis is essential for normal reproduction of mammals because sperms leaving the testis are incapable of fertilizing the oocytes (Amann et al. 1993). Testicular sperm lack motility and fertility, but they acquire these abilities by the time they reach the tail of the epididymis (Goyal and Williams 1991). The acquisition of these abilities by sperm depends upon their passage through a specific environment, which in turn is regulated by the absorptive and secretory activities of the epithelium lining the excurrent ducts of the testis (Turner et al. 1979).

The mammalian epididymis is a dynamic accessory sex organ and is comprised of several ductuli efferentes (vasa efferentia) and a long, coiled ductus epididymis. Grossly, it is divisible into three parts; caput, corpus and cauda. These three regions differ in structural and functional features: caput is mostly involved in fluid reabsorption and secretion of glycopeptides, corpus, where sperm maturation is completed and cauda, involved in sperm storage.

The epididymis is one of the least studied epithelial tubes, from a morphogenic perspective. It must undergo a highly coordinated succession of molecular events during development. The elongation and morphogenesis of the epididymal duct must be highly coordinated with its specialized function of providing an appropriate environment for sperm maturation (Joseph et al. 2009). In the available literature, most of the research on the epididymis has been reported during postnatal life in buffalo and prenatal work is limited to dog and bovine.

Reproductive efficiency of the animals is influenced by a number of environmental and physiological factors. Such factors may influence normal embryological differentiation of reproductive system which in future is detrimental for reproductive performance. The developing foetus is surrounded by the amniotic fluid compartment and is connected with the allantoic sac via the urachus and placental vasculature and receives nutrient supplies mainly via the umbilical vein. Foetal fluids are important for physiologic exchanges between foetal and maternal tissues, so they are necessary for the efficient handling of foetal waste products and preventing mechanical shock to the developing foetus during entire gestation. Therefore, a broad knowledge of foetal fluids is of the utmost importance in understanding foetal metabolism and identifying pathological conditions during pregnancy.
The fertility can be increased to 100 per cent with three pronged approaches i.e. 30 per cent by improving reproductive management, 40 per cent by using modern reproductive tools and 30 per cent by control of reproductive diseases (Agarwal 2004). Out of all these factors the first one can be achieved by studying the sequential developmental processes during embryonic life.

The research work done on the prenatal development of testis and epididymis of Gaddi sheep is scanty; so, keeping in view the paucity of scientific literature, the present research work is proposed on the testis and epididymis of Gaddi sheep foetii with the following objectives:

- To study gross anatomy of testis and epididymis at different stages of prenatal life in Gaddi sheep.
- To study histogenesis and organogenesis of testis and epididymis in prenatal period.
- To establish the histochemical status of testis and epididymis of Gaddi sheep during prenatal life.