

# **A Case Report of Congenital Ventricular Septal Defect in a Newborn Holstein Calf**

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## **ABSTRACT**

The ventricular septal defect is the most common congenital cardiac defects in sheep, cattle and horses. It occurs frequently as a subaortic defect. Echocardiography is a rapid and noninvasive method for evaluation of cardiac congenital disease in animals. This diagnostic technique that can provide a wealth of helpful information including the size and shape of the heart, its pumping strength and the location and extent of any damage to its tissues. It is especially useful for assessing diseases of the heart valves, as it reveal abnormalities such as poorly functioning heart valves. A newborn female calf in a farm of dairy cattle found dead. It was stated that the calf had survived for only 4 hours. No pathological findings were observed upon general examination. In necropsy, most evident signs in necropsy were mild hypertrophy of heart with abnormal shape and pulmonary congestion.

**Keywords:** Dairy cattle, Heart, Holstein calf, Congenital cardiac defects

Congenital cardiac defects in large animals can occur alone or in combination [1,2]. The frequency of cardiac malformation is 2.7% in calves, but ventricular septal defect (VSD) is one of the most important cardiac abnormalities and congenital cardiac defects in sheep, cattle and horses [3,4]. They are almost invariably subaortic defects occurring high in the septum at the pars membranaceae. In the absence of other defects their presence results in the shunting of blood from the left to the right ventricle, producing a volume load on the left ventricle and left atrium [5]. The clinical signs of an isolated VSD vary and depend on the size of the defect, direction of the shunted blood, and presence of concurrent valvular or myocardial disease. In isolated VSD the blood flow is shunted from the left ventricle to the right ventricle through the defect in the interventricular septum. The size of the shunt depends on the size of the defect and the pressures in the left ventricle, right ventricle, and pulmonary artery. VSD is suspected when there is a loud, harsh, plateau-shaped. Pansystolic murmur with its point of maximal intensity (PMI) in the tricuspid valve area, and a slightly softer, more crescendo-decrescendo holo systolic murmur that is loudest in the pulmonic valve area. The murmur on the left side has its PMI in the pulmonic valve area, associated with a relative pulmonic stenosis [6].

In May 2014, a newborn female calf in a farm of dairy cattle found dead. It was stated that the calf had survived for only 4 hours. The owner stated that no complications had been seen during the birth and the calf had been delivered without help. The mother cow had not been suffering from any disease. This was her first pregnancy and normal procedures were observed during the pregnancy. However, the calf could not stand up and had respiratory distress. No pathological findings were observed upon general examination. In necropsy, most evident signs in necropsy were mild

hypertrophy of heart with abnormal shape and pulmonary congestion. Tissue samples were collected for histopathological examination. During the dissection and examination of the heart, the ventricular septal defect was found. The vascularization of the heart was normal. The defect was measured as 15 × 25 mm (Figure 1).



Figure 1. The heart of a Holstein-Friesian calf with the ventricular septal defect (VSD).

In the development of the heart these communications are localized between the atria, the ventricles, and the great vessels [2]. The separation of the left and right ventricles is completed by 3 parts of the embryonic heart: the muscular portion of the septum, the downward growth of the conotruncal ridges, and the membranous portion of the septum derived from the endocardial cushions [3]. Defects can be related to defective development of any of the 3 parts. VSDs are usually single but may be multiple, and most commonly involve the membranous septum. This type of VSD is termed paramembranous or perimembranous, as they exceed the bounds of the membranous septum and involve a muscular defect at their periphery; they may also be referred to as subaortic or infracristal. Less common sites of VSD are subpulmonary (infundibular, conal, supracristal), below the septal leaflet of the right AV valve, or in the muscular portion of the ventricular septum toward the apex of the heart. There is insufficient information on the advisability of breeding animals that have this defect. An inheritable predisposition has been suspected in Hereford cattle, and chromosomal abnormalities have been demonstrated in association with this defect in cattle. Most commonly as an isolated defect, VSD is also seen as part of a number of other defects, such as tetralogy of Fallot or persistent truncus arteriosus. There appears to be a high incidence of spontaneous postnatal closure of small VSDs in humans, and a similar phenomenon has been reported in dogs. The presence of a VSD has no deleterious effect on the fetus because left and right ventricular pressures are equal, and there is therefore little flow across the defect [3].

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