

## Vet 408: Cardiac Cycle

Phase	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5	Phase 6	Phase 7
Characteristic	Atrial Contraction	Isovolumic Contraction	Rapid Ejection	Reduced Ejection	Isovolumetric Relaxation	Rapid (early) Filling	Reduced Filling (diastasis)
When	End of diastole	Start of systole	Systole	End of systole	Early diastole	Diastole	Diastole
ECG	Follows P wave	QRS	Between QRS-T	Starts during T wave	Silent	Silent	Silent
Valves	AV valves open SL valves closed	AV valves closed SL valves closed	SL valves open	SL valves open (less blood is leaving) AV valves closed	All valves closed *Closure of SL valves causes the second heart sound	AV valves open	AV valves open
Heart Sound	S <sub>4</sub>	S <sub>1</sub>	Silent	Silent	S <sub>2</sub>	S <sub>3</sub>	Silent
Filling	Contributes 10-40% of ventricular stroke volume	Ventricles are at peak volume Where you would measure end-diastolic volume	Ventricular volume decreasing Biggest drop in volume Total volume ejected is the stroke volume		Ventricles are at their smallest volume (end systolic volume)	Rapid filling from atria to ventricle, rapid rise in ventricular volume	Blood flowing from atria to ventricles nearly stop because they are 80-90% full
Pressure	Slight increase in atrial pressure Atrial and ventricle pressure are roughly the same	Blood is in the ventricle and pressure is rising Atria have a slight rise in pressure	Aortic pressure and ventricular pressure are about equal	Aortic and ventricular pressure are decreasing and aortic pressure slightly > ventricular pressure. Atria are filling so pressure increases	Ventricular pressure is less than the aortic pressure	Atrial pressure exceeds ventricular pressure	Atrial pressure slightly exceeds ventricular pressure
Clinical Example or Additional Info	Equine with atrial fibrillation *Exercise intolerance	Papillary muscles are also contracting	Flow murmur if abnormal	Subaortic stenosis (SAS) Ventricle has to push blood out of the obstruction created by the ridge. LV needs to reach a high pressure to send the blood out leading to left ventricular wall thickening	Active ventricular relaxation begins Ca <sup>2+</sup> is re-sequestered in SR via SERCA  Atria are full	Dilated cardiomyopathy S <sub>3</sub> gallop sound implies increased LV end-diastolic pressure (over-distended, poorly compliant ventricle)	