Cover crops over the longterm may increase soil organic matter, soil and plant health and crop productivity. Two research trials were initiated in 2007 and 2008 to ultimately look at the long term affect of cover cropping in a vegetable rotation. The objectives of this project were to look at how different cover crops impact processing tomato yield, quality, profit margins, insect and disease pressure, and soil health. The cover crops planted after spring wheat were 1) oat, 2) fall rye, 3) oilseed radish, 4) mix of oilseed radish and rye, and 5) no cover crop control. Results from one year indicate that the cover crops did not influence processing tomato quality (Agtron colour, pH or soluble solids). None of the cover crops tested had any negative effects on the incidence or severity of common pests (bacterial spot, bacterial speck, bacterial canker, Colorado potato beetle, tomato hornworm, and stink bug) when tested under a typical commercial spray program. Marketable processing yield was on average 36 ton/ac for the early variety (TSH 18) and 52 ton/ac for the late variety (cc337). Oilseed radish + fall rye mix yielded (marketable and total) statistically higher than fall rye (5 t/ac difference) but no cover crop treatment was different than the no cover crop control. Both varieties followed the same trend but differences between cover crops were more pronounced with the late variety compared to the early variety. Similar to yield, economic analysis showed highest profits with oilseed radish+fall rye and lowest with fall rye, but none of cover crops tested were statistically different than the no cover crop control. Therefore, based on results from one year, economics should not be a limiting factor to planting a cover crop because the profit margins took into account custom planting and control of the fall rye in the spring. These results were observed on a site with healthy, good tilth soil (sandy loam, OM 3.5%), perhaps greater differences would be observed on degraded soils. Also, one might expect long term benefits to planting cover crops; these effects were seen after the third year of cover cropping.