We employ non-equilibrium molecular dynamics simulations to investigate the behaviour of a simple model liquid crystal exposed to a laminar flow field and illuminated by a laser beam. The laser model accounts only for the two most important effects: local heating and polarisation of the sample. Because of a highly non-linear coupling between the flow and the laser field we observe regions of substantial biaxiality. The biaxiality can be ascribed to the emergence of a second symmetry axis besides the nematic director which is the axis of rotation of the molecules caused by an optical torque due to the laser.