A multivariate spline is a piecewise polynomial in several variables defined on some simplicial partition of a polyhedral domain. The polynomial pieces are joined together along the faces of the partition to ensure some degree of required global smoothness. We show that many spaces of multivariate splines possess additional smoothness (supersmoothness) at certain faces. This type of additional smoothness is neither imposed explicitly nor is reflected in the standard description of these spaces. This phenomenon affects the dimension and interpolating properties of splines spaces. The supersmoothness is caused by certain geometric properties of the underlying partition. (Received January 23, 2012)