We present the results from stable isotope labeled precursor feeding studies combined with ultrahigh performance liquid chromatography-high resolution mass spectrometry for the identification of labeled polyketide (PK) end-products. Feeding experiments were performed with $^{13}$C$_8$-6-methylsalicylic acid (6-MSA) and $^{13}$C$_{14}$-YWA1, both produced in-house, as well as commercial $^{13}$C$_7$-benzoic acid and $^2$H$_7$-cinnamic acid, in species of *Fusarium*, *Byssochlamys*, *Aspergillus*, and *Penicillium*. Incorporation of 6-MSA into terreic acid or patulin was not observed in any of six evaluated species covering three genera, because the 6-MSA was shunted into (2Z,4E)-2-methyl-2,4-hexadienedioic acid. This indicates that patulin and terreic acid may be produced in a closed compartment of the cell and that (2Z,4E)-2-methyl-2,4-hexadienedioic acid is a detoxification product toward terreic acid and patulin. In *Fusarium* spp., YWA1 was shown to be incorporated into aurofusarin, rubrofusarin, and antibiotic Y. In *A. niger*, benzoic acid was shown to be incorporated into asperrubrol. Incorporation levels of 0.7–20% into the end-products were detected in wild-type strains. Thus, stable isotope labeling is a promising technique for investigation of polyketide biosynthesis and possible compartmentalization of toxic metabolites.