The purpose of this work is to study the dose enhancement by a thin foil of high-Z material in a phantom, and to explore its potential clinical application to boost vaginal mucosa during external beam treatments. EGS4 Monte Carlo was used to calculate the perturbations on beam spectra produced by the foils and dose enhancement effects of photon-beam quality, beam incident angle, atomic number (Z) and the thickness and size of the foil. Measurement was performed to validate the EGS4 results. Calculations for a variety of foils and high-energy photon beams show that dose enhancement (a) increases with Z up to 82 (Pb); (b) decreases with foil thickness when the foil thinner than a certain value (1 mm for lead foil for 15 MV); (c) decreases with incident photon-beam energies; (d) changes slightly for beam incident angles less than 45^0 and decreases more prominently for larger angles; and (e) increases with size of foil. The dose enhancement for a water-equivalent cylindrical applicator, encapsulated by a 1-mm-thick lead foil, is calculated in a 360^0 rotational field and in a four-field-box. A 38% enhancement was obtained at 0.25 mm and 18% at 2 mm from the applicator. Further pathological and clinical study will be required to determine whether this degree of dose enhancement will be clinically useful.