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For a cyclic  $p$ -extension of fields  $E/F$  where  $F$  contains a primitive  $p$ th root of unity, we determine the  $\mathbb{F}_p[\text{Gal}(E/F)]$  module structure of  $H^m(G_E, \mathbb{F}_p)$  in terms of the field extension  $E/F$ . We apply this to determine restrictions on the group structure of an absolute Galois group  $G_F$  (with Dave Benson) and to determine the cohomological dimension of the maximal pro- $p$  quotient  $G_F(p)$  (with John Labute). (Received January 09, 2007)