Pediococcus pentosaceus BT520 exhibited a good characteristic as probiotic of black tiger shrimp. A development of commercial growth medium for high cell production at industrial scale was studied. Various digested and non-digested by-products from food industries including amino acid by-product (AABP), digested brewer's yeast (DBRY), digested fish soluble (DFS), digested defatted soybean (DDSBB) and digested whey powder (DWP) were combined in pairs to replace protein components in the standard MRS medium. These were very promising substitutes for costly proteose peptone, meat extract and yeast extract. All protein sources functioned as nitrogen source (N-source) and/or growth promoting factor (GPF). AABP was only a N-source, whilst DBRY, DFS, DDSBB and DWP acted not only as GPFs but also as good N-sources. When comparing among medium formulas comprising the same quantity of total nitrogen, the remarkable cell concentration and cost efficiency (cfu/baht) were yielded from the formula containing DBRY+AABP. The optimum ratios of GPF : N-source : C-source in the formula with DBRY+AABP were further determined. Molasses appeared to be a potential carbon source. The maximum cell number derived from this developed medium was $1.7 \times 10^{10}$ cfu/ml and the medium cost was decreased by 16.5-fold compared with the MRS medium. This developed medium was also able to apply with other lactic acid bacteria.