$$Y^\vee \xrightarrow{\;\mathrm{ru}_Y^{-1}\;} Y^\vee \otimes \mathbf{1} \xrightarrow{\;\mathrm{id}_{Y^\vee} \otimes \mathrm{coev}_X\;} Y^\vee \otimes (X \otimes X^\vee)$$

$$\xrightarrow{\;\mathrm{as}^{-1}\;} (Y^\vee \otimes X) \otimes X^\vee \xrightarrow{\;(\mathrm{id}_{Y^\vee} \otimes f) \otimes \mathrm{id}_{X^\vee}\;} (Y^\vee \otimes Y) \otimes X^\vee$$

$$\xrightarrow{\;\mathrm{ev}_Y \otimes \mathrm{id}_{X^\vee}\;} \mathbf{1} \otimes X^\vee \xrightarrow{\;\mathrm{lu}_{X^\vee}\;} X^\vee$$