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**Fig.S1** Two undirected networks involving 29 metabolites in ripe tomatoes. Nodes denote metabolites. Edges represent the strong symmetric associations between nodes. Both (A) and (B) are learnt by LBNS + StARS. The variability threshold used in StARS to construct (A) is 0.05 while the threshold used to construct (B) is 0.1.

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**Fig.S2** Two undirected networks involving 24 sensory traits in ripe tomatoes. Nodes denote sensory traits. Edges represent the strong symmetric associations between nodes. Both (A) and (B) are learnt by LBNS + StARS. The variability threshold used in StARS to construct (A) is 0.05 while the threshold used to construct (B) is 0.1.

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**Fig.S3** Four undirected networks involving 29 metabolites or 24 sensory traits in ripe tomatoes. Nodes denote metabolites in (A) and (B), and sensory traits in (C) and (D). Edges represent the strong symmetric associations between nodes. All four graphs are learnt by the PC-skeleton algorithm, where the significance level of conditional independence tests used to construct (A) and (C) is 0.01 and the one used to construct (B) and (D) is 0.05.

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**Fig.S4** Three networks regarding the relationships between 29 metabolites, brix and 24 sensory traits in ripe tomatoes. Blue, green and lavender nodes are used to distinguish between metabolites, sensory traits and brix. Edges in (A) and (B) are, respectively, learnt by LBNS + StARS (variability threshold set at 0.1) and the PC-skeleton algorithm (significance level of 0.05 for conditional independence tests). Edges in (C) are learnt by the Lasso + SS (where explanatory variables selected over 77.6% of 100 half-sized subsamples are returned for each response variable). Particularly, black edges highlight strong dependencies between metabolites and sensory traits (some via brix), where the bold black edges are consistent in (A) and (B).

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**Fig.S5** Two correlation networks involving 29 metabolites or 24 sensory traits in ripe tomatoes. Nodes denote metabolites in (A) and sensory traits in (B). Edges represent the significant pairwise Pearson correlations (the p-value associated with the t-test < 0.05) between the nodes. Solid and dashed edges indicate positive and negative correlations, respectively.