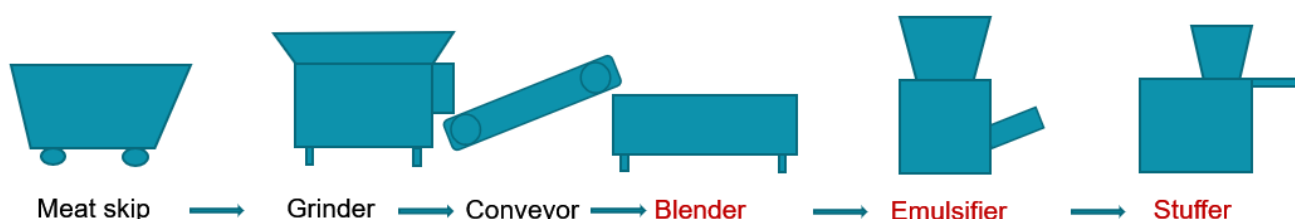


Case Study

Jack wished to quantify the Hang Up for each piece of equipment in a sausage manufacturing plant, so that he could do a VITAL risk assessment and obtain the labelling outcomes for the allergens.

He began by mapping out the equipment used, as shown in the diagram below.



Meat was the only ingredient used in the meat skip, grinder and the conveyor. Other ingredients such as stabilisers, seasoning, and additives were used with meat in the blender, emulsifier and stuffer.

There were two sausage recipes, both had the same key ingredients (meat, stabilisers, additives) however the seasoning blend was unique to each recipe. Jack summarised the allergen information for each recipe in the table below. He used information from the seasoning blend suppliers to record the quantity of added allergenic ingredient, and its protein content.

Allergens present	Wheat	Soy	Milk
Sausage recipe 1 containing 30% seasoning blend A	Seasoning blend A contains 20% added wheat flour which contains 10.8% protein	No	Seasoning blend A contains 10% added skim milk powder which contains 36.3% protein
Sausage recipe 2 containing 30% seasoning blend B	Seasoning blend B contains 20% added wheat flour which contains 10.8% protein	Seasoning blend B contains 5% added hydrolysed soy protein which contains 90% protein	No

Jack did not need to quantify the Hang Up for the meat skip, grinder, or conveyor because these pieces of equipment did not come into contact with ingredients that contained allergens. He confirmed that this will always be the case by reviewing the Standard Operating Procedures that were set up to segregate ingredients with allergens from these pieces of equipment.

When Jack inspected the blender, emulsifier and stuffer he realised that all three were Hang Up points. That is, if sausage recipe 1 was run through these pieces of equipment, followed by sausage recipe 2, residue from the first recipe would distribute into the second recipe.

Hang Up is the residue or material that has accumulated at a hang up point that can become distributed into a subsequent product. It represents all forms of environmental cross contact.

A **Hang Up Point** is a specific area (point) within processing equipment on a manufacturing line where material may accumulate instead of flowing through freely.

Calculating the quantity of readily dispersible cross contact in the blender

The concentration (parts per million) of each allergen in a processing profile can be determined by dividing the total protein from a cross contact allergen present in the Hang Up by the minimum possible batch size (kilograms). Note: milligrams per kilogram (mg/kg) and parts per million (ppm) are equivalent concentration units.

Information required for VITAL assessment of cross contact due to processing of Sausages	
The processing profile	Blender – 300kg batching process Sausage batching (combining ground meat, stabilisers, seasoning, and additives)
Nature of the allergen	The blender combines the ground meat and the powdered dry ingredients homogeneously. Therefore, the allergens in the Hang Up behave as a readily dispersible form.
Quantity of Hang Up	After the blending step was complete, the blender was emptied. Jack physically scraped out and weighed the residue that remained in the emptied blender. Jack determined that the maximum amount of post blending residue was 5kg.
The percentage of the allergen component within the Hang Up	As the quantity of wheat flour is the same in both seasoning blends, and will be intentionally added to both sausage recipes, Jack did not include wheat flour as part of his assessment. Sausage recipe1 contains 3% skim milk powder (10% of 30%) Sausage recipe 2 contains 1.5% hydrolysed soy protein (5% of 30%)
The percentage of protein within the allergen component of the Hang Up	Total protein in skim milk powder 36.3% (source: seasoning supplier) Total protein in hydrolysed soy protein 90% (source: seasoning supplier)
Batch size exposed to the Hang Up (minimum possible batch size (kilograms))	300kg Jack noted that batch sizes were always 300kg however if the batch size was smaller some time in the future, the concentration will have to be recalculated.

Calculation of the cross contact allergen concentration (the amount of milk protein in ppm) from Sausage recipe 1 from the blender

 Concentration of cross contact (ppm) =

Protein level of cross contact allergen (%)	X	Amount of allergen ingredient in formulation of product in Hang Up (%)	X	Amount of Hang Up (g)	X	1000
Batch size exposed to Hang Up (kg)						

Total protein of the skim milk powder 36.3%

Sausage recipe contains milk powder added at 3%

Quantity of sausage recipe in the blender as Hang Up 5kg (5000 g)

Batch size exposed to Hang Up is 300kg

$$(0.363 \times 0.03 \times 5000 \times 1000) / 300 = 181.5 \text{ ppm}$$

When calculating the concentration of cross contact allergen in processing step (or piece of equipment), it is important to sum the outcomes from each processing step to obtain the total cross contact from processing in a finished product. For example, if the blender, emulsifier and the stuffer were all batch processes, also calculate the concentration of allergen cross contact, using the logic above, for the emulsifier and the stuffer and sum the outcomes.

The complexity with a sausage set-up is that it can be partially continuous. For example, the emulsifier may be used continuously using batches taken directly from the blender. If cross contact occurs homogeneously for a period of time after changing from recipe 1 to recipe 2 after which there is no residue, and the quantity of recipe 2 that contains some of recipe 1 can be quantified, this would be considered the batch size exposed to Hang Up. However, it may be difficult to quantify this confidently.

If that is the case, control allergen cross contact by other means such as cleaning thoroughly between recipes, reformulating the recipe with seasoning blends that have no or aligned allergens, or scheduling in a different order.