

Technical rules for assessing carry-over in delivery trucks

These simple technical rules were developed as part of a study programme led by Tecaliman, and funded by the association and the DGAI (French Directorate of Food).

The rules were established based on the results of this study, summarised in i'Tec_H7 and presented in more detail in l'Doc T8.

By way of introduction to these rules, it is useful to review certain study conclusions:

- Flushing between batches, especially after at-risk batches, is a vital preventive measure in the fight against carry-over.
- Medicated feedstuff transport is made safe by using newer trucks.
- Inter-box carry-over proved to be generally insignificant. The study demonstrated that this type of carry-over could be dealt with by visually checking the internal cleanliness of the boxes after a delivery of animal meal.

In our opinion, performing an assessment according to the technical rules described in this datasheet is only necessary in the following cases:

- If there is doubt over carry-over limitation in a given truck, particularly where older trucks are involved
- If making an assessment prior to modifying a machine or amending a procedure that may be followed by another assessment following completion of said work on the machine or amendment of the procedure.

The results of the study suggest that it is not necessary to test all the machinery on a regular, annual basis.

Given the simplification of the method developed at the end of the study, it is likely that a test would not take longer than 1 1/2 hours to perform.

1. Focus

Assess maximum possible carry-over between two batches delivered in succession by the same delivery truck.

2. Principle

One tracer batch and one collector batch were

produced, loaded into a delivery truck and then unloaded one after the other into another truck. Samples were used to assess the level of carry-over between successive batches.

3. Apparatus

3.1. Tracer

The tracer was selected under conditions like those of the method developed for animal feed plants. An external tracer may be used.

3.2. Feedstuff

Two batches of animal meal were used with the aim of estimating the highest possible level of carry-over.

3.3. Plant

Each plant manufactured two batches of animal meal. This manufacture had to be carried out, in order to minimise the amount of carry-over in these batches at the plant.

3.4. Truck

The truck had to be tested under the use conditions that matched standard practice or according to the test objective. Batch size was dictated by the size of the boxes closest to the tractor.

4. Method

4.1. Plant manufacture

The collector batch was produced before the tracer batch in order to minimise the risk of in-plant carry-over.

The use of an external tracer limits the risk of carry-over from another feedstuff processed at the plant during the same period.

Both batches may be run past the same cell one after the other. In this case, it is likely that the tracer batch will be diluted by collector batch residues in plant circuits. Therefore, despite the possibility of differing loading rates which could impact on sampling times, it would be preferable to use two loading cells.

4.2. Loading

The collector batch was loaded before the tracer

batch, and placed in the box closest to the tractor. An aggregate sample of this batch was taken at the time of loading. This sample must contain approx. 30 increments (primary samples).

A cover was placed on top of the collector batch receiving box, in order to minimise the risk of carry-over at the time of loading.

The identically sized tracer batch was then loaded into the second box. No sample was taken.

The weights of the batches placed in the boxes were recorded.

4.3. Batch transit in the truck

The tracer batch was "delivered" first. An aggregate sample of this batch was made up on delivery. This sample must contain approx. 30 increments (primary samples).

The delivery time was measured.

A flushing procedure may be implemented if this is standard practice when using this truck. The result of the flush can be collected and analysed.

Next, the collector batch was "delivered". The delivery time measurement taken with the tracer batch was used to determine the sampling time for the collector batch, in order to recover the first 200 kilogrammes.

After recovering the head sample from the collector batch, the remainder of the batch was unloaded without sampling. The sample was then weighed.

Increments from this final test portion may be used to make up an aggregate sample, used to check that this part of the batch is free of tracer.

A flushing procedure may be implemented after throughput of the collector batch if this is standard practice when using this truck. The result of the flush can be collected.

4.4. Processing the samples

At least three aggregate samples were obtained:

- Collector batch at plant output
- Tracer batch at truck output
- Collector batch head sample at truck output

Each sample was divided to bring it into line with the size of a test portion.

Practical recovery of the first 200 kilogrammes of collector batch and make-up of a representative sample of this mass was definitely the trickiest part of the protocol. It was possible to obtain a representative sample by making successive divisions (see i'Tec_H10).

4.5. Analyses

A tracer analysis was performed on all 3 samples and, where necessary, on the representative flushing samples.

4.6. Processing the results

Where:

- M: total weight of the loaded collector batch

- m: weight of the collector batch head sample at truck output
- [t]: tracer concentration in the tracer batch at truck output
- [csu]: tracer concentration in the collector batch at plant output
- [csc]: tracer concentration in the collector batch head sample at truck output

Median batch carry-over, C_{ca} , that evaluates maximum carry-over between two batches delivered in succession by the same delivery truck, was computed using the formula.

$$C_{ca} = \frac{([csc] - [csu])}{[t]} \times \frac{m}{M} \times 100$$

5. Conclusion

The level of carry-over recorded in the delivery trucks was extremely low; this type of measurement can be reserved for one-off surveys.

Carry-over can be controlled without referring to test results, by setting up procedures such as:

- Choosing to place at-risk batches in rear boxes, in order to minimise the length of the circuit,
- Managing inter-batch incompatibilities,
- Making sure that flushes are performed where necessary,
- Upgrading older trucks
- Auditing proper application of the procedures.

6. Bibliographic references

Tecaliman 2003, l'Doc_T8 – Development of a methodology for the evaluation of cross-contamination by additives in a feed delivery truck.

l'Tec_H10, 2003 - Determining the mean concentration of tracer in a batch of heterogeneous animal feed.

l'Tec_T7, 2003 – Results of delivery truck carry-over assessments.