EUROPEAN CODE OF GOOD PRACTICE FOR FEED ADDITIVES AND PREMIXTURES

ANNEX 4 – GUIDANCE ON HOMOGENEITY

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ANNEX 4: GUIDANCE ON HOMOGENEITY

1. INTRODUCTION
A homogenous mix is attained when all of the ingredients in a product are present, in the same ratios they were added, throughout the product. This is an important concept as a processing run that is not homogeneous may result in an overdose of additives in some instances and an under-dose in others, both of which can be dangerous to animals and the consumer.

2. PREVENTION
To prevent ingredient segregation, the following criteria must be taken into account:
- the particle size, shape and distribution;
- the design of the process line including extraction points and air lines;
- mixing time, overfill or apparatus failing to move ingredients through the mixing area such as gaps between mixing paddles and the mixer wall.

3. WHERE HOMOGENEITY CAN BE AN ISSUE?
The above problems are all commonly found in most processes. Common areas where they occur are:
- equipment vibration;
- electrostatic hang up;
- changes in air pressure;
- free fall through or from equipment;
- angle of repose, funnelling;
- dust collection points.

4. TO OVERCOME HOMOGENEITY ISSUE
Ways to overcome these problems:
- use ingredients with a uniform particle size and density;
- training to ensure there is no overfilling, good accuracy at addition points, weighing, calibrations, etc;
- adjustment of paddles to operate as close to mixer walls as possible and replacement of worn parts;
- changing the addition rates to re-blend fine ingredients and moving the addition point as close to the mixer as possible;
- reduce possibilities for further segregation between processing and packaging.

5. HOW TO TEST HOMOGENEITY?
How to test for a homogenous mix and/or segregation:
• repeatedly sample the mixture as close as possible after the mixture and/or at the point of packaging;
• test for chemical characteristics that should be exhibited when well mixed (tracers can be used that are anyway part of the mix or specifically be added);
• Microtracers with a predefined number of coloured iron particles can be used as well, and be used according to the instructions of the supplier.

6. **Coefficient of Variation**

Coefficient of Variation:
- As a guide, a CV of less than 5% is desirable with respect to homogeneity of additive mixtures.
- This CV will be highly depending on the inclusion rate and the particle size of the included additives, as well as the used carriers and equipment.
- Operators should establish an acceptable limit for CV based on scientific research and in consideration of specific mixers (refer to HACCP Principles).
- Depending on the inclusion in the mix, different CV levels could be established.

7. **An Example of Procedure**

This is an example of a procedure that can be used to determine the efficacy of blending to ensure that all ingredients are uniformly distributed:

1. Determine the product to be tested. Use a product that has an ingredient that can be tested with a high degree of accuracy. Tracers such as Zn or Mn can be used.
2. Take and test retention samples of each raw material before production commences.
3. Mix the raw materials in accordance with normal procedure.
4. When the mixing is completed and packaged (but not sealed) samples should be taken from throughout the batch to check for consistency. A sample must be taken from the first bag of product made and regularly thereafter.
5. Each retention sample must be tested for the active ingredients and results recorded.
6. The efficacy of the mixing process should be determined by calculating the standard deviation and coefficient of variation of the results.
7. Records of testing should be maintained in accordance with documented procedures.