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Current and future status of the application of liquids in the feed industry (industrial logistics)

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SUMMARY - Liquid application in the modern feedstuffs industry. Present condition of both aspects: macroliquids and microliquids. Technical applications and inherent problems of different technologies. Liquids of the future: Some vitamins, some medicines and their specific problems. Equipments according to the injection point. Specific problems. Security in application. Preventive measures for human safety.

Key words: Liquids, macroliquids, microliquids.

RESUME - *"Situation actuelle et future des applications des liquides dans l'industrie des aliments composés (logistique industrielle)". Applications des liquides dans l'industrie moderne des aliments composés. Situation actuelle concernant deux aspects : macroliquides et microliquides. Applications techniques et problèmes inhérents aux différentes technologies. Liquides du futur : quelques vitamines, quelques médicaments et leurs problèmes spécifiques. Equipements selon le point d'injection. Problèmes spécifiques. Sécurité dans les applications. Mesures de prévention pour la sécurité des personnes.*

Mots-clés : *Liquides, macroliquides, microliquides.*

For some time now, liquids have been added to our feeds. This is an increasing trend and techniques are constantly being refined, making it possible to add larger quantities of some liquids (e.g., to expand) and increase the number of additives due to greater precision in the additions.

Two majors groups of liquid additives currently in use can be identified:

Macroliquids

Molasses, greases, oils, water, which hardly require discussion as you are more aware of the characteristics and problems than I am.

Microliquids

Substances used in small quantities, with distinct problems that depend on whether they are heat-sensitive or not and which require a more careful discussion since they are generally more expensive.

Depending on their temperature sensitivity, these substances must be added by mixer if they resist well or during post-pelleting after compacting or expanding, as appropriate, if they are very sensitive to high temperatures.

In this case, methionine, lysine, choline (mixer) and enzymes, probiotic and antifungal agents (post-pelleting) are currently used.

This situation could change quickly and work is currently being developed to add new substances in liquid form to feeds.

In the immediate future, such substances could include vitamins (particularly C, K_3, E), some medications (glycotropic gels) and pigments.

The criteria determining the use of new liquids will be price, elimination of the possibility of crossed contamination, cost of cleaning the material and technical inconveniences due to the physical characteristics of the substances. In this case, these products should always be added during post-pelleting.

Material

A variety of systems are used to add liquids by mixer, ranging from the well known oval wheel counter -which offers greater accuracy as the number of pulses per unit of volume increases (error minimization up to limits of 10 g/litre of additive)- to electromagnetic systems that include both the more expensive mass version needed when the liquid being measured is non-conductive and the much more affordable debimetric version that offers the same precision as the above unit when the liquid contains some water and, therefore, is conductive.

When adding these substances, several problems that could arise if the necessary precautions are not taken must be considered.

Extreme care must be taken with the injection itself, which must be done under pressure with a minimum open angle of 80° toward the injector mouths and monitoring of the place where the product contacts the feed in order to avoid staining walls, stirrers or paddles.

Another major factor to consider is the injection time. In order to guarantee proper injection and good dispersion, the substance should be injected in as little time as possible (the addition pump flowrate must be calculated based on the maximum quantity that may be added) to ensure addition during only the first minute of mixing so that at least two to four minutes are left to homogenize the blend well.

Material added during post-pelleting. Care must be taken in this area with the patents, since there are several patents concerning the application method and site.

Nevertheless, the most important technological problems in this technique stem from handling the two variables: flow and measure of the liquid to be injected and flow and measure of the granulate to be treated.

The granulate may be measured by weighing (impact scale, weighing belt, etc.) or by varying the outlet conveyor from the cooler hopper.

There are two solutions:

Variable granulate flow and based on this, variation of the quantity of liquid (a process that is hard to adjust and expensive) and the opposite solution with the cooler output hopper where small variations in the pellet flow can be made by varying the conveyor speed.

When adding liquid in the post-pelleting process, another factor to consider is the site location on the manufacturing diagram.

To make this decision, we recommend a case-by-case analysis since no two solutions are alike nor are two feed plants similar enough to require the same installation.

Lastly, advanced research has been conducted into the bulk addition of vitamin E in aqueous dispersion for the final fattening of broiler chickens and pigs to avoid an excess of vitamin premixes, among other advantages.

Finally, we recommend a safety factor for personnel handling or near the liquid injections since some substances may, at the very least, be allergenic.