

# Can you **keep feed clean?**

Preventing contamination requires vigilance from the point of manufacture through delivery.

Two years ago, the European Food Safety Authority (EFSA) put salmonella control at the forefront of the biosecurity agenda for feed mills in Europe after it was asked by the European Commission to deliver a scientific opinion on microbiological risks in feedingstuffs for food-producing animals.

Salmonella is the major biological hazard for animal feed, said EFSA's specialist panel, with other bacteria such as *Listeria*, *E. coli* and *Clostridia* being relatively less important from a feed standpoint.

Industrially-produced feeds were said to be more at risk from salmonella contamination than other feed types, and were most likely to become contaminated through their raw materials, especially oilseed meals and animal-derived protein sources.

EFSA's advice also included the reminder that although feeds from industrial mills usually are heat-treated to kill salmonella and other bacteria, re-contamination can occur afterwards during cooling and subsequent handling.

EFSA called for action by all feed manufacturers aimed at continuously reducing the occurrence of salmonella in animal feed, along with the establishment of microbiological criteria for assessing contamination at critical stages of the feed production chain. All mills in the European Union should apply the same process-



*For feed to reach the farm contamination-free, checks and controls need to be in place through the production and delivery processes.*

hygiene evaluations, the EFSA panel added. Validation of a common EU standard method for monitoring salmonella was needed urgently for use in animal feed.

The authority also called for a baseline survey on the testing of salmonella in feed across the EU to provide comparable data between member states, and the implementation of good practices to ensure effective heat treatment at feed production plants.

## Sampling procedures

The focus since then from a European viewpoint has been on surveys and sampling. For example, a recent EFSA report suggested that pigs and pig meat might be responsible for up to one-fifth of all cases of salmonellosis in humans in the EU and that the risk would be reduced considerably by feeding only salmonella-free feedstuffs. This alone, the report declared, could bring about reductions in the number of cases of 10-20% for member states with a high salmonella prevalence and of as much as 60-70% in EU countries having a low prevalence.

So the big biosecurity question in Europe has become — what can mills do to make sure that feeds are free of salmonella at the time of manufacture at the factory and of consumption on the farm?

A non-statutory Code of Practice issued in the UK at the end of 2009 by the governmental department for food and rural affairs offers guidance to all feed business operators for establishing good production practices to safeguard the microbiological quality of feed materials and minimise the risk of salmonella contamination. It begins by emphasising the importance of correct bacteriological monitoring.

The aim of the monitoring is to check on the environmental hygiene of the premises, equipment, vehicles, incoming and outgoing products, the guide explains.

In general, dust samples are more sensitive than swabs or scrapings for routine screening purposes, but swabs or scrapings may be more useful when following up a suspicion of contamination in a plant in order to identify precisely the location of resident contamination.



*There are many critical points for sampling, including the tops of storage bins.*

Critical sites for sampling dust are the ledges, walls and floors as well as the tops of storage bins, but checks are also indicated for conveyors, dust filters and loading equipment. Further samples should be taken regularly, in a frequency appropriate to risk, from the intake area and at process points in the manufacturing plant such as for grinding, mixing, pelleting and cooling.

### The human factor

A 2002 presentation to a multistate poultry meeting in the US by Dr Frank Jones from the University of Arkansas discussed this human aspect with regard to pathogen reduction strategies at feed mills.

Making the point that data collection must be accurate, he described a comparison at one mill between samples collected by the plant's own workers and others by members of a research team. Whereas under 7.5% of the researchers' samples tested positive for pathogens, this compared with 43.75% for the samples collected by mill personnel — raising the possibility that a contamination detected

For more advice on keeping feed clean, go to:

[www.WATTAgNet.com/16309.html](http://www.WATTAgNet.com/16309.html)

in the feed might, in fact, come from the hands of the person collecting the sample.

Control of contamination in feeds and feed mills takes three forms, Dr Jones pointed out. While one seeks to exclude contamination from the feed, there are also the targets of killing organisms within the feed and preventing their multiplication. Higher numbers of organisms in feeds require harsher treatments for destruction than lower numbers. But harsher treatments cause nutritional damage to the feed, in addition to the fact that they cost more.

Dust, moisture and feed age will have a major bearing on the degree to which a given lot of feed will be contaminated, said Dr Jones. Any point within the feed manufacturing process that is either dusty, adds moisture (including relative humidity), adds heat to feed or allows feed to remain for an extended period of time should be examined as a possible sanitation control point.

### Critical places

One possible place to examine in a mill would be around bucket elevators. These conveyor devices generally create aerosols of considerable amounts of dust. Also, heat is generated, particularly around the pulleys in the head and boot sections. Each batch of feed passing through the boot section of the elevator is exposed to material that has already collected there and the heat generated may also cause moisture to concentrate in cooler areas of the boot, resulting in an increased potential for contamination.

Another risk factor occurs where raw material conveyors are located close to coolers, and therefore potentially in the flow of air drawn in to cool pellets. Dr Jones observed that risks increase if covers on ingredient conveyors have been left open for ease of access, or windows opened that may have allowed insects and wild birds into the feed processing area.

His work has confirmed frequent other warnings that the heat of the pelleting proc-

ess has only a temporary effect on microbial contamination, with microbe numbers likely to rebound quite quickly afterwards. Sometimes, it seems, the problem is connected to the presence of dust or debris around the pellet mill so that heat-treated material is re-contaminated at the exit of the pelleting chamber.

### Resistant bacteria

Sources such as his presentation and the British code of practice stress the importance of adequate cleaning and disinfection protocols for product contact surfaces and equipment. But an ongoing research project in Norway on properties of salmonella in mills, financed by the Norwegian feed industry and the Research Council of Norway, has highlighted some highly variable results from trying to disinfect against salmonella in feed factories.

The project team believes that some types of salmonella establish themselves on surfaces by creating a form of slime, or biofilm, and that this may then make them more resistant to certain sanitisers. It is most likely to occur on surfaces that are often damp and are not cleaned regularly. The biofilm could also be protecting the bacteria against drying.

The existence of protective biofilms is not a new finding — food sector researchers have been reporting for some years that factories can contain resistant microbial cells in biofilms attached to surfaces of various materials, including steel and plastic. From the work carried out at Norway's National Veterinary Institute on feed manufacturing, several common disinfectants have been found to have a reduced effect on the particular salmonella serovars associated with biofilm formation. Strains of serovars with this ability are known to persist in Norwegian feed mills.

### Hygiene in delivery

Even if a feed manufacturer succeeds in maintaining products free from salmonella

## ► Clean feed

until they are loaded into a vehicle, the possibility for contamination remains up to the delivery of feed to the farm. Advice published this year in the US states that feed biosecurity programmes at farm level should focus first on how new diets are delivered, in order to stop the potential introduction of pathogens. The adviser also recommends that mills arrange formal training on biosecurity policies and procedures for its feed delivery drivers and production personnel.

Detailed recommendations include that the vehicle cab should be equipped with plastic boot covers for the driver's use on each visit and also disposable floor mats, that are similarly discarded into a designated container when the delivery is completed. A new European advisory document on farm feed handling wants storage bin hygiene to be given more attention at farms, so that it matches the sophisticated systems now used by mills to clean and disinfect trucks.

Better scheduling of feed deliveries is also urged, with priority given to the farms with the highest health rating either to receive a designated separate transport or to be first in a sequence of visits by the same truck. Most often this would mean starting with genetic or seedstock enterprises, ahead of farms with commercial breeding animals and then those that grow or finish for market.

## Swabs of trucks

The importance of routine precautions was underlined by an American study over 10 years ago that investigated whether feed delivery trucks and the feeds delivered could be sources of salmonella contamination in pig-producing operations. Swab samples from different places in the grain box on 22 feed trucks were cultured for the presence of salmonella, as were feed components.

The investigators found salmonella in swabs from five trucks and four from where the feed components had been sampled. However, positive swabs and feed samples matched for only two trucks. None of the vehicles had been used to transport livestock within the past 30 days, nor had any of them been cleaned or disinfected between loads.

# What is your biosecurity policy for dealing with visitors to the feed mill?

These suggestions are from the animal health division of Oregon Department of Agriculture, USA. Key risk areas include: property entrance points, vehicle and pedestrian traffic areas, doorways into facility buildings and visitor clothing, hands and hair.

1. Each mill should have a clearly stated visitor policy. This notice should be posted at the entrance to the property and company buildings.
2. A logbook of visitors should be maintained.
3. Visitors in the feed processing and handling areas should be limited only to individuals essential to the operation of the mill.
4. Visitors to the mill facility should follow a predetermined route in order to control exposure to feed products.
5. Foot baths or dip mats should be placed wherever truck drivers will be entering or exiting their trucks and at each entry/exit point into company buildings.
6. Mills that have retail feed stores on site should keep retail customer traffic completely isolated from the mill facility, vehicles, mill production employees and truck drivers. Mills that do not have a retail feed store on premises should discontinue all

other retail feed sales from the mill.

7. Mills that permit retail feed store owners or other wholesale customers pick up loads at the facility should not allow the drivers to leave the cab of their vehicle, and the vehicle should be cleaned and disinfected prior to entering the mill property. If the drivers must get out of their vehicle, then their feet should be disinfected and access to the facility should be controlled to prevent the risk of spreading disease. Traffic flow patterns for these vehicles should be designed to prevent them from contaminating the feed mill.
8. Service personnel (vendors, electricians, machine repairmen, meter readers, etc.) and regulatory inspectors should be restricted in their access to production and transportation areas within the facility. Visitors that may go to other mills or locations where birds are present should have their feet and hands sanitised as well as wear protective coveralls, boot coverings and hair coverings supplied by the mill. A company contact person should communicate biosecurity concerns to each outside vendor of potential concern.

While the sample prevalence of salmonella in feed trucks was low at 0.7%, said the study report, the overall contamination rate of the feed trucks was much higher at 22.7%. The presence of positive feed samples suggested that the feed could be a source of salmonella contamination for pigs on the farms to which these rations were being delivered. So the report's authors urged proper truck sanitation methods between deliveries.

Biosecurity advice to feed mills and farms in one US state says that trucks, after completing their delivery, should be given a thorough clean-up on the farm or at a commercial truck wash, before delivering to an-

other customer or returning to the mill. The recommended routine starts with pressure-washing to clean off mud from the wheels, wheel wells and undercarriage, followed by disinfection. What is more, the steering wheel/assembly, foot pedals and gear shifts should be sprayed with disinfectant.

As for those disposable overalls, boot covers and caps supplied to the driver, the same source points out that it is not always possible to discard them appropriately at the farm so an alternative has to be available. It proposes that they could be placed in a sealed plastic bag that is sprayed with an approved disinfectant and left in the cab for safe disposal back at the factory. ◀