

## Processing

# Chicken feed from pathogen

*Very few companies have the luxury of owning a feed mill for in-company use only. Not wanting to rely on the risks of external feed deliveries, Lohmann Tierzucht in Cuxhaven, Germany built their own pathogen free plant.*

By Dick Ziggers

Lohmann Tierzucht (LTZ) is specialised in breeding and marketing parent stock of hybrid white-egg and brown-egg layers. Different strain crosses “bred in Germany” are designed for a wide range of production systems and market requirements. The farms with the high value breeding stocks are located in the area of Cuxhaven in the north of Germany. A few other farms are specially laid out to produce specified pathogen free eggs, which are used worldwide by many vaccine manufacturers, laboratories and research institutes. These VALO farms have been free from specific poultry diseases for many years. To keep up the high hygienic standards and quality control a lot of effort is needed.

A major risk for these high value farms is the feed. Until recently LTZ acquired their feeds from regular manufacturers in the area. After delivery this feed was treated to kill possible pathogens before feeding it to the birds. “But we were not completely satisfied with these arrangements,” Dr Gerhard Seemann says, who is responsible for production of poultry and feed at LTZ. “We were somewhat limited in the use of raw materials and we also had concerns about cross contamination. Many years ago we already banned animal products from the feed for our breeding stock and SPF farms, long before the official ban took place. Since our regular feed producers kept on using these products until the ban, it posed a risk we were worried about.”

Elimination of Salmonella in animal feed is one of the key issues of the animal feed industry for the years to come. With the new regulation banning more antibiotics from the feed mill there is now a growing need to steam heat treat the feed in a batch process to kill Salmonella and to reduce bacteria.

Therefore, some five years ago it was decided to tackle these risks. Two options were available. One was to buy compound feed and (heat) treat it at an own facility; the second, making their own feed. When buying feed externally the risk of cross contamination still existed, so it was decided to build a feed mill that would



**Every incoming raw material has its own dedicated silo.** (Photos: Dick Ziggers)

(at first) be entirely dedicated to the company's farms. This new feedmill is located in the small village of Dorum, not far from Cuxhaven and within close range of the Lohmann farms.

### Batch system prevails

“Some continuous systems were available on the market, but we were not sure if that would be the right solution for the effect we were targeting,” Seemann says. “Therefore we decided to look for a batch process to make sure that every particle in the feed mixture would receive the heat treatment.”

The first idea was to install a sort of ripening kettle, but in practical terms that would be difficult to monitor. Also the cooling of the feed would be difficult. “Pelleting and crumbling could be an option, but that would not mimic reality at the poultry farms, because



**Dr. Gerhard Seemann is in charge of feed and animal production at Lohmann Tierzucht, Germany.**

# free plant



**Forberg heated mixer for sanitising the feed.**

in practice the birds receive a meal feed. Our tests then would not reflect results that have to be realised on the farms we are selling our layers to,” Seemann explains.

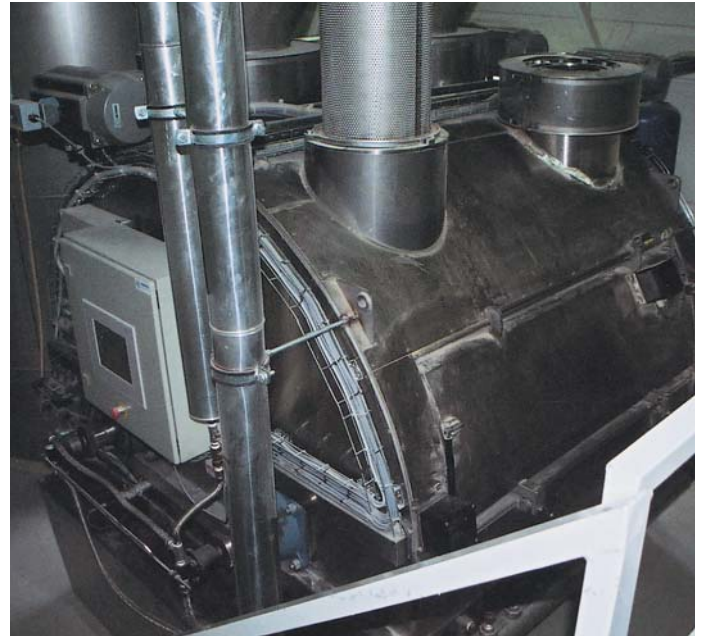
Eventually Lohmann started working with Forberg from Norway on a batch system where the Forberg batch mixer is pivotal in the cleaning process.

When the mill is run in one shift of eight hours per day annually 15,000 tonnes of feed can be produced. When all Lohmann birds plus an extra client who also is interested in receiving pathogen free feed are to receive this feed a total capacity of around 11,000 tonnes is needed.

The mill is run by a full time feedmill manager and a part-time second person who is responsible for the recipes and the quality assurance programme.

### Feedmill layout

All raw materials delivered to the feedmill are considered to be contaminated. Therefore samples are taken and microbiological examinations performed at a lab-



**Forberg cooler unit to cool down the steam treated feed to ambient temperature. The cooler/mixer is located in a enclosed area that is ventilated with filtered air. Filtered air is also used for cooling the feed.**

oratory. Qualitative research on nutritive content is carried out at a certified laboratory in Oldenburg. Every feed component has its own dedicated bin for storage.

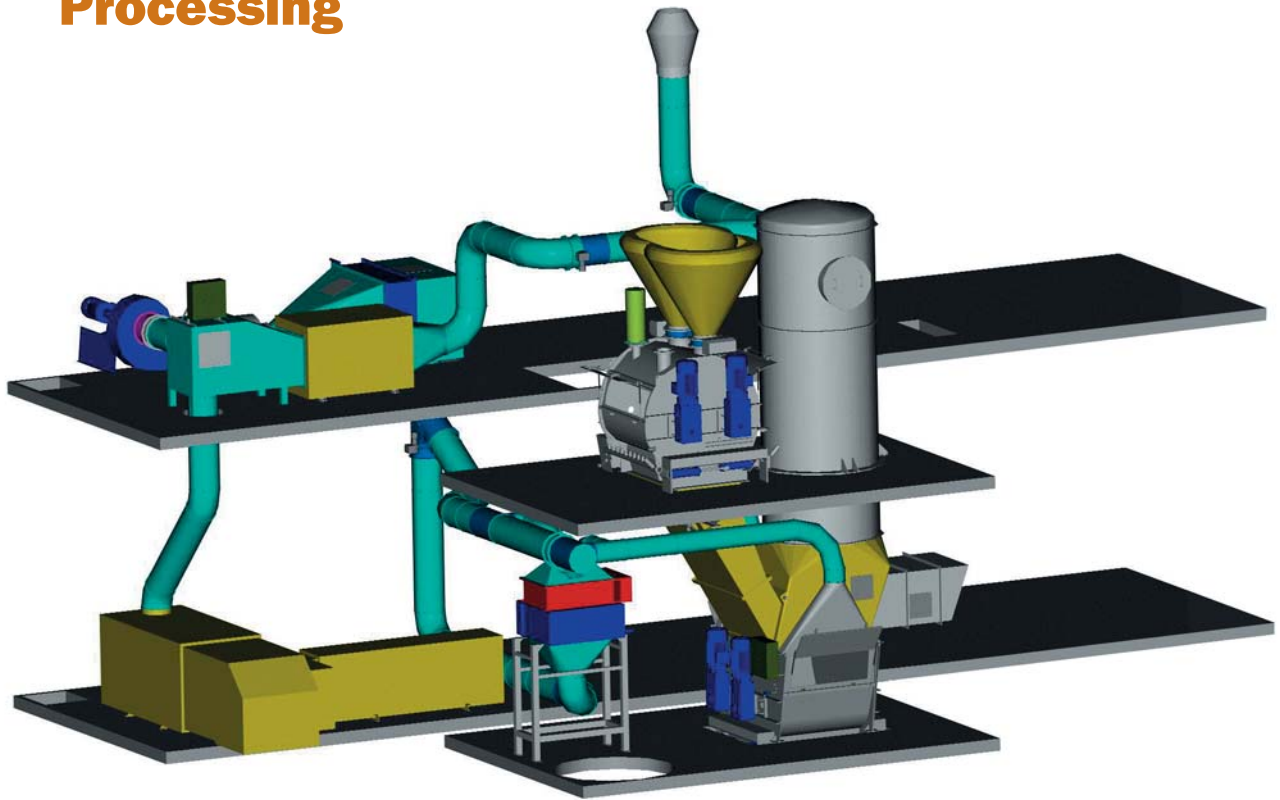
Because only layer feed is made, very few raw materials are needed. The main components are maize, wheat, soy and sunflower. Calcium phosphate is added in two grinds, a coarse source and a fine source for establishing the right eggshell quality. Fat for energy comes from soy oil and a vegetable fat with little linoleic acid. This is done to be able to control egg weight during the laying period by adjusting the protein content of the feed. Vitamins as well as other micro-ingredients are supplied after cooling at a minimum required level to minimise the risk of contamination through these ingredients. For vitamins the minimum legal level is 0.05%. Because of the heat treatment of the feed fat is added after cooling to avoid degradation of the product.

### Roller mill for grinding

Raw materials that need to be ground, i.e. maize, are stored in a dedicated bin after grinding. Grinding takes place through a Kahl roller mill. A hammermill was not considered as it creates too much dust. The roller mill is controlled through a computer that adjusts the grind automatically to the raw material supplied.

Raw materials are weighed and then augured to a surge bin on the top floor of the mill. From there the

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**This computer drawing shows the core of the heat treatment installation with the heated mixer and the cooling unit underneath it.**

*(Desing Kees Rodenburg, Forberg)*

whole process takes place in a vertical mode to avoid feed particles from accumulating as they would in a horizontal transportation structure. From the surge bin the batch flows into the first mixer where the heat treatment takes place. Depending on the density of the products this bin can treat batches of 1-1.4 tonnes. Ingredients are mixed and steam is added up to the moment the mix reaches a temperature of 90°C. Then mixing stops and the feed is kept at this temperature for six minutes. In the mixer, moisture content increases from around 12 to around 17 percent. For quality reasons the mixer is made out of stainless steel. To avoid any condensation the walls of the mixer as well as the paddles are heated with steam. After this retention time of six minutes the feed is mixed again at discharge.

A positive side effect of the heat treatment is the micro agglomeration of the feed binding smaller particles together increasing the efficiency of the feed. Due to mixing technology involved, no segregation is observed throughout the whole process. Heat sensitive additives, such as vitamins, enzymes etc., can be added after the product is cooled down to ambient temperature.

## Cooling in an enclosed room

The following step is cooling of the feed. The cooler/mixer is situated one level down in the mill in an enclosed room which is ventilated with filtered air and constantly kept at a positive air pressure of 115 kPa, to avoid any recontamination from outside. At first cooling takes place with hot air. Through evaporation, tem-

perature and moisture content of the feed already decreases. The cooler air reduces the temperature of the feed down to the 28°C.

After cooling, vitamins and fat are added in the mixer. At this stage it is also possible to add enzymes and/or acids to create an extra barrier for recontamination. Another 90 seconds are needed to mix again. Then the complete feed is discharged to a load cell.

The cooling air is filtered through a three-stage filter. Used cooling air can be re-circulated within the whole system where temperature is reduced via a heat exchanger that uses ground water for temperature uptake. This air then can be used for cooling again. One of the reasons for re-circulating the air is to minimise smell problems around the feedmill. The heat exchanger can also be used to cool down outdoor air in summer when the temperature of the outdoor air is too high for sufficient cooling purposes.

## Fixed route for delivery

At load out, the bulk truck has to move back and forth to fill the compartment of the bulk trailer as the load out cell is of a stationary type. The truck has a fixed route to deliver to the farms, starting with the most delicate flocks (the SPF layers) and then continuing to the youngest animals etc. Every load of feed is sampled and examined again for pathogens. There are no feed deliveries on a Friday. On that day the load out silo and the mixers are cleaned and disinfected. ●