Feedmill of the future

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Feedmill of the future
... here today-built for tomorrow!

How we feed the world’s ever growing population is the big question for the milling industry. Milling and Grain magazine goes in search of answers, on a behind the scenes tour of the Van Aarsen-built, Kalmar Lantmän project - the most modern feedmill in the world - to find out how the technology in this new mill sets a standard for the future.

by Darren Parris
Milling and Grain

The Kalmar Lantmän feedmill in Kalmar, Sweden
There is almost nothing more important in life than feeding the planet. A wise man once pointed out that we must feed nine billion people by 2050. However, as a humble writer, I have seen firsthand round the globe and on every continent, just how very difficult this task is going to be.

Having visited many mills throughout both the developed and developing world, I have become fascinated at the challenges facing the modern miller; when we consider probably upwards of 80 percent of everything we consume has somehow been touched by the milling process, be it the simple process of flours and grains for breads, biscuit’s, pastry, crisps etc or your rice’s, pasta and semolina’s or indeed your coffee or chocolates how we mill has become ever more important.

And, nowhere is this more important than the production of feeds for all the species that give us our milk, cheeses, meats and fish.

When we consider the Feed Conversion Ratio (FCR) for most species of edible animals, it is clear that we must get the feed right. As a quick recap, the FCR refers to how many pounds (lb) of feed it takes to produce a pound of gained meat for human consumption. Below are some typical examples of FCR for some of the most common eaten species:

- Beef cattle - 5.5 to 6.5 lb of feed for each pound of gain
- Chickens - 2 to 3 lb of feed for each pound of gain
- Pigs - 2.18 to 5.91 lb of feed for each pound of gain
- Fish – 1.2 to 1.8 lb of feed for each pound of gain

You can see that these FCR’s vary considerably depending upon the species, with fish and poultry being the most efficient and therefore considered the most sustainable.

Often some of the ingredients in feed pellets, etc contains food already suitable for human consumption. Therefore from a sustainable perspective it has become ever more important to make sure the final feed compound is containing all the right ingredients to allow it to be an effective feed that puts the right nutrients back into the food for human consumption.

It is at this point you realise just how much more complex the process is for milling feeds than it is for flour, chocolates, rice or coffee, etc. When we consider what we want from our meats, and that they should be nutritious for us, they must contain the correct levels of minerals, vitamins, amino acids, proteins and carbohydrates to mention just a few nutritional expectations.

Therefore, the art of farming good healthy and nutritious animals with a good FCR will often come down to a good feed supplies and as with many recipes in life, every farmer will have his own preferences about what goes into their feeds for their animals.

Animal feeds can be complex compounds, which for a balanced healthy diet will need to include some of these basic nutritional elements:

- Carbohydrates
- Proteins
- Fat

This is by no means a complete list, and by way of an explanation, if I just focus on proteins, these are composed of over 20 different amino acids, which are liberated during digestion.

Animals with a simple single stomach (monogastric), including humans, swine, poultry and rabbits, require the correct amounts of the following 10 essential amino acids daily: arginine, histidine, isoleucine, leucine, lysine, methionine, phenylalanine, threonine, tryptophan and valine.

On top of this when you look at just some of the minerals that are essential for animal life, which include common salt (sodium chloride), calcium, phosphorus, sulphur, potassium, magnesium, manganese, iron, copper, cobalt, iodine, zinc, molybdenum and selenium. And, then if you keep in mind that the last six of these can be toxic to animals if excessive amounts are provided, you begin to understand the challenges facing feed millers to get feed right.

I point this out only to highlight the complex requirements that a feedmill of the future, as of today, would need to be capable of delivering.

With hundreds of potential ingredients, that would need to be added in exact doses and mixed and pelleted according to a farmers wish is almost unconceivable.

Experts at VICTAM predicted dramatic changes for feed milling in Europe over the next 10 years

This does not even touch upon the additives in feed to improve gut health or palatability or indeed any probiotics and veterinary medicines such as antibiotics. This would all need to take place in hermetically sealed environments to avoid cross contamination in the mill across different species.

So already one can begin to build a picture of what tomorrows feed mill must be capable of.

The holy grail of the feed industry

In this era of improved sustainability, improved efficiency, improved automation in a more hygienic environment it is important to point out that this utopia of a futuristic mill meeting all these requirements and more has become the holy grail of the feed industry.

No surprises then that during the VICTAM Exhibition in Cologne, Germany recently experts in the feed technology field revealed how the EU feed sector should become more sustainable. These same experts at the VICTAM predicted dramatic changes for feed milling in Europe over the next 10 years. One of those commenting at VICTAM was Trudy van Megen, director of the Feed Design Lab, a Dutch research and education centre for innovation and sustainability in the feed industry, who went on to say, “The European feed sector has to do more with less and must reduce its dependence on imported grains such as soy for animal feed production to boost its sustainability profile.”

It was pointed out by a few experts at VICTAM that if a factory decreases variability in a pellet line and optimises the process in terms of capacity, temperature and machinery, it is possible to decrease consumption of electrical and thermal energies in pellet manufacturing.

Most notable of the speakers was Harm Klein, business developer for feed at Tebodin, who spoke specifically on the
Feed mill of the future’. Harm looked at the trends that are supporting shift in feed production 10 years’ from now. He said new feedmill constructions, in general, will take place in emerging economies, with only expansion or redesign of feedmills and not outright builds likely in regions like Europe and North America.

More and more feedmills in Europe, said Klein, will only supply concentrates to livestock producers and, thus, the production and storage process at feedmills by 2025 will have undergone a radical shake-up.

How right was Harm Klein? With the one exception it will not be in 10 years’ time, it is already here today.

What millers aspire to

Now, let’s be clear, I am not a trained feed miller nor a nutritionist or engineer, but I have visited my fair share of feedmills and feed additive companies and having spoken to many millers and farmers over recent years and I have learnt what each and every miller would like to aspire to.

I understand the business model of a feed company, those goals and objectives that must be met with the feed to either maximise sales or optimise the feed for the production of meat, milk, or eggs.

Operating a modern feedmill requires good decision-making on the part of the mill manager. The feed mill manager must understand how to use the key indicators that will increase profitability and productivity, as well as reduce costs. Each manager must select from the multitude of indicators that influence the operation’s productivity and costs. These indicators will vary based upon the primary business objective of the feedmill.

Commercial feedmills typically focus on profit margins, sales and customer service; whereas an integrated feed operation focuses on high volume production of feed at the lowest possible manufacturing cost.

Regardless of the business model under which a feedmill operates, there are indicators (KPIs) that apply.

Managers should develop KPIs for manufacturing and delivery processes, labour efficiency, manufacturing and delivery costs, safety and quality. These KPIs, along with an annual manufacturing budget, will help a manager recognise the strengths and weaknesses within the operation.

KPIs can be used in the development of both short- and long-term goals to improve the productivity of the feedmill. Typical areas to monitor feed mill productivity include:

- Tonnes per run
- Pelletmill changeovers
- Bagged tonnes per day
- Actual versus scheduled hours of operation
- Downtime
- Tonnes delivered per load
- Load out waiting time
- Tonnes per man hour or man-hours per tonne

Man-hours-per-tonne is typically measured in commercial feedmills where more labour is required for the manufacturing and packaging process of feed due to the production of small batches of specialty feed or production of feed based on individual customer orders.

Another area to monitor are the shrink/gain costs that are associated with the loss or gain of ingredients and feeds. Feedmills typically experience a shrink in ingredients due to losses that occur during the receiving and grinding processes. Receiving losses are typically in the form of dust or product loss, whereas during the grinding process there is a loss of moisture. A mill that produces pelleted feed may experience a gain in feed due to residual moisture left in the feed after the cooling process.

Mill managers may find it helpful to calculate the shrink and gain of both ingredients and feed separately, as well as the total shrink (gain) of the feedmill. The total shrink (gain) can be determined by the following equations (Emmerson, 2005):

- Expressed by weight: \(\text{Shrink (Gain)} = \text{Beginning inventory} + \text{Receipts} - \text{Ending inventory} - \text{Shipments}\)
- Expressed by percentage: \(\text{Shrink (Gain)} = \frac{\text{Shipments in Weight}}{\text{Weight of Shipment}} \times 100\)
- Expressed by monetary value: \(\text{Shrink (Gain)} = \frac{\text{Shrink (Gain) by Weight}}{\text{Monetary Value/Weight Unit}}\)

Monetary Value/Weight Unit = Monetary Value of Shrink (Gain).
Kalmar Lantmän is a leading feed manufacturer in Sweden, and with years of operational experience it had very clear goals for what it wanted to achieve with its new feed mill.

Kalmar Lantmän owned the site in Kalmar and already operated two feedmills on it. As part of the wish-list for Kalmar Lantmän, the new feed mill should:

a) Replace the two existing feedmills
b) Create lower production costs per tonne of animal feed
c) Considerably reduce labour costs
d) Be the very best in energy efficiency
e) Offer the highest degree of flexibility and efficiency
f) Use the highest degree of automation
g) Highest degree of hygienic production
h) Offer the highest level of fire safety and health safety
i) Be environmentally friendly

Arriving in Sweden with my colleague Olivia Holden we met up with Maril van Kempen and Hans van der Weijden from Van Aarsen International, the turnkey supplier of the feedmill and Åke Karlsson from Kalmar Lantmän.

My first impressions - this is an impressive structure, at 60 meters tall.

It sits on a foundation of 3000sqm supported by 924 concrete and steel piles each driven into the ground to find solid rock to support it. Considering the 8400 tonne foundation slab of concrete and the further 23,200 tonnes of prefab concrete used in the building, it needs these piles.

So as we climbed the 13 levels, 18,000sqm of feedmill factory, to the top, you began to get a feel for the magnitude of this project. From the initial clearing of the old space to driving in the piles and laying the first foundation, Van Aarsen had to deliver the equipment required for each level as it was assembled.

As the prefabricated concrete was laid, Van Aarsen had to fit the equipment immediately as no one wants the project to stand still as the cranes for the build still had to be paid for!

The total project was expecting to come in at US$50 000 000 with some of the larger proportion of costs coming from the preparation of the building site, driving in the piles and the building structure itself.

The choice of contractor for Kalmar Lantmän turned in favour of Van Aarsen as the company proposed a new building design that would be 30 percent smaller than its competitors, making substantial savings in the build costs whilst still giving the feedmill the full function and layout as requested. But to top it off, the new design offered the additional possibility for a sixth line, all whilst saving 30 percent build cost.

This was a significant moment for Van Aarsen and Kalmar Lantmän.

Not only did this new design save on space and costs, it was also future proof.

It also solved one huge hurdle for Kalmar Lantmän: Its wish had always been to build the mill in concrete, with many wish list features specked out such as the intake should be on the south side of the mill, the height should be no more than 60 meters, the loading section should be on the north side with serious protection against the possibility of cross contamination of different species feeds.
Building in concrete was the preferred option, but was also the most expensive choice, and was out of reach in the first designs; however, with a saving of 30 percent on the building size, the use of concrete became a reality.

With concrete there are no hidden gaps like you get with a steel construction. Everything can be hermetically sealed. With concrete floors in place a very special coating was applied; this involved a handmade, hand applied process, involving many layers including a primer, ground down sand and different layers painted on making a very solid and hygienically manicured floor.

It gets tremendously cold in Sweden with snow and ice, therefore there should be outside heated floors.

**Lifting modern equipment into place**

With the 30 percent saving in building costs, the project went ahead in the favour of Van Aarsen, it took a year to take away the old buildings and drive in the almost 1000 piles into the earth to form the foundations.

As each concrete floor was added, Van Aarsen arrived with the state of the art milling equipment, examples of which are on all 13 floors. I might add, it was a privilege to see first-hand, Sweden’s and most probably Northern Europe’s, largest in house commercial elevator, which was installed with a load capacity of 10 tonnes, it can reach each floor allowing any machines to be replaced at any time.

The building took shape throughout the Swedish winter or 2012, which would often slow down the drying time of the cement, therefore the project manager Åke Karlsson had to bring in industrial heaters to put on each floor as the construction took place.

Also, unlike buildings in metal with frames etc., concrete structures will need some well planned advanced ‘cuts’ to allow for piping, valves, elevators and cabling, so attention to detail was king in this construction. To get a high level of hygiene the design and flow of material was mostly by gravity, which whilst not uncommon, the use of gravity in this mill was extraordinary and many within the industry felt the plans of project manager Åke Karlsson unrealistic, with few believing that it could be done. However, he has proven them wrong.

Even the smallest attention to detail was put in place building this mill. All the cabling was copper wire, which allowed for smaller tracks, with most cables designed to run vertically to avoid catching dust and positioned in every case for ease of accessibility with the added bonus that copper wires are also rat proof, should any ever get in.

One of the largest costs to a feedmill is energy consumption. You have to power the machinery, steam boiler, compressor systems, lighting and heating, to name a few. Even when the feedmill is not producing there are still costs when its standing still. So getting the energy usage right was imperative.

Whilst every effort was made to fit energy-efficient machines with energy-efficient motors, such as all motors >30kW are
frequency controlled and all motors with >200kW are with a low harmonic frequency converter, allowing for waste electricity to be siphoned off and stored in back-up power cells for use later.

All of these efforts would have been in vain had the feedmill opted for the wrong level of intake transformers. Initial estimates suggested 5 x 2000kW transformers, which if agreed, would have involved a new mains cable to the substation at an additional cost of over €2,000,000.

With the right machines, motors and power saving processes in place the project was able to operate with just 4 x 1600kW transformers. This is where knowing your mill is very important and Åke Karlsson from Kalmar Lantmän was adamant about the required power usage from the beginning as he was with the overall cost.

**Producing small batches efficiently**

Now, compared to some mills, the production at Kalmar Lantmän may seem relatively small. However, they are producing around 265,000 tonnes annually for the Swedish market. This is broken down to having around eight to 15 tonnes per order, again which for many may seem to be quite a small average or low level order.

One of the many delightful aspects of the mill build is that it was designed with several separate lines with a focus on producing small batches efficiently.

Not only can the mill produce small batches, it has been streamlined with separate production lines for the production of feed for each of the respective animal groups: all of this being done in such a way as to avoid cross contamination, which is evidently a very important factor in the mills operation.

Different feeds for different species is common, there are more ingredients for pigs and poultry and less for cattle. The building is also separated into a raw material section ‘dirty’ and a finished product section ‘clean’. Another reason why the whole building was built in concrete as it is easy to clean and there are no little cracks for dirt to hide.

Whilst observing the mill in operation it was impressive to see the double-deck cooler system working, which allows the company, on the fly, to immediately change products. This system allows for a very short time to swap products. In The old mill this would have taken 20 to 30 minutes to administer a change of species feed for production.

Now the process only takes a maximum of two minutes, this allows the mill to switch over quickly and saves a huge amount of production time annually and allows them to react faster to customers’ needs.

**Serving a radius of 200km**

Having produced feed for over 25 years they started with around 15 formulas for feed, today with roughly the same number of customers - though they have all moved on from having 10 or 20 heads of cattle to now many hundreds – the company produces some 200 formulations.

Within Sweden they have around 15 percent of the feed market with a turnover of around €140,000,000, with the closest next feedmill being 250km away.

However, as Kalmar is located on the coast the mill does not have a 360-degree circumference of business, though they do have the large islands of Öland and Gotland which they service. On the other hand as ferry prices and fuel rise they can logistically only deliver feed economically up to 150 - 200km away from the plant.

With so many farmers, each with their own specific preference for feed the mill has over 50 recipes alone for cattle and over 200 recipes for feed in total of which more than 150 are active at any given time.

Most of the Swedish farmers like to have their own mix and with this new mill and the systems inside they can produce bespoke mixes for every farmer even if the batch is only five tonnes.

Not only can they deliver tailored feeds for every farmer, it is all carried out in an extremely hygienic environment where hygiene has been foremost on the minds of the millers. With their high hygiene concept in place it allows for higher flexibility with no contamination problems.

As with many plants and in particular their old plant they would have to clean a line first before switching to a different recipe. Their automated systems are superb, as is often required today...
many farmers require various additives in their feeds to deal with everything from palatability, improved digestion, gut health, additional proteins, minerals, etc.

This is another area where this mill really sticks out; they have their own hammer mills and roller mills – a combination you don’t find everywhere - and they do the grinding for all their own materials.

**Very little if any downtime and inventory accuracy**

And yet, it gets more impressive as their dosing system allows them to carry out simultaneous dosing. Each of the 52 silos holding specific additives is on their own individual weighing scale. A number of the silos can be used for dosing or grinding additives, the 52 silos are broken down into eight separate sections, again sitting on their own set of scales as does each silo. So in effect the whole 52 silos are one large-scale system.

When mixing and batching amounts, they can be calculated accurately across all 52 silos for an exact weight for a specific feed, allowing an extremely fast turn around and continuous flow in the plant with very little if any downtime.

With different products in each silo, they can still produce many different products in macro silos as all silos are standing on load cells of which there are between 800 and 900 pieces in the whole feedmill. This allows excellent control of what they have in each and every silo and a clear understanding of the step-by-step process. This also gives a very high degree of traceability.

This step-by-step breakdown of everything going into the mill and out of the mill is completely automated. Kalmar Lantmän buys its ingredients in kg or tonnes and sells their end feed products in kg and tonnes; it is the only feedmill in the world that can keep track of all of its ingredients in this way. If a lorry delivers short, they will immediately know, what ultimately goes out must equal what came in.

It also has a self-controlling system, if a silo deposits more than two tonnes on a load cell and the cell cannot take any more than two tonnes, then the system will send out an alarm.

With all the sensors, weighing systems, etc the mill can have data on everything - 100 times more data than previous, almost a data overload.

Of course, the important point is to know what data to use and how. Kalmar Lantmän has many possibilities and are consistently learning how to use the data to enhance performance.

In addition to the weighing sensors, at several locations throughout the mill, in the process, sensors have been fitted for spark, temperature and smoke detection. Valves within the circuit is switched off after detection has been made.

**Older equipment for sale**

Talking with the company about the two older mills, it was explained that they comprised a mix of Andritz and Buhler equipment. Kalmar Lantmän is currently looking to sell all its older machines, ideally to one customer as a full working mill solution. It would be an ideal project for an African or Indian miller, and they could ship as a complete mill.

Due to the new mill being located at the small port in the town of Kalmar, it was important aesthetically that the mill did not look out of place; therefore much attention has been paid to the outside look of the mill so that it blends in with the town’s skyline. It is true; it does not resemble a feedmill, more like a hotel with its marble finish.

After our brief interview with the Kalmar Lantmän feedmill project manager Åke Karlsson, he supplied me with some overview facts and figures before we headed off for our complete tour of the mill.

Finally, I would like to thank Marij van Kempen and Hans van der Weijden of Van Aarsen International and Åke Karlsson of Kalmar Lantmän for hosting our visit to Kalmar.

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**Timeline – from wish-list to reality**

**2009** - Kalmar Lantmän, located in Kalmar, Sweden, decided to construct a new feedmill in Kalmar with the intention of replacing their existing two feedmills.

**2010** - Three companies made the short list of potential suppliers and partners in the project; these were Andritz, Buhler and Van-Aarsen.

**2010 / 2011** - Each of the three companies worked closely with Kalmar Lantmän to submit their proposals for design, innovation and automation.

**2011** - Van Aarsen International awarded the contract.

**2012** - In February, the final contracts were signed between Van Aarsen International and Kalmar Lantmän. For Van Aarsen, this is the largest independent order ever in the company’s history.

**2012** - April, the building started with a ground-breaking ceremony.

**2012** - April to September – building the foundation, drilling in almost 1000 foundation piles and completing the basement and intake pits.

**2012** - October started the prefab concrete construction from ground level.

**2012** - November to April 2013, continued construction throughout the winter, requiring heaters to dry the concrete to stay on schedule for machine delivery and insertion.

**2013** - May, finished walls and roof.

**2013** - June- December, connecting all the internal processing lines to the respective machinery, installing the many kilometers of electric cables as well as the piping for liquids, steam and compressed air.

**2014** - January-March, continued the close collaboration with the Kalmar Lantmän project management team to complete the project on the basis of ‘Just-in-time’ construction, by controlling critical delivery times for machines and prefabrication.

**2014** - April, the factory was officially opened by Price Carl Philip from Sweden.

**2015** - June, the feedmill was visited by Darren Parris and Olivia Holden from Milling and Grain Magazine.

**2015** - August, the feedmill report was published in the August edition of Milling and Grain.
**Raw material intake**

As raw materials come into the raw material intake, and because of the unique location of the Kalmar Lantmän feedmill, there are several ways in which this takes place. They can be supplied by:

a) Ship
b) Trucks; with raw materials unloaded into one of two intake pits where the trucks reverse in and dump their contents
c) Pneumatic unloading; minerals, such as lime stone and salt are blown into the storage silos
d) Micro ingredients such as vitamins are supplied in big bags
e) Liquids arrive in tankers at the mill’s dedicated liquid terminal

When materials arrive they are checked for foreign objects using a magnet system and cleaner.

**Grinding and hammer mills**

The mill has the ability to grind raw materials in two ways; the most common is using one of two hammer mills with automatic screen exchange, which can deposit the ground materials into one of the 52 raw material silos.

The raw materials can be ground to any desired size. What makes this particular operation so special is the hammer mills are operated with low harmonic frequency controllers with a low harmonic, so when the system is slowed down, i.e. the brakes are applied the waste perpetual electricity is siphoned off and re-used back into the building utilising a two-stage controller: Another example of energy saving. This coupled with the automatic screen exchange, which allows for three different screens, which means the hammer mill need not be stopped a screen change can take seconds as opposed to the previous process, which took a good 20 to 30 minutes.

In addition to this energy efficient set up of the hammer mills, each hammer mill is hermetically sealed in its own sound-insulated control room reducing the noise to a maximum of 55db. Even though the building itself has been built with a sound insulated concrete construction, additional measures have been taken to reduce further the more noisy equipment.

Hammers are also prone to producing sparks, which when coupled with dust can become a potential explosion risk. In the Kalmar Lantmän mill all the bins after the hammer mills are equipped with an explosion relief system.

For other feed products, such as specific chicken feed, the recipe has the possibility not to be transported through the hammer mill but is able to go through the roller mill instead.

**Dosing**

Located at the feed mill there are the following silos for storage:

- 72 small ingredients silos
- 96 finished feed silos
- 52 raw material silos

Each of the 52 silos holds 85 cubic meters; the silos have been constructed round to maximise flow. This makes up the most modern automated dosing system in operation.

All 52 silos sit on scales with a capacity of three cubic meters or
2000kg for each scale. Between all the silos, this is one large-scale system which all work together.

Therefore, if you had a recipe that included 10 or 12 different raw materials all the silos would start dosing down to its scales simultaneously. At the bottom of each silo is either a double-screw or triple-screw depending on the need for accuracy. I observed 10 stainless-steel triple screws which were designed for more aggressive products, of course in these cases the silos are also stainless steel.

In addition to all this control and automation, all the double- and triple-screws are frequency controlled. This efficient system allows for all ingredients of a recipe to be dosed simultaneously allowing for 30 batches an hour of four tonnes each.

Each of the silos are 4mm stainless steel with the cones of the silos being 5mm, at the bottom of each silo are three load cells, which weigh exactly how much material is inside.

In fact if I stood, as I did on one of the 52 scales, it is automatically picked up in the control room and an alarm is raised.

And, whilst it has never happened, should the wrong dose ever be measured -because they are using long bridge scales with eight products in one scale - the operation can simply be stopped and the unused (wrong dosed) ingredients can be sent back to their original silo for re-use.

In older feedmills this would have simply been waste. Though this is an added insurance policy and avoids any contamination, one hopes it is never used.

With all these sensors and scales, the software supplied by Van Aarsen (Cofely) allows for many multiples and variations of adjustments and different parameters, with over 900 load cells the system offers a complete automated approach to the whole mill, allowing the whole operation to be dealt with by just one man in the control room, which significantly cuts down man hours required.

As the whole factory was built in concrete, planning was critical as the whole flow of the mill in relation to the piping and its silos, etc., had to be pre-cut out of the concrete before each level was build, this included pre-drilling and cutting all the holes for the possible sixth line that can be added in the future.

It was important to add in the possibility of a sixth line as to increase an existing mill is not easy and whilst this new mill has many innovations that put it significantly ahead in terms of design and automation, the possibility of a sixth line and the ability to move equipment and machinery between the floors with the 10 tonne lift make the mill to all intents and purposes, future proof, when taken in context of the average life cycle of a feedmill.

Mixing

Each mixer holds four tonnes / 8000 liters. As with the silos, each mixer is on load cells, allowing the control room to consistently monitor, in real time, the exact weight of ingredients in each. The ingredients are mixed in fast homogeneous blending paddle mixers. There is a mixer for each species line of feed to avoid contamination; even spillages around the mixer are protected from cross contamination as each is hermetically sealed away from each other.

All the mixing is dry mixing. Ingredients such as molasses is processed, preheated before adding in doses. A dry mix is much more preferable as with liquid mixes, there is always a clogging of the paddles, which would require some down time for someone, once a week to enter the mixer and clean it out.

With dry mixing, you do not need to clean so often and you keep your lines running more efficiently.

And the innovations do not stop here; all the waste heat generated by the mixers is re-used and is filtered off to the compressor system to heat up water for the boiler.

Processing at 13 tonnes per hour the re-used heat can pre-heat the water to between 80 to 90 degrees, which in the winter the temperature of the water can start at the intake as low as seven degrees.

Conditioning and pelleting

Before the pelleting process the whole mixture is conditioned with steam, after which it goes through a hygienization process where it is kept at 85 degrees for a maximum of four minutes, which destroys any build up of salmonella.

In keeping with their very high standards for health safety and the environment all waste steam goes through a condensing system, reducing the temperature to between 40-50 degrees and is extracted through a chimney in the roof.

In a further effort to save time and allow a more efficient feedmill process the pelleting line uses a C900 pellet mill, which has a unique die exchange system, which in turn enables the miller to change dies quickly should a different customer require a different pellet diameter.
Crumbling, sieving and coating

The mill has the state-of-the-art crumbling machine where the pellets can be crumbled, for instance into chicken feed. The pellets and crumbs are then sieved so as to free them from dust, with the dust being returned to the pelleting system. As an additional service to its customers, Kalmar Lantmän also offers the possibility to coat pellets or add extra liquids at the final stage of the process. Each production line is fitted with a pellet coater where liquids such as enzymes, which are not resistant to high temperatures, can also be added.

Every completed batch of feed has a small sample automatically taken from it and bagged and tagged and sent automatically to the lab for quality testing.

Cooling

The coolers suck in air from the outside via a HEPA filter, similar to what you have in your car to clean the air of pollens, etc.

The intake is a large corridor probably 20 meters long, with a mesh to stop birds and animals coming in. Once in the corridor there are three intake filters with a much finer mesh to filter out smaller bugs and particles before going through the HEPA filter.

The coolers have been set up with a double deck configuration for a quick product change over and two of the lines are equipped with special meal coolers.

Also, as the winters can be very cold in Sweden, there is the possibility to warm up the intake air so it is not too cold. The same goes for any waste air pumped back into the atmosphere, it is carefully filtered to make sure there is no dust contamination and that any pollutants are below 3mg per cubic meter.
Loading and distribution

Once the process has finished, the final product goes into one of the 96 finished product silos, trucks will enter the mill on the north side where there are three separate loading lanes inside the building.

In each loading station there is a double robot-weighing outlet, which moves along the gantries, collects the desired feed and positions itself automatically over the truck for loading.

It was clear to me that this project had succeeded by using the very highest levels of automation available in today’s market.

The overall project consisted of smart engineering by making the building 30 percent smaller whilst maintaining all the five lines with space for an additional line.

Then installing high quality machines allowing the production of a low cost per tonne of feed. Outside of these key points, and the many others I have mentioned above, it ultimately succeeds because of its automation.

• Automation of the whole production process
• Only two operators during the day and one at night
• Operators can make any adjustments on the spot with a tablet
• Remote controlled by Van Aarsen’s automation specialists for service and support
• All silos, bins, mixers are equipped with weighing facilities, to see at any moment where all raw materials or finished products are in the process, as well as keeping an eye on actual stock levels
• Automated sampling of finished product in combination with a fully automated sample packaging system.

Van Aarsen. The vital link to your feed chain

The better the animal feed, the better the food on the table! It’s as simple as that. We take our crucial role in the “agro-feed” chain seriously, helping you to achieve optimal solutions in the production of compound feed.

Our innovative machines and complete feed mill solutions are designed and constructed to increase production and lower operational costs: with minimum energy consumption and maximum benefit to feed safety & ease of operation. Since 1949. Worldwide.

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