



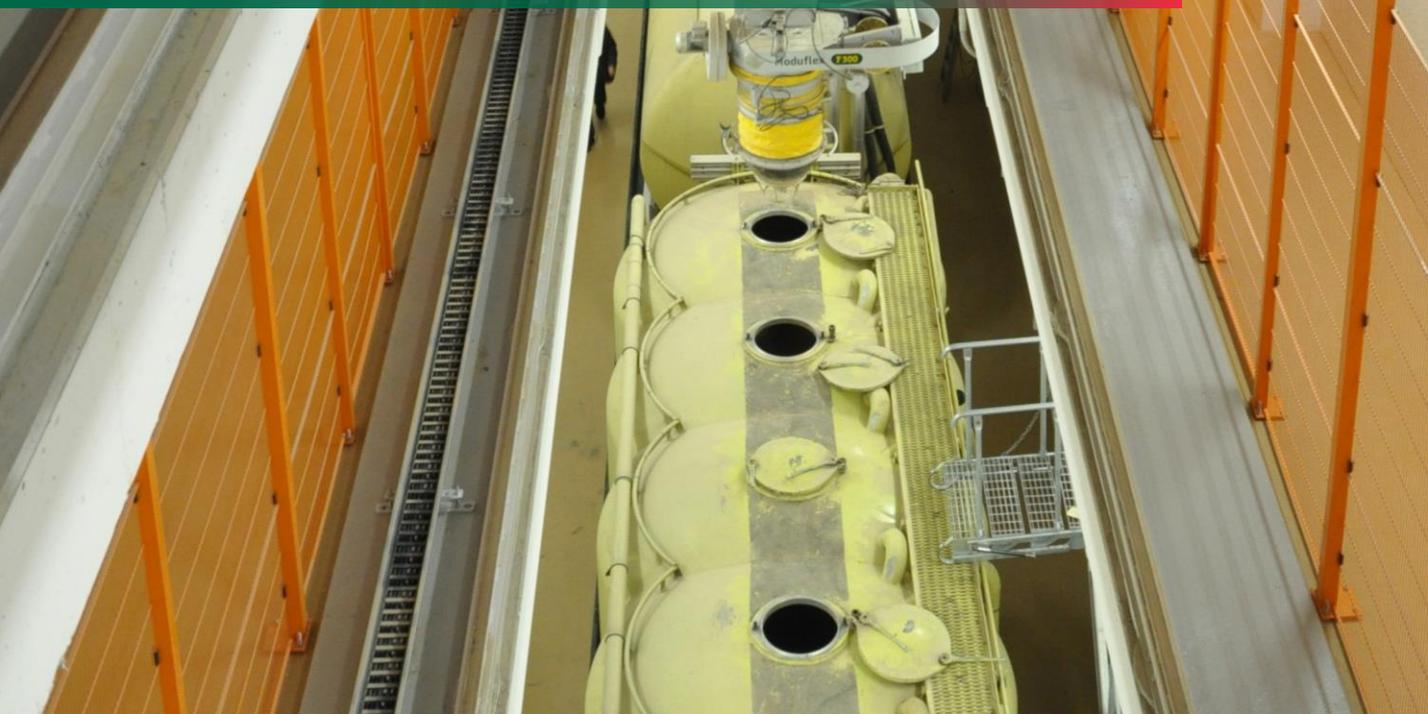
Van Aarsen  
SINCE 1949



PoultryTechBangladesh



*PoultryTechBangladesh*  
*Feed Miller Manual*  
*Part 1 | Hygiene*



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# 1. Introduction

## PoultryTechBangladesh

- **PoultryTechBangladesh**, a public-private partnership, comprises leading complementary parties from various steps in the poultry value chain, facilitating Bangladeshi companies to provide integrated solutions. The partnership aims to strengthen business relations between stakeholders in the Dutch and Bangladeshi poultry value chain, resulting in increased trade, investment, and cooperation, contributing to a more competitive and sustainable poultry sector in Bangladesh.
- **Objectives of PoultryTechBangladesh include:**
  - Support Bangladesh's poultry sector to become more competitive, sustainable and more responsible;
  - Trigger and support entrepreneurship and share values about integer business practices;
  - Identify, assess and stimulate business activities and partnerships between stakeholders active in the Dutch and Bangladeshi poultry value chains, resulting in increased trade (import/export), investment and (international) co-operations.



# Introduction

## Manual for feed millers

- As part of the PoultryTechBangladesh activities, Van Aarsen has developed two comprehensive manuals tailored for feed mill operators in Bangladesh. These manuals aim to improve operational efficiency and provide insights into best practices in feed milling.
- This manual covers all aspects of an energy efficient feed mill and is designed to help operators optimize their performance, adopt best practices, and implement sustainable and efficient feed milling techniques.

## Van Aarsen International

- Van Aarsen, a global leader in the design, development, manufacturing, and supply of machinery for feed mills and premix plants, has developed this manual to support feed millers in Bangladesh.
- **Van Aarsen presents 40 tips to ensure good hygiene practices within your feed mill.**

# 2A. Prevent contamination from entering

## Raw materials intake

1. The quality of ingredients used for feed production is important because what animals eat can affect the quality of meat and eggs. The ingredient quality control of a feed mill is an important first step in safeguarding the health of animals on the farm.
2. Cleaning during intake of the (raw) materials to prevent feed contamination and damage to the equipment.

## Air handling

3. The feed milling facility's air handling system should be segregated by location. Air inlet areas for pellet cooling can be a major source of microbial contamination and should be designed and located to minimize contamination of finished pellets by providing clean incoming air.
4. All intake air for the process passes HEPA filters (anti bacteria filters) at entrance to the process as for cooling and hot air sterilization of the pelleting lines.
5. Air handling systems should be cleaned thoroughly on a scheduled basis.



# Prevent contamination from entering



## Water Usage

6. Water used in feed production should meet hygienic standards and must be of suitable quality for animals.

## Process control

7. Automatic sample taking raw materials before intake to check material quality.



## 2B. Prevent contamination within the feed mill

8. Buildings and equipment used to process feed and raw materials should be constructed in a manner that permits ease of operation, maintenance and cleaning and minimizes feed contamination.
9. Process flow within the feed mill should be designed to minimize feed contamination.
10. Each feed processing line may be physically separated by placing them each in separate compartments to prevent or minimize cross contamination through the air between the feed processing lines.



## Storage

11. Storage areas for raw materials and finished products should be separated to prevent cross contamination.
12. Storage of raw materials, processed materials and finished feed in round or rounded silo's, bins and hoppers to prevent sticking of materials (creating mass flow in the silo).
13. Bin cleanliness in the feed storage area is essential and should be monitored on a regular basis.
14. C.I.P. (Cleaning In Place) units in every liquid storage tank for optimum cleaning when changing or refilling liquids.



## Transport

15. All piping executed in round piping with flow angles >60 degr. to prevent sticking of materials and optimum product flow through the process lines.
16. Transport equipment such as bucket elevators and chain conveyors are equipped with anti-contamination bottoms and heads to minimize the residue of materials.
17. Application of Stainless Steel parts to prevent contamination and corrosion caused by condense or aggressive products.

## Dosing

18. 100% automated dosing of all feed formula components (no hand tipping).



## Mixing

19. Only dry mixing of the formula components in the mixing stage, to minimize contamination in the batch mixer and to maintain optimum mixing homogeneity.



## Pelleting

20. Application of a closed oil lubrication system, eliminating contamination of the feed with grease.
21. Application of food grade grease and oils.

## Coolers

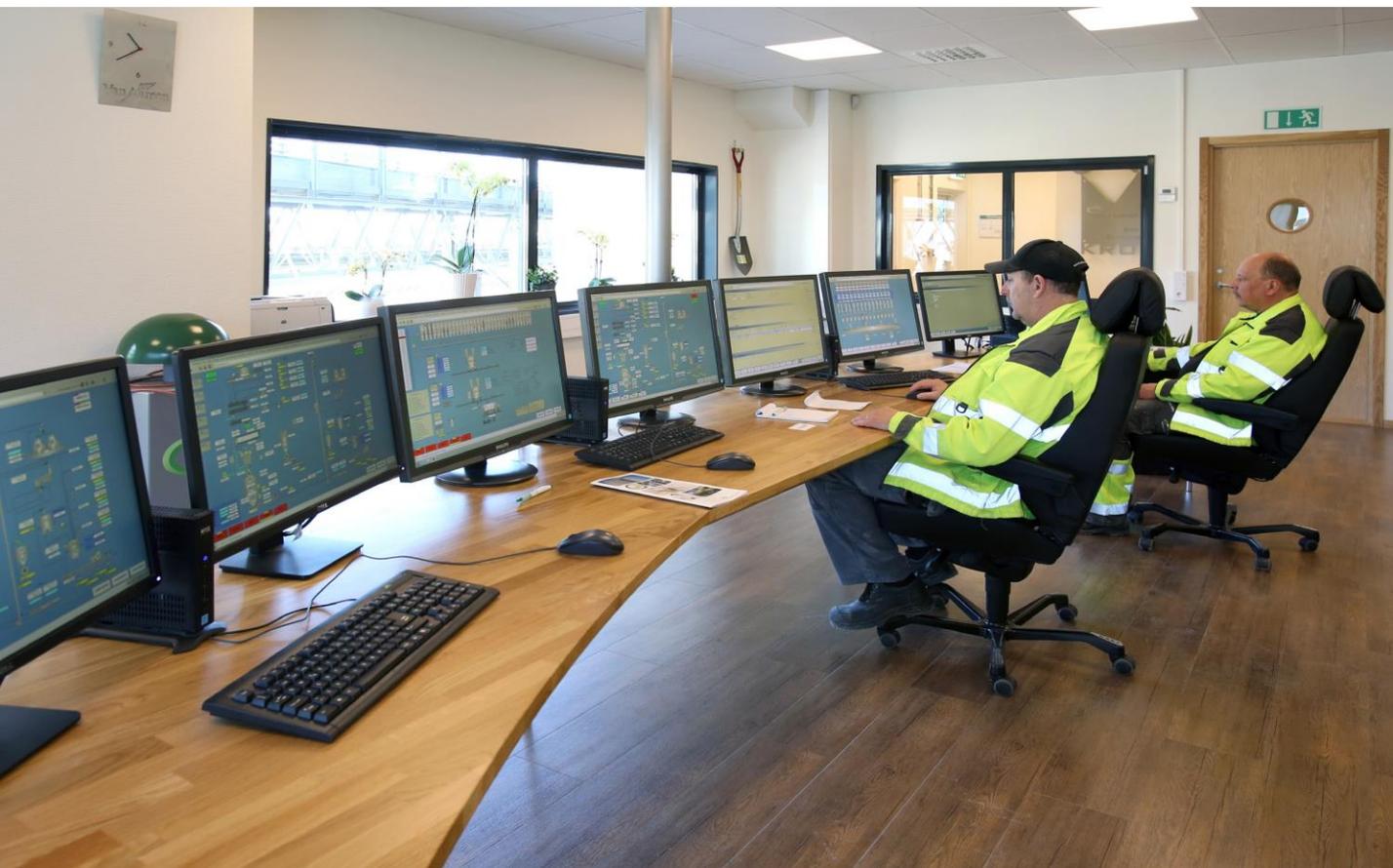
22. Coolers placed in sealed rooms with overpressure atmosphere to prevent cross contamination through air.
23. Camera guarding inside the coolers for easy checking complete emptying of the

## Air handling

- 24. Separated aspiration air outlet channels for dry and wet process steps and process lines to prevent cross contamination inside the channels.
- 25. Decentralized aspiration on all transport equipment.

## Process control

- 26. Anti-contamination software. Safe flow of recipes in relation to contamination.
- 27. Safe control by weighing silos and bins in each process step to prevent cross contamination caused by residues.
- 28. Automatic sample taking in every feed processing step up to and until truck loading to control, track and trace the feed production performance.



## 2C. Dust control and optimum House keeping

29. Care should be taken to minimize deterioration and spoilage at all stages of handling, storage and transport of feed and feed ingredients.
30. Feed spills should be cleaned up immediately.
31. Special attention to the internal and external finishing of equipment and installation parts such as internal smoothening of welds, closed profiles for supporting structures for equipment and inclined reinforcement ribbons to bins and hoppers for minimum dust collection and easy housekeeping.
32. Vertical placed cable trays to prevent dust collection.
33. Floors and walls in concrete structure with a finishing coating for optimum hygiene and housekeeping.
34. Vacuum cleaning system at each floor and compartment to enable frequently and easy housekeeping.



## 3. Kill pathogens

By the application of a long term vessel pathogens, such as Salmonella bacteria, will be killed. This process takes place when the temperature of the meal is higher than 85°C and a retention time lasts 4 minutes (240 sec) or longer.

This treatment is especially important for layer feed: Eggshells can contain Salmonella.



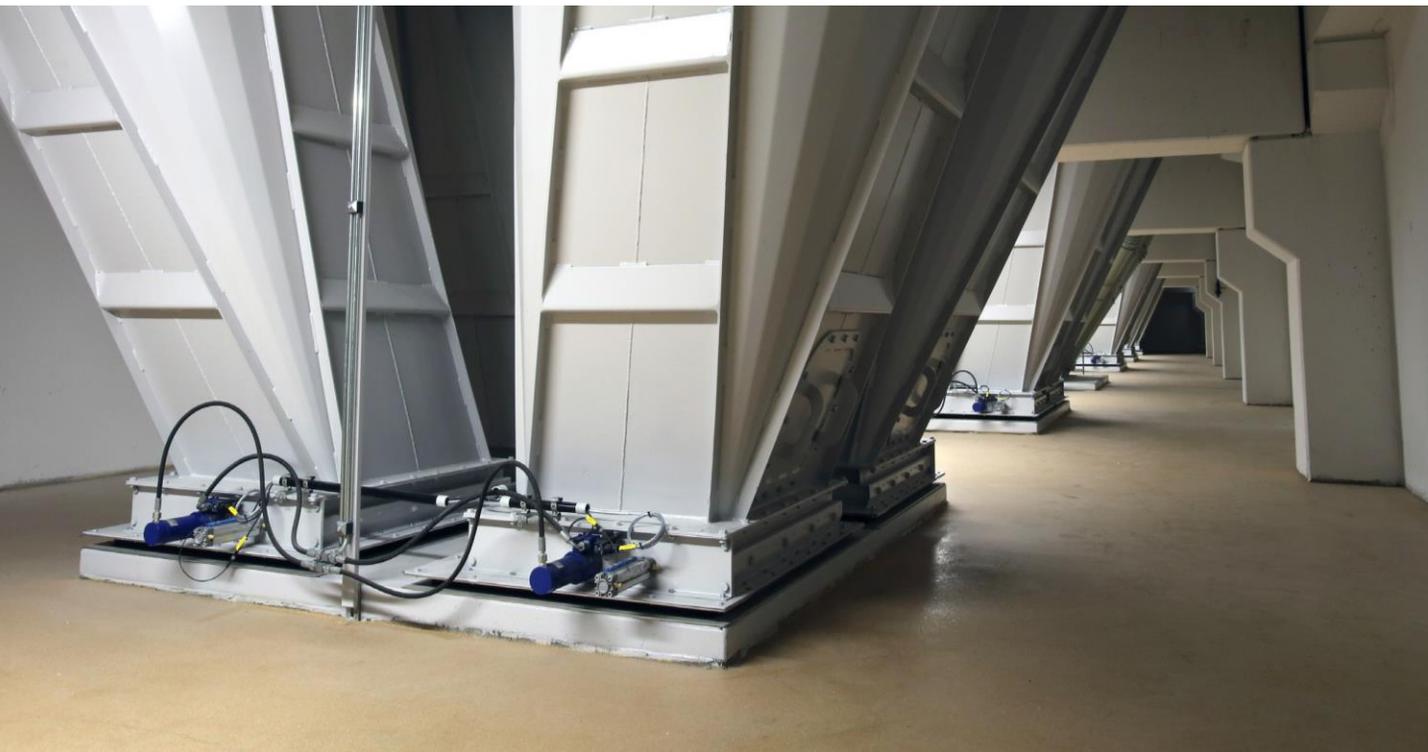
35. The Long Term Vessel conditioner, placed after the steam mixer, significantly improves the process of feed conditioning. This has a major effect on biosecurity while also optimizing the nutritional quality of the feed and enhancing the pelletability of the product.
36. Hot start steam mixer guarantees a minimum demanded press meal temperature at start up, preventing spoilage of the first meal.

## 4. Prevent bacteria growth

Special precautions should be taken to limit fungal and bacterial growth in moist and semi-moist feed.

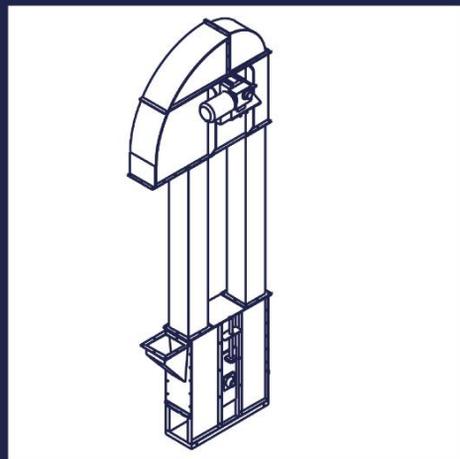
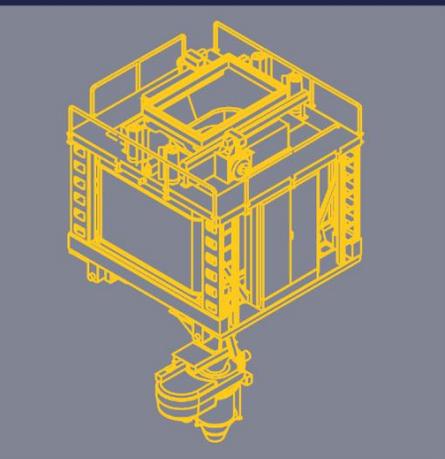
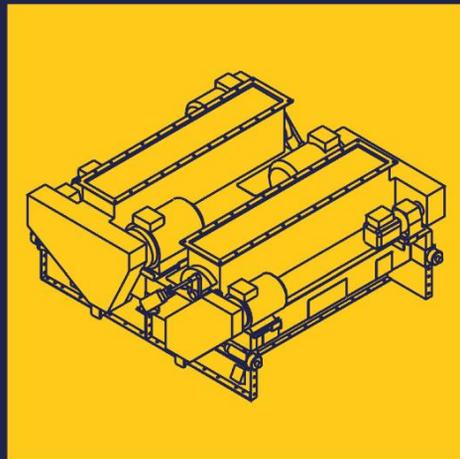
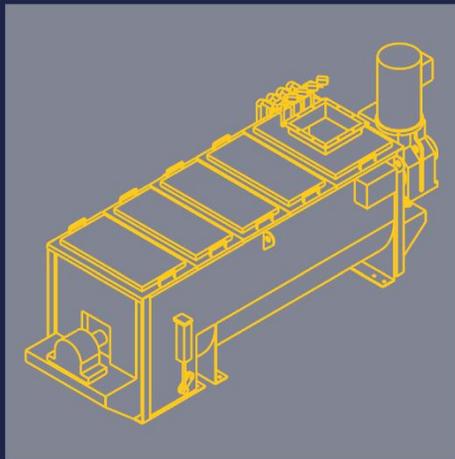
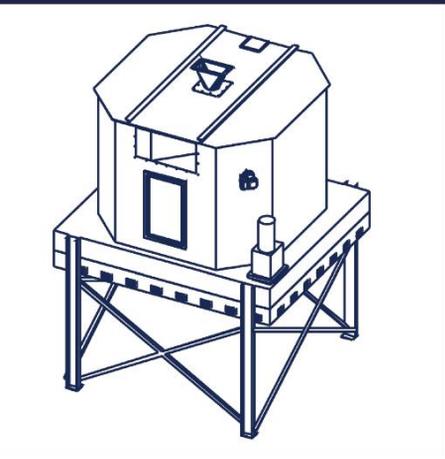
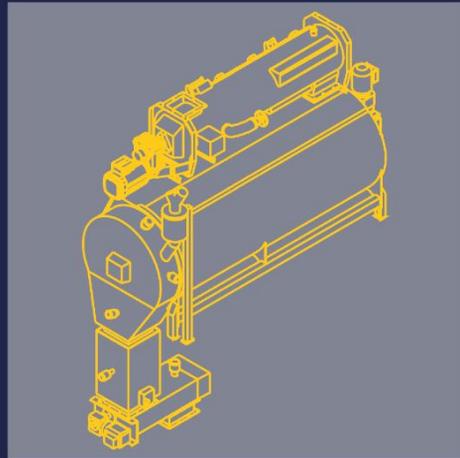
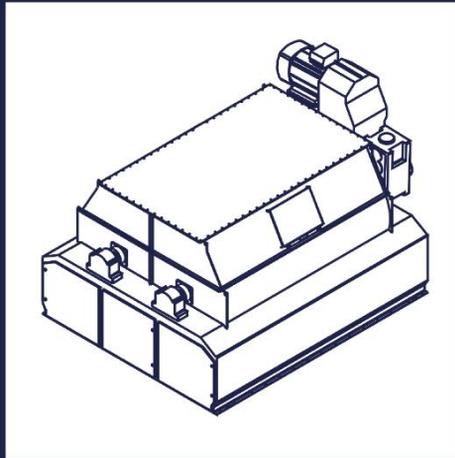
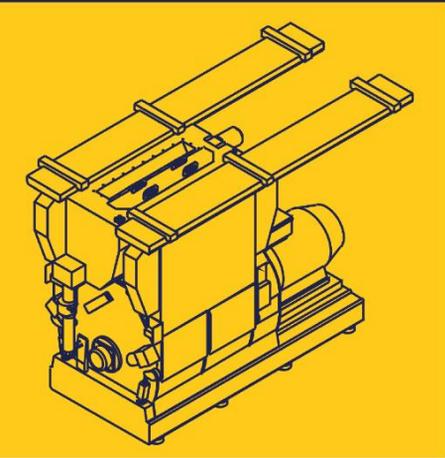
Condensation should be minimized.

37. Dry feed and feed ingredients should be kept dry in order to limit fungal and bacterial growth.
38. All equipment in the heat treating and cooling process stage carried out with tracing and insulation to maintain required process temperatures and prevent condensation inside the related process equipment.
39. Counter flow Hot Air for pre heating and sterilization of the pelleting lines.
40. Fully welded liquid and steam piping lines to guarantee leak less liquid dosing again to prevent bacteria growth.





# 5. Best practices



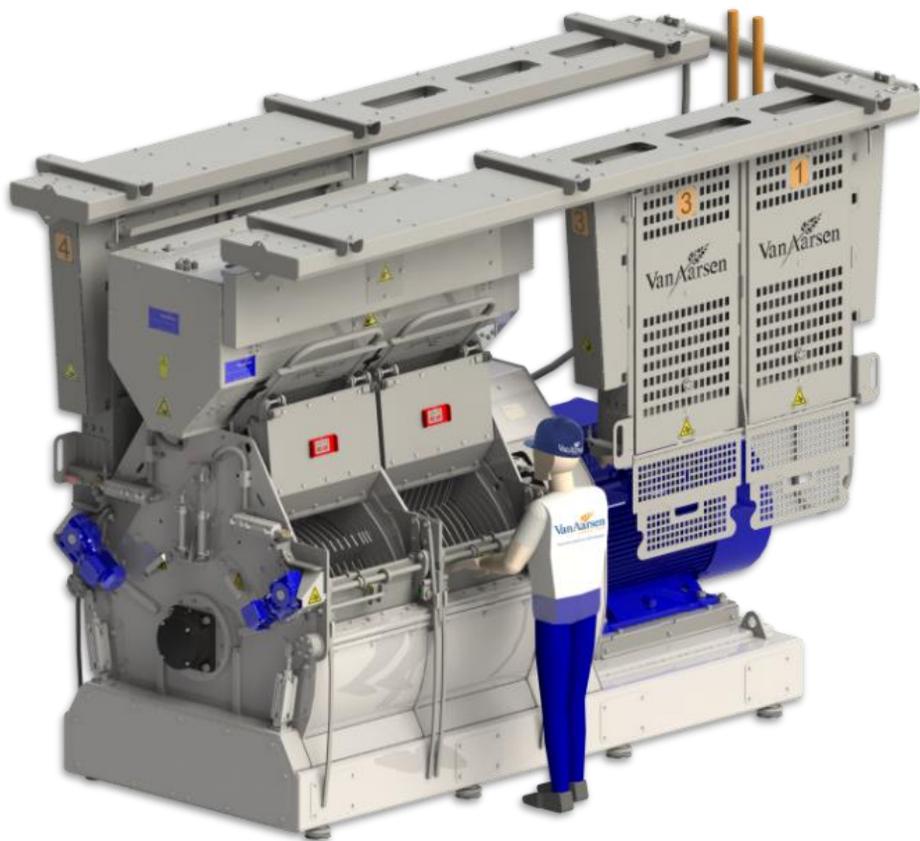
# Dosing units: SID- MID - PID

- Dosing and weighing small quantities of 'high value' ingredients.
- Compact design with 8 bins per unit.
- First in first out dosing with hydraulic operated slides.
- Weighing range 50 gram – 200 kg.
- Component accuracy up till 1 gram.



# Hammer mill GD

- Capacities range 20 – 50 tph, dependent on raw material, formula and required grinding structure.
- Compact, user friendly, low maintenance construction.
- Unique automatic screen exchange for 3 screens.
- Recipe controlled screen selection and rotor speed.
- Flexible production for structure milling.



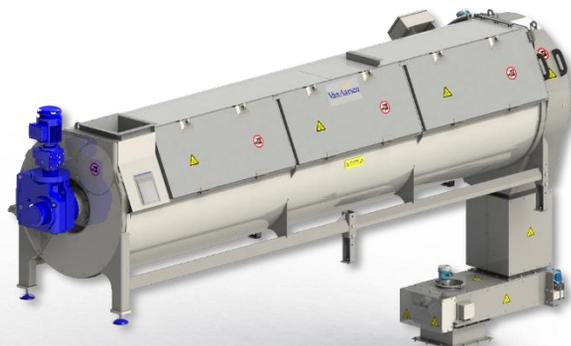
# MultiMix: Single & Double Shaft

- Different executions for feed, premix and coating purposes.
- Range from 1000 liter – 16.000 liter.
- Big bomb-door opening and beaters to minimize contamination.
- Filling possibility of 30% to 100% of nominal filling degree.
- Homogeneity: coefficient of variation < 5%.
- Easy cleaning of housing and paddles via inspection door.
- Liquid addition pipes with air cleaning.



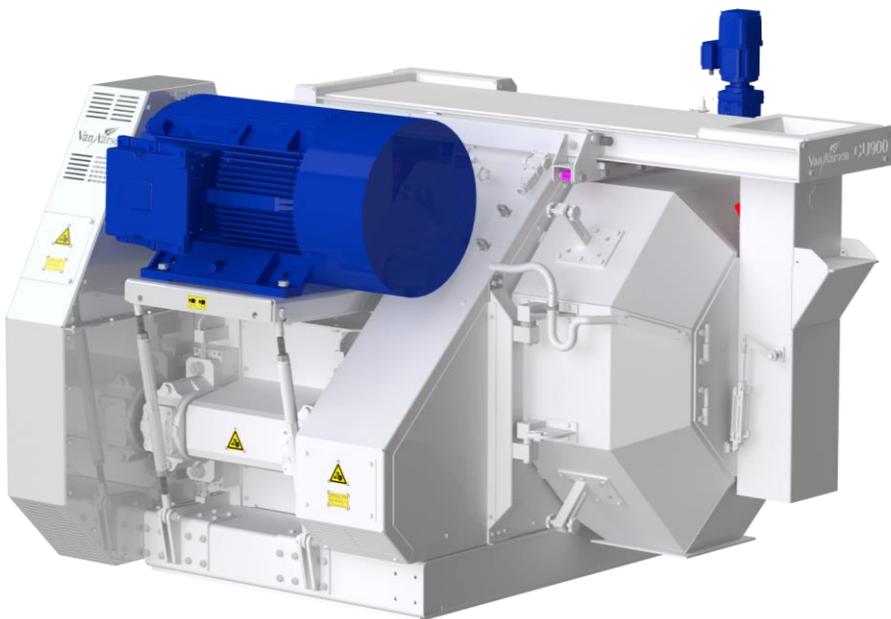
# Long Term Vessel

- Better physical (hardness and durability) quality of the pellets and mash are possible, in combination with a tuned recipe and die configuration.
- Variable retention time up to 4 min up to 90°C.
- Optimal product treatment due to LTV screw, guarantees first in - first out principle.
- Very low energy consumption (less than 0.25 kWh/ton).
- Up to 20% higher capacity (tons per hour) of the pellet mill.
- Up to 20% less energy consumption of the pellet mill.
- Wide range of raw materials, with more difficult gelatinization, can be processed.
- Optimal operation of LTV is fully integrated with pellet mill control.
- Ensures equal, continuous and accurate feeding of the pellet mill.
- Better performance of the animals (production, feed conversion as well as health status).



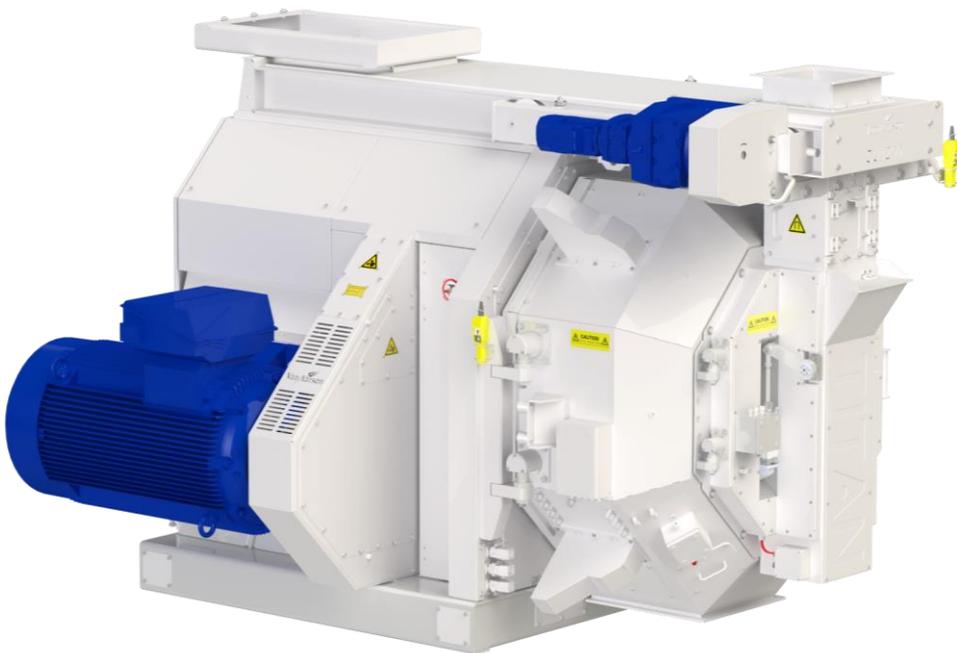
# Pellet mill: CU Dynamic

- High capacity up to 70 tph with good pellet quality.
- Large effective die surface to maximize capacity.
- Low operational costs per ton feed, even down to 1 €/ton, including dies, rollers and wear parts.
- CU Dynamic pellet mill:
  - Motor-operated roller adjustment provides a simple operation, with less wear and optimized operating conditions.
  - Active roller slip control to provide a trouble free and optimized pelleting process of all recipe.



# Pellet mill: CU1200

- CU1200 / 400 Dynamic with highest capacity.
- Compact symmetrical lay out with ‘Low Center of Gravity’.
- Die:
  - Diameter inside 1200 [mm].
  - Width 400 [mm].
  - Pelleting area 15080 [cm<sup>2</sup>].
- Rollers:
  - Quantity: 2.
  - Diameter inside 580 [mm].
- Main Motors: 2x 355kW.



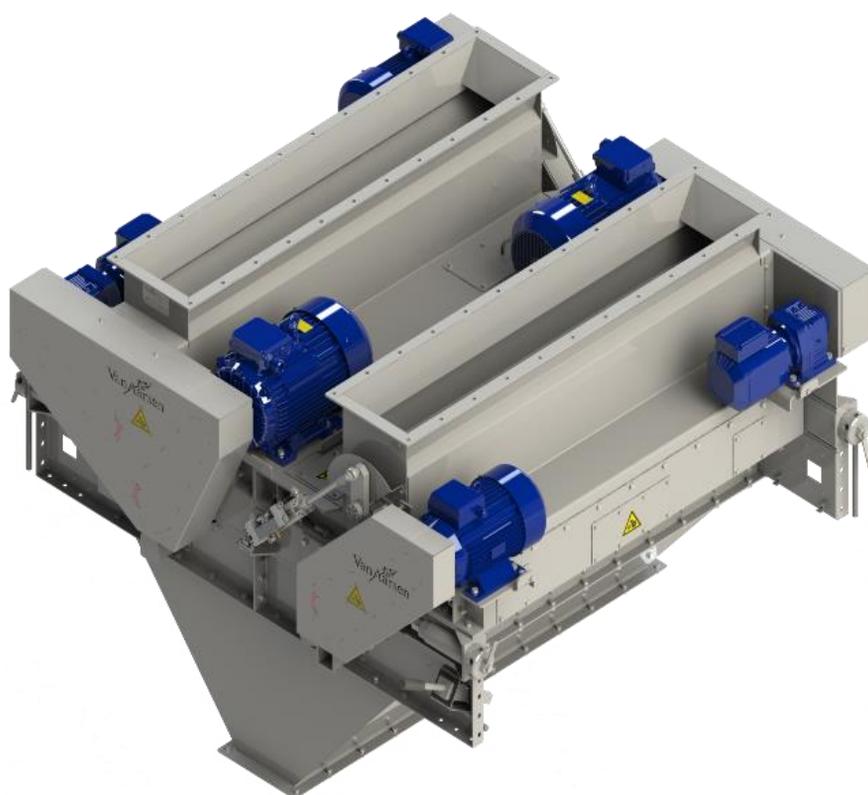
# Counter flow cooler

- Small footprint due to counterflow principle (invented by Van Aarsen).
- Low energy consumption (low air volumes).
- Continuous pellet discharge for optimal cooling process.
- Optimal pellet moisture content.
- Available and upgradable as double deck cooler for quick product change-over.



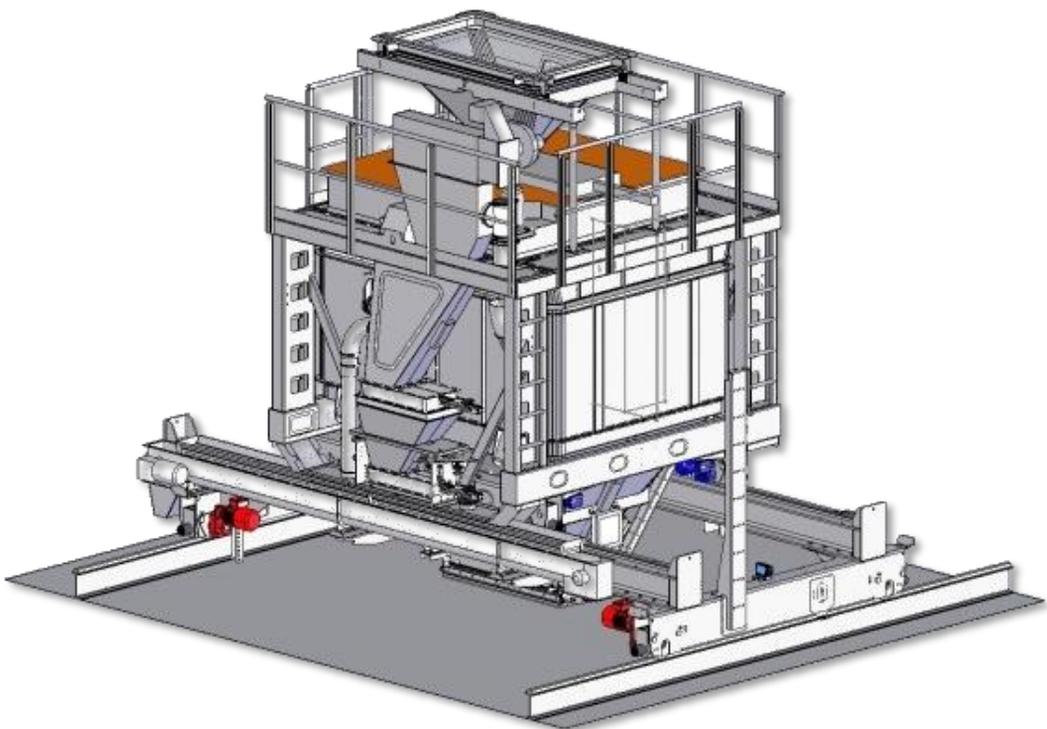
# Crumbler

- Continuous production of crumbles.
- Flexibility with regards to types of pellets and desired crumbs.
- Achieving optimum utilization of its capacity by separately driven dosing roller.
- Adjustable roller distance manual or automatic.
- By-pass device to divert the flow of pellets around the crumbler rollers (manual or air controller).



# Moveable Bulk robot weigher

- Fully automatic loading of bulk transport trucks with finished feed.
- Quick loading time without truck movements.
- Gentle product handling.
- Moveable bulk robot executions in both X and X-Y direction.
- Weighing capacity 4.000 kg to 6.000 kg.
- Positioning by laser technology.



# 6. Key differences between European and Bangladeshi feed mills

## Key differences between European and Bangladeshi Feed Mills: Insights for the future

Bangladesh's feed industry operates under different conditions compared to Europe, primarily due to differences in **labor costs, raw material availability, and industry trends**. Understanding these variations can help Bangladeshi feed millers **prepare for future challenges and optimize their operations**.

### Labor costs: A competitive advantage, but for how Long?

One of the biggest advantages for Bangladeshi feed mills is **lower labor costs** compared to Europe. However, as the industry grows and economic conditions evolve, labor costs **may increase over time**. To stay competitive, Bangladeshi feed millers should:

- Invest in automation where possible to reduce dependency on manual labor.
- Train workers in technical skills to improve efficiency and productivity.
- Plan ahead for potential wage increases by optimizing operational costs.
- While Bangladesh currently benefits from affordable labor, preparing for future changes will ensure long-term sustainability.



# 7. Recommendations for Bangladeshi feed millers

## Exploring alternative raw materials and residual flows

Bangladesh is **actively exploring substitutes for traditional raw materials** due to price fluctuations and supply chain limitations. There is also increasing interest in **utilizing residual flows from the food industry**, which can reduce costs and waste. Best practices for feed millers include:

- Testing and evaluating alternative ingredients to maintain feed quality and nutritional value.
- Collaborating with the food industry to secure reliable sources of by-products.
- Investing in research to assess the impact of alternative raw materials on animal performance.

Europe has already adopted **circular economy principles**, using food industry by-products efficiently. Bangladeshi feed mills can **learn from these strategies** to reduce dependency on costly imported raw materials.



# Recommendations for Bangladeshi feed millers

## Efficient feed milling

Efficient feed milling operations require careful planning and adherence to best practices to ensure product quality, operational efficiency, and food safety. Based on key challenges identified in the Bangladeshi market, we provide the following recommendations:

### 1. Proper piping angle for material flow

Many feed millers may not be aware that the minimum angle for piping in a feed mill should be **60 degrees**. This angle is essential to:

- Maintain a consistent flow of raw materials, reducing the risk of blockages.
- Prevent contamination due to residue buildup in improperly angled pipes.
- Improve overall efficiency in material handling.

It is recommended that all new installations and existing feed mills ensure their piping systems meet this standard to enhance operational performance.



# Recommendations for Bangladeshi feed millers

## 2. Contamination control and air filtration

Controlling contamination, particularly **Salmonella**, is crucial for producing safe and high-quality feed. To mitigate risks:

- Air from the cooler should be drawn in from outside the feed mill.
- This air must be filtered using a HEPA filter before entering the system.
- Regular maintenance and filter replacements should be scheduled to ensure continuous protection.

Implementing these measures will significantly reduce the likelihood of airborne contaminants affecting the final feed product.

## 3. Raw material cleaning at Intake

The most effective point for cleaning raw materials is **directly at the intake**. This ensures that contaminants and foreign particles are removed at the earliest stage. Recommended steps include:

- Installing magnets to capture metal fragments.
- Using a heavy part separator to remove stones, debris, and other unwanted materials.
- Ensuring routine inspection and maintenance of these cleaning systems.

This proactive approach will improve feed quality, prevent machinery wear, and enhance overall safety.



# Recommendations for Bangladeshi feed millers

## 4. Temperature Management and Condensation Prevention

Temperature control in feed mills is vital for maintaining equipment efficiency and preventing moisture-related issues such as condensation, which can lead to mold growth and product degradation. To mitigate these risks:

- Insulate equipment to regulate temperatures and reduce heat loss.
- Use electrical tracing where necessary to prevent moisture buildup.
- These measures will help in maintaining equipment longevity and ensuring consistent feed quality.

## 5. Proper handling of liquid additives

When adding liquids to feed formulations, **contamination risks must be minimized**. To achieve this:

- Use a separate liquid mixer after the batch mixer.
- Avoid adding liquids directly into the batch mixer, as it increases the risk of microbial contamination.
- By implementing a dedicated liquid mixing system, feed mills can maintain hygiene standards and improve the consistency of their final product.



## 8. Quiz - Test your knowledge!

**1. Air inlet areas for pellet cooling can be a source of microbial contamination, what is a solution for this problem?**

- a) Take the air from outside, integrate HEPA air filter in the cooling system.
- b) Place the air inlet in the feed mill.
- c) Take the air from outside, without filter.
- d) Pellet cooling can take place in the finished feed silo.

**2. What will help you to check the raw material quality before intake?**

- a) Get an approved document from the supplier.
- b) Automatic sample taking of raw materials before intake.
- c) Check the color of the raw material.
- d) Ask the driver of the truck.

**3. Storage of raw materials, in silos and hoppers to prevent sticking of materials needs to be in?**

- a) Round or rounded silo's.
- b) Square silo's and hoppers.
- c) Flexible plastic silo's and hoppers.
- d) Rectangle silo's and hoppers.

Results: 1. A | 2. B | 3. A



# Quiz - Test your knowledge!

**4. Minimum flow angles of piping to prevent sticking of materials and optimum product flow through the process line?**

- a) Minimum angle of  $>30^\circ$ .
- b) Minimum angle of  $>45^\circ$ .
- c) Minimum angle of  $>60^\circ$ .
- d) Minimum angle of  $>75^\circ$ .

**5. How mix formula components in the mixing stage, minimize contamination and maintain mixing homogeneity?**

- a) Add all liquids to the batch mixer.
- b) Add also molasse in the batch mixer.
- c) Add steam to the batch mixer.
- d) Only dry mixing.

**6. How shall we place cable trays to prevent dust collection?**

- a) In a Vertical placed open cable tray.
- b) In a Horizontal flat placed open cable tray.
- c) In a completely closed tray.
- d) In a round tube.

Results: 4.C | 5.D | 6.A



# Quiz - Test your knowledge!

**7. What improves the process of feed conditioning and significantly effects biosecurity and optimizes the nutritiona?**

- a) A single steam mixer.
- b) A Long-term vessel, placed after the steam mixer.
- c) A double steam mixer.
- d) A triple steam mixer.

**8. How to maintain equipment temperatures and prevent condensation in heat treatment?**

- a) Use stainless steel.
- b) Use aluminum sheet plate.
- c) Carried out with tracing and insulation.
- d) Heating up the complete feed mill.

**9. Where is the best place to clean the raw materials?**

- a) Directly at the farmer during earning time.
- b) By the intake directly.
- c) Before the dosing weigher.
- d) Before the batch mixer.

**10. What is the best way to keep the floor clean in a feed mill?**

- a) Sweep every day with a broom.
- b) Clean every day with water.
- c) A vacuum cleaning system on each floor.
- d) Spray clean air with an air compressor.

Results: 7.B | 8.C | 9.B | 10.C



# 9. Van Aarsen International

To define the optimal set of measures for ensure good hygiene practices it is important to take into account all relevant parameters of the feed milling process and the formulas produced.

Our representatives will gladly help you to define the best solution for the specific requirements of your feed mill production process.

Van Aarsen International supplies machines and complete factories for the sustainable production of compound feed. We offer the certainty of an investment that provides maximum added value.

We design and construct feed milling projects with a great diversity of high-quality innovative machinery. Our systems are developed to lift production and lower operational costs with focus on minimizing maintenance and energy consumption and maximizing food safety and ease of operation

*Sources:*

*The United Nations Food and Agriculture Organisation Manual of Good Practices for the Feed Industry. The Institute of Food and Agricultural Sciences. Minimizing Microbial Contamination in Feed Mills Producing Poultry Feed. Experience from worldwide installed feed mills – Van Aarsen International – the Netherlands.*

