



**The Batching
Experts**

Challenges in Batching in Animal Nutrition Plants

Understanding Complexity, Tackling Inefficiency and Embracing Automation

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Batching is a critical process in the manufacturing of animal nutrition, impacting product consistency, efficiency, cost management, and overall quality. A proper batching 'system'(or process) ensures that raw materials are combined in the correct proportions to produce consistent, high-quality products that meet industry standards and consumer expectations. This relates to collecting and weighing all bulk, major, micro and nano ingredients and mixing them until the mix is ready for the next steps in the process.

This white paper provides an in-depth overview of the challenges in batching in animal nutrition plants (feed, pet food and premix), exploring its importance, common practices, challenges, technological advancements, and the rising concern of labor shortages that affect plant operations.



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Introduction

The animal nutrition industry has evolved rapidly over the last few decades, and this goes also for both the end-products, as for the manufacturing process. The market for animal nutrition is getting more demanding and more “humanized”. Pet owners increasingly treat their animals as family members. This means they also care what their pets eat. They want to know which ingredients are used and where those ingredients come from. They want a product that is produced in a responsible and sustainable way. This is similar for the farmers who care about the animals they feed, and who rely on a healthy business case too.

Besides a safe and healthy product, we also need to provide a working environment that is safe and healthy for our employees. In many regions, it is increasingly difficult and costly to find workers for manual labor. And if you do find these workers, there is always the risk that they make mistakes. The batching process is highly influential and critical to overall production success. As pet owners increasingly demand high-quality, nutritious, and

safe food for their animals, the need for optimized and efficient production processes has become paramount.

One of the essential operations in the production of animal food is the batching process. Batching involves the precise mixing of raw materials such as grains, vegetables, vitamins, minerals, and additives to form a homogenous mixture. This mixture then undergoes further processing, such as pelleting or extrusion, and drying or cooling, to create the final product.

Approximately 95% of the raw material in batched products contain macro ingredients like grains and legumes, and just 5% are vitamins, minerals and other additives, called micros. This 5% of the raw material volume, the micros, entail 65% of all dosings, 75% of the ingredients, 80% of the ingredients’ costs and 90% of the added value. This means it is 100% important for the final result.

Purpose of this White Paper

This white paper aims to provide manufacturers, plant managers, process engineers, and other industry stakeholders with actionable insights for improving batching processes in animal nutrition plants. For companies looking to remain competitive and compliant with industry standards, focusing on the optimization of batching systems is a critical step toward success.

The paper covers the importance and principles of batching challenges faced in the process, the latest advancements in batching technology, and best practices for optimizing efficiency and product quality.





The Value of Batching in Producing Animal Food

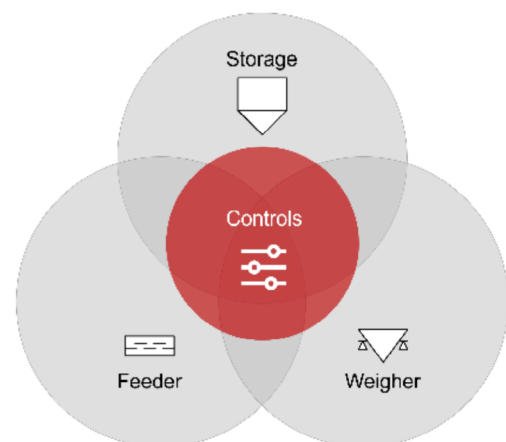
Batching is one of the first critical steps in the production of quality animal food. Properly executed batching ensures:

1. **Consistent Quality:** Accurate ingredient measuring and mixing ensures each batch has the same nutritional content, flavor, and texture.
2. **Compliance with Regulations:** Consistent formulation supports adherence to strict safety and nutritional guidelines in animal food production.
3. **Cost Management:** Precise batching minimizes raw material overuse and waste, helping control ingredient costs.
4. **Increased Efficiency:** Automated batching increases throughput and reduces labor requirements, lowering the risk of human error.
5. **Safe and Healthy Working Conditions:** Automation that reduces dust and heavy lifting creates a safer work environment and improves employee satisfaction.

Key Batching Process Steps in Animal Food Manufacturing

Correct Ingredient Weighing

The first step in the batching process involves bringing the correct raw ingredients in the designated silos/bins. Incorrect product in means incorrect product out, and for tracking and tracing this is an important step. The second step is taking the right ingredients and weighing all these to ensure the correct proportions are used. This step is critical for the consistency of the final product. In animal nutrition plants, automated weighing stations are commonly used to minimize human error and improve accuracy, but manual labor still occurs on a large scale in the process of filling bins and in the weighing process. It is



important to remember that storage, feeder, weigher and the controls all have their impact on the final product.

For correct ingredient weighing, there are multiple aspects important to be successful. This is called the synergy of dosing, because only where these aspects are synchronized, the result will be optimal. How the silos/bins are filled and shaped is important to get the oldest products out first.

The feeder is critically important because this dictates the range from smallest inclusion to the biggest inclusion, it dictates the product flow out of the silo and the bigger the range, the fewer scales you need. Ranges can be 1:20 but can also be 1:1000. A wider range means a single feeder can handle both micro-ingredients and macro-ingredients, reducing the number of separate scales required.

Another key factor is the scale / weigher. How accurate can this scale weigh, and also here are techniques like the weigher in weigher concept, where the most delicate products and smallest inclusions are weighed in a small scale, and bigger inclusions in the bigger scale, all inside the same weigher. This increases the range and accuracy without adding an additional weigher, saving costs and precious floor and silo space. The batching controls and algorithms make sure all components involved, are working optimally and the results are accurate (=quality), fast (=capacity) and consistent (=always the same result).

Ingredient Transfer and Mixing

Once the ingredients are weighed, they are transferred to a mixing station. The transfer is often automated, and conveyors are used to move raw materials to the mixing station. The ingredients are then mixed to create a homogeneous mix.

Depending on the formulation, multiple stages of mixing may be required, including pre-mixing for dry ingredients (in case of pet food) and wet mixing for liquids.

Flexibility and Recipe Adjustments

Most animal food recipes require fine-tuning, especially when new ingredients are introduced, or formulation changes are made. The batching system allows flexibility for recipe adjustments without compromising product quality.

In-process Sampling and Monitoring

Throughout the batching process, samples are often taken from each batch to ensure they meet the specified standards. Quality control checks are performed on several parameters, including the consistency of texture, moisture content, and nutritional profile. Automated systems are increasingly used to track these parameters in real-time.

Post-mixing Batch Verification and Corrective Adjustments

Once mixing is completed, batch verification is performed. If the desired product (e.g., appearance, texture, or nutritional composition) is not achieved, adjustments can still be made before moving on to the next production step. This may involve making formula adjustments or reworking the batch – and in worst cases, scrapping it entirely.



Challenges in Batching in Pet-food & Premix Manufacturing

Ingredient Variability and Availability

Raw materials may vary in moisture content, particle size, and composition, which can lead to inconsistencies in the final product. Managing ingredient availability, quality and ensuring uniformity in batch composition are significant challenges for manufacturers of animal nutrition.

Batch Size and Flexibility

Many petfood and premix plants must manage multiple batch sizes due to varying order volumes, product types, and customer requirements. Balancing production efficiency with flexibility in batch size and batch content can be difficult.

Automating the batching process with equipment (silo, feeder, weigher and controls) that can handle the widest weight range and variety of products, including movable scales, is key for successful batching.

Mixing Efficiency

Poor mixing can result in unevenly distributed nutrients and ingredients, impacting the nutritional content and taste of the Animal Food product. Poor mixing can also result in de-mixing. Achieving uniform mixing while maintaining throughput is a critical challenge.

Traceability and Registration

Maintaining accurate records for each batch is essential for compliance with regulatory standards. Traceability is also critical in the event of product recall. However, manual data entry errors or incomplete documentation can create significant problems for manufacturers.

Time Management and Downtime

Batching processes often require significant downtime between different stages of production orders, which can impact overall efficiency. Reducing downtime and optimizing batch cycle times is crucial for maximizing production capacity.

Labor Shortages

Labor shortages are becoming a very critical issue in manufacturing industries globally, and petfood and premix plants are no exception. Skilled labor shortages, particularly in batching operations, can disrupt production schedules and lead to operational inefficiencies. The high turnover rate in the manufacturing workforce, along with the increasing demand for skilled workers in other sectors, has created a competitive environment for recruitment and retention. This problem is worsened by the reliance on manual processes in some areas of batching, which require trained staff for precise operations and quality control.



Labor shortages can lead to the following issues in petfood and premix manufacturing:

1. **Increased Risk of Human Error:** When there is a shortage of skilled labor, the risk of errors in filling bins, weighing, mixing, and processing ingredients increases, which could compromise product quality and consistency.
2. **Production Delays:** Lack of adequate staffing can cause delays in batch preparation, leading to extended production cycles and lower throughput.
3. **Reduced Ability to Scale Operations:** Labor shortages can hinder the ability to scale operations quickly in response to growing demand or changes in production volume.
4. **Delay, Reduction or Elimination of Cleaning and Maintenance:** With fewer people doing the work, it is often seen that cleaning and preventive maintenance are moved to a later moment or disappear out of sight, resulting in an unhygienic process, contamination and downtime as minor technical maintenance work is not performed leading to more complex failures.

Technological Advancements in Batching

Automated batching systems have revolutionized the petfood and premix manufacturing industry. These systems can weigh, transfer, and mix ingredients with high precision, reducing human error and increasing throughput. The integration of sensors, scales, and automated conveyors allows for real-time monitoring of the batching process, enabling manufacturers to identify potential issues and make adjustments on the fly.

Digital batch management systems track the entire process, from ingredient intake, weighing to final mixing and quality control. These systems allow manufacturers to maintain detailed records of each batch, ensuring compliance with regulations and providing valuable data for future process optimization.

AI-powered systems are increasingly used to predict and optimize batching outcomes. By analyzing historical data, and general industry data, AI can be used in the dosing algorithm, guiding the feeder and predicting the flowability of the ingredient in the bins.

More automated batching systems can be **connected to the internet**. This enables equipment manufacturers to support their clients remotely and increase serviceability. Equipment suppliers who have a 24/7 support service can support clients producing 24/7 and can follow the global players in all locations worldwide.



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Best Practices for Optimizing Batching in Animal Food Plants

Automated Batching Systems

Automated systems help to reduce human error, enhance consistency, and increase quality and production speed. The right automated batching systems also increase the plant's overall flexibility. Best batching systems offer a feeder with a wide dosing (smallest to biggest inclusion 1:1000 ratio) and weighing range (increase reach by using weigher inside weigher technique) and can collect raw ingredients from a big number of bins (for example movable scales).

Barcoding Systems

Barcoding systems and RFID systems help using the right products and prevent human error, while additional advantages are the traceability and First-In-First-Out stock management (oldest raw ingredients are used first, products stored in a proper way, able to be found quickly, etc.).

Use the Best Suitable Transfer Systems

after collecting the right raw ingredients, the batch needs to be transferred to the mixer and multiple types of systems are being used. Chain conveyors, pneumatic lines and container transfer are some alternatives. Choosing the right systems can prevent de-mixing, product damage and cross contamination and can prevent future callbacks.

Monitor Ingredient Quality

Regular testing and inspection of raw materials can mitigate variability in ingredients such as moisture content, particle size, and contaminants. This helps maintain consistent product performance and prevents quality issues downstream.

Optimize Mixing

Use advanced mixing technologies with automated controls to ensure uniform distribution of ingredients, minimize batch-to-batch variation, and improve consistency across production runs.

Ensure Raw Material Traceability

Digital tracking systems (e.g., barcoding or RFID) can be used to log material origins, lot numbers, and usage history. This supports rapid response to quality issues, simplifies audits, and strengthens regulatory compliance.

Reduce Downtime

By implementing preventive maintenance and cleaning strategies and streamlining equipment setup, possible production interruptions are minimized and overall plant uptime is increased.



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Plant Control and MES System

Implement a plant control system that can control, monitor and analyze production results, supports the flexibility needed in switching client orders, formulas, and provides track and tracing information to name a few. A strong plant control system supports in controlling the process, instead of the other way around.



Hidden Costs of Incorrect Batching

Incorrect batching in pet food production can have several costly consequences for companies. Here are the key costs associated with errors in batching:

Wasted Ingredients

Overuse of Ingredients: If ingredients are added in excess, it results in material waste. This can be expensive, especially in the case of vitamins and minerals, if the ingredients are premium or specialized for specific pet needs (e.g., for allergies or sensitive digestion).

Underuse of Ingredients: When the correct proportions aren't followed, it might lead to a shortage of essential ingredients, meaning the batch could be under nourishing for pets, or require additional purchases to correct the imbalance.

During the batching process, dust can create challenges and therefore dust extraction is an important detail in the process. Dust can be collected and dumped as trash, but can also be released in the actual batch, which reduces waste.

Production Downtime

When an incorrect batch is identified, the production line may need to be stopped to fix the issue. This downtime delays the overall production, leading to lost productivity and potentially delayed shipments.

If the incorrect batch can't be reprocessed or corrected, it may need to be discarded entirely, leading to a direct financial loss. Reworking a batch, if possible, involves additional labor, resources, and time to correct the mistake.

Quality Control and Testing

Re-running tests or adjusting the batch for quality assurance purposes adds labor and testing costs. Additionally, the company may need to repeat quality control on every affected batch to ensure safety, which increases operating costs.



Regulatory Compliance Issues

Pet food is highly regulated, and any errors in formulation could lead to non-compliance with safety standards or nutritional requirements. If the product doesn't meet regulations, it could result in fines or the need for costly recalls.

Recalls are expensive not only in terms of direct costs (e.g., retrieving and destroying the product) but also in terms of damage to the brand's reputation.

Customer Complaints and Brand Damage

Incorrect batching can lead to product recalls, customer complaints, and damage to the company's reputation, which can be long-term and costly.

A company that sells substandard or incorrect pet food risks customer trust, which can result in lost future sales, negative reviews, and the potential need for expensive marketing to regain customer confidence.

Legal Risks

If the incorrect batching results in harm (e.g., health issues for pets), the company might face lawsuits, insurance claims, and legal fees. Pet food companies must adhere to strict safety standards, and failure to comply can lead to litigation.

Inventory Loss

Incorrect batching might lead to an excess or shortage of stock. If too much of a specific product is made and cannot be sold (e.g., due to the wrong nutritional composition), it may need to be discarded, resulting in inventory loss.

Incorrect Transfer of Products

Incorrect transfer of products can lead to product damage because products heat up, are damaged because of the speed of transferring or can contaminate, and when un-noticed could lead to deaths of animals.

Increased Operational Costs

Incorrect batches often require more human labor to monitor, test, and adjust the process. Additionally, it can lead to extra paperwork or tracking to identify and resolve problems.

Loss of Market Share

Continuous batching errors or quality concerns can lead to consumers switching to other brands, resulting in lost market share and long-term financial repercussions.

The costs of incorrect batching in pet food companies are multifaceted and can significantly impact both short-term operational efficiency and long-term brand reputation and financial health. Proper batching systems and quality controls are essential to minimizing these risks.

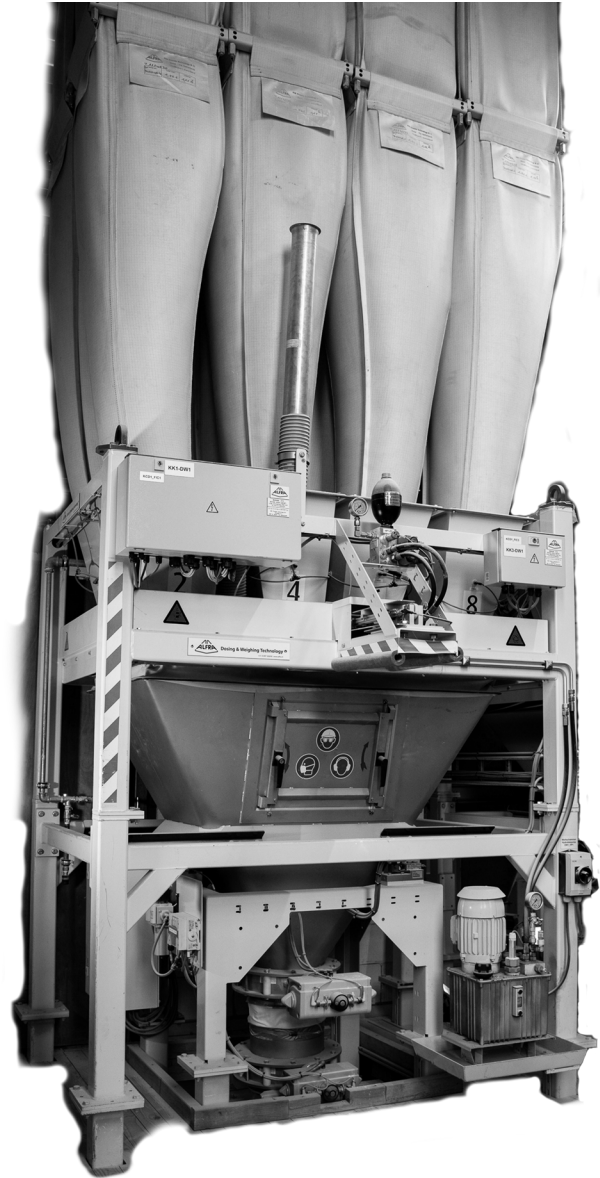


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Conclusion

Batching in animal nutrition plants plays a crucial role in ensuring the consistent production of high-quality food/feed products. Whilst there are significant challenges associated with batching, advancements in automation, digital systems, and data analytics are transforming how feed and food manufacturers approach this process.

By adopting best practices and leveraging new technologies such as feeders with a wide range that provide both speed and accuracy, equipment that provides flexibility and operates without human interference, and implementing the correct control systems, animal nutrition manufacturers can enhance product consistency, improve operational efficiency, and meet the evolving demands of pet owners.





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Improving your own (manual) batching system into a structured system?

Dive into your own batching process and see what improvements you can make. Many global petfood and premix manufactures have chosen KSE – The Batching Experts, as their preferred supplier, because of the extensive knowledge they have gathered at many petfood and premix facilities worldwide.

With extensive knowledge in designing processes, and extensive range of batching equipment and automation controls, KSE is the go-to partner for an optimized batching process and capable of resolving the challenges mentioned above.

Visit us at Petfood Forum to discover how we can help take your batching process to the next level!

Let's talk about your goals and challenges and see our solutions in action, and meet the team behind the innovation. Visit us at booth #1627.