STATE OF AI

IN THE DAIRY INDUSTRY

Insights from the Conversations Between Dairy Leaders and Global Technologists at the 2024 DairyTech Conference

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FOREWORD

By Tom Edwards, Americas Consumer AI Leader, EY

The dairy industry stands at an inflection point, where tradition meets transformation. As I highlighted during my keynote address at DairyTech, artificial intelligence (AI) is no longer just a concept on the horizon—it's a powerful force actively reshaping how we approach dairy processing and supply chain management.

At its core, the adoption of AI is driven by our universal need for ease and convenience. In the dairy industry, this translates into practical solutions that optimize operations and improve outcomes. From wearable technologies monitoring herd health to AI-driven predictive analytics revolutionizing supply chains, the potential applications are vast. These technologies not only reduce costs but also pave the way for smarter, more sustainable practices that benefit producers, processors, and consumers alike.

We are living in what I call a "golden age of AI." The advancements in natural language processing, machine learning, and intelligent automation are enabling us to reimagine processes once thought immutable. In dairy, this means moving from siloed operations to integrated systems that can predict, adapt, and innovate. This report, State of AI in the Dairy Industry, provides a status update on the most impactful areas where AI can elevate our industry—from streamlining efficiencies to enhancing the end-to-end supply chain—taken from the conversations of the professionals who attended DairyTech.

As I've seen across industries, organizations are progressing through stages of AI adoption—education, experimentation, and scaling innovation. The dairy sector is no exception. To remain competitive and meet the demands of modern consumers, we must embrace this transformative technology. AI offers us the opportunity not just to respond to challenges but to anticipate and lead through them.

It's an exciting time for dairy, and this report provides the insights and inspiration needed to harness AI's potential. Together, let's take the next steps toward a more resilient, efficient, and sustainable future.

USE OF AI TECHNOLOGY

This report was developed with the support of artificial intelligence. IDFA utilized AI-based notetakers during the 2024 DairyTech conference to record remarks made during 4 main-stage panel discussions and 14 breakout sessions among conference attendees. These summaries were then edited by hand to extract relevant points and add organization, then run through additional AI-based tools to create a summary and narrative text. The final text was then checked for accuracy and lightly edited.

EXECUTIVE SUMMARY

The State of AI in the Dairy Industry underscores the transformative potential of AI across the dairy industry. From improving operational efficiency to enabling sustainability and fostering innovation, AI is poised to redefine how dairy businesses operate and compete. Yet the dairy industry is in the early stages of exploring AI, with much of the focus being placed on good governance and return on investment (ROI). Industry professionals are aware of the competitive advantages that AI tools can offer, and most are seeking real-world solutions to implement these applications.

There is a clear desire among professionals for practical guidance on how to incorporate AI, especially when it comes to tools and systems for analyzing data. However, the information available on AI is often overwhelming, leaving many without actionable steps to move forward. Despite the challenges that come with implementing such significant change, there is a strong interest in the potential benefits that AI could bring to various sectors of the industry, including purchasing, warehousing, and operations. Security and control over data were concerns, with some suggesting that AI initiatives should begin on a small scale, gradually expanding as they prove successful.

Conference speakers and attendees identified industry collaboration and shared goals as critical elements for optimizing operations and driving global growth for the dairy industry. Early planning and a mutual understanding of each organization's needs and expectations are seen as fundamental to creating a pathway for success. In the United States alone, more than $8 billion has been invested in new processing capacity in recent years. Shared investment and collaboration in AI initiatives may offer a way to achieve common goals and increase the likelihood of success.

AI adoption is not without obstacles. Many dairy businesses rely on outdated software, and costs for data collection tools can be a significant barrier to effective data integration. Resistance to new technologies, concerns about job displacement, and data privacy issues further complicate adoption. Addressing these challenges requires clear communication, targeted education, and a commitment to change management.

For dairy businesses to fully embrace AI, DairyTech attendees recommended the following:

1. Enhance Data Readiness: Assess current data practices, clean and centralize data, and ensure readiness for AI analysis.

2. Leverage Expertise: Collaborate with data scientists and AI providers to identify and implement impactful solutions.

3. Educate and Engage: Develop training programs to ease resistance and emphasize the value of AI tools in reducing workloads and enabling strategic tasks. Allow teams to suggest specific problems or inefficiencies within their processes that AI could potentially address.

4. Start with Quick Wins: Focus on high-impact applications, such as inventory optimization and predictive analytics, to build confidence and demonstrate ROI.

5. Define Metrics: Establish KPIs and benchmarks to measure the success of AI implementations and ensure ongoing improvements.

6. Foster Collaboration: Encourage data-sharing initiatives to enhance efficiency and innovation across the industry.

AI represents a game-changing opportunity for the dairy industry, enabling businesses to enhance efficiency, sustainability, and innovation. With the right strategies, leadership, and collaboration, the dairy sector can unlock AI's full potential to drive long-term growth and resilience.

KEY CONVERSATIONS
DATA COLLECTION AND HANDLING

DairyTech discussions about improving operational efficiency within the dairy industry highlighted the importance of analyzing data and using real-time measurements to guide decision-making. There was a broad consensus that granular, high-quality data is crucial to maximizing efficiency across operations. It was emphasized that starting with data that is already prepared for analysis is essential, and that investing in data preparation is a necessary step for making effective decisions.

There are significant challenges in working with live sensor data, like the need for a robust data infrastructure. Participants noted that data cleaning—identifying and correcting anomalies, as well as addressing missing data points—is critical to ensuring that AI-driven solutions are usable. To address these challenges, many suggested the need to hire data scientists or seek external expertise to tackle specific problems. They suggested their competitors in the industry are already realizing the benefits of this kind of specialized knowledge.

The ongoing reliance on Excel spreadsheets for data analysis was another point of concern, with a call for centralizing data in order to simplify access and improve analysis. A potential solution discussed was the integration of data from various sources into a unified data environment, which could facilitate AI-based projects and streamline data management. It was clear that data collection and analysis challenges are persistent and that creating a centralized data location to avoid information silos is a priority.

Particular challenges in the dairy industry, such as the heavy reliance on human input for data collection and the need for greater automation and the role of natural language processing in simplifying data collection and analysis, were also discussed.

Conversations also delved into the challenges of data sharing between companies, especially in the context of AI tools. Some companies view their data as proprietary and are hesitant to share it, while others see the value in collaborating and sharing data to enhance efficiency and optimize operations. The need for accurate, reliable data in decision-making, especially in areas like sustainability and supply chain management, was underscored. Ultimately, participants agreed that conducting data readiness assessments is crucial for understanding how AI and machine learning can benefit operations.

A centralized data location is again emphasized as a key requirement to avoid silos and ensure that data can be fully leveraged to optimize decision-making and efficiency across the industry.

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USE IN OPERATIONS, PROCESSING, AND SUPPLY CHAIN

Discussions about AI's potential in dairy operations focused on its ability to revolutionize yield optimization projects. Much conversation centered around optimizing cheese yield in vats, where small variables—such as wash time—can significantly impact the final product. They emphasized the need to use AI tools to streamline processes and reduce reliance on manual grading tasks, addressing challenges in managing data from converting facilities.

Participants also stressed the importance of understanding milk composition and its impact on the manufacturing process. They recognized the value of standardizing milk components and controlling environmental factors to improve consistency. AI's ability to identify subtle differences in milk from individual farms stood out as a key way to maximize yields and enhance overall production.

However, they acknowledged that data quality and alignment from multiple sources remain critical challenges, with a recurring call for more accurate and consistent data.

The conversation extended to AI's potential in forecasting within the dairy industry. Participants explored how AI could predict supply and prices on a macro scale, providing valuable insights to optimize decision-making across operations.

A holistic approach to supply chain management was also discussed, emphasizing the integration of different supply chain aspects for optimal results. Participants discussed how AI could improve processing and forecasting, particularly in route planning and demand forecasting, to bring significant operational improvements.

Finally, participants highlighted the need to refine product specifications and focus on specific product mixes to boost profitability. Aligning production with market demands and optimizing product mixes could enhance efficiency, reduce waste, and improve the financial viability of dairy operations. Overall, participants agreed that AI holds tremendous promise for transforming operations, particularly in yield optimization and forecasting. However, addressing data quality and integration challenges will be essential to unlocking its full potential.

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MAINTENANCE

Discussions about improving operations centered on the potential benefits of preventative and predictive maintenance. There was a strong interest in using AI tools to monitor data streams from sensors and devices, with the goal of identifying potential issues before they escalated into major problems. The conversation emphasized reducing reliance on human knowledge in predictive maintenance, particularly for predicting plant downtime. Leveraging AI enables operations to shift from reactive to proactive maintenance, addressing issues in real-time based on data insights.

However, participants acknowledged the challenges in implementing predictive maintenance systems in manufacturing plants. A significant hurdle was the need for a mindset shift, moving from a reactive approach to one that emphasizes proactively servicing equipment based on data insights. This shift was not only about integrating new technology but also about changing the culture within the plant.

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Another topic covered was the potential for AI to not only predict when maintenance is needed but also to enable more preventative measures, including the possibility of autonomous maintenance systems. Such advancements could revolutionize how maintenance is approached, further minimizing downtime and enhancing efficiency.

Finally, the conversation explored strategies for reducing working capital tied up in critical spare parts inventory. By using AI to better predict maintenance needs, companies could optimize inventory levels, ensuring that they have the right parts on hand without overstocking and tying up valuable resources. This comprehensive approach to predictive maintenance could lead to more streamlined operations, reduced downtime, and improved cost efficiency across manufacturing plants.

WAREHOUSE AND ORDER FULFILLMENT

Discussions about the potential of AI in warehouse automation strongly focused on its ability to optimize storage and reduce wasted movements within the facility. It was noted that accurate data plays a crucial role in streamlining operations, particularly when it comes to managing custom orders and ensuring efficient order fulfillment. Participants emphasized the importance of thorough data analysis, which could identify high-volume areas that are prime candidates for automation. In addition, the need to standardize units of measurement across all SKUs was highlighted as an essential step to ensure consistency and maximize operational efficiency.

Conversations also explored the possibility of using AI to design new warehouse buildings, drawing on insights from past designs. By analyzing previous data, AI could assist in creating layouts that optimize space and workflow, improving overall warehouse performance.

Another key point of discussion was AI's potential to automate scheduling processes, which could significantly reduce human error and free up valuable resources for more strategic tasks. This would not only improve the accuracy and efficiency of scheduling but also allow staff to focus on higher-level responsibilities that contribute to business growth.

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Finally, participants discussed the potential benefits of AI in enhancing customer understanding, improving sales cycles, and reducing downtime. AI's ability to analyze data and predict customer needs could lead to more informed sales strategies, while automating various processes could minimize downtime and ensure smoother operations across the warehouse. Overall, there was a shared belief that AI has the potential to revolutionize warehouse operations, improving efficiency, accuracy, and overall performance.

FOOD SAFETY

Discussions about the potential of AI for food safety applications focused on the ability to predict and prevent issues during the production process. Participants explored how AI could enhance safety by identifying potential risks before they escalate, improving the overall safety standards in food production. However, there were also concerns raised about the possibility of AI providing bad advice, especially in an industry where there is a significant ethical responsibility to ensure the safety of consumers. The idea that AI could make errors or offer incorrect guidance in critical situations was highlighted, emphasizing the need for caution and oversight when implementing AI in food safety applications. The balance between innovation and maintaining rigorous safety standards was seen as a crucial consideration moving forward.

SUSTAINABILITY

Discussions about the potential of AI to improve dairy industry sustainability efforts focused on solutions for waste reduction, recycling, and improving overall efficiency. While the challenges of sustainability differ across various regions, AI can play a pivotal role in addressing these issues. Automation, for instance, can help reduce energy consumption while simultaneously boosting operational efficiency, helping dairy operations become more sustainable.

A key element in achieving sustainability goals is the integration of data analysis, which is crucial for improving efficiency in plant operations. As traceability and sustainability become increasingly important in food production, machine learning can be utilized to optimize these processes, ensuring that dairy producers can meet environmental standards more effectively. Additionally, AI can contribute to energy management, helping to reduce emissions and better manage resources.

However, powering AI systems presents its own challenges. One of the critical obstacles is upgrading the grid to accommodate the increased use of renewable energy sources, which is essential for ensuring that AI-driven solutions are sustainable in the long term.

In the dairy processing sector specifically, AI can assist with wastewater management, a vital aspect of maintaining sustainability. As consumers and regulators alike place growing demands on companies to provide sustainability metrics, environmental health and safety managers are finding it increasingly difficult to gather and manage the necessary data. Here, AI offers significant opportunities for applications in energy management, waste reduction, water conservation, and overall data management, helping streamline these efforts and provide more accurate insights.

AI's capabilities extend beyond just improving current practices—it can also simulate potential changes and predict future outcomes, particularly in areas like carbon emissions at the farm level. By using AI to model these scenarios, dairy producers can make informed decisions that support long-term sustainability goals while also preparing for future environmental challenges.

CORPORATE PROCESSES

Discussions about the potential of AI to support corporate functions of dairy businesses focused on analyzing customer orders, inventory trends, and warehouse operations, ultimately providing more efficient solutions. Participants felt AI could assist in tasks such as research, drafting emails, and understanding strategic company information, speeding up data analysis and decision-making processes. This ability to streamline operations has made AI an appealing tool for many businesses looking to improve productivity and decision-making.

However, one of the biggest challenges is convincing people to adopt AI, especially in areas like human resources (HR) and payroll. While AI offers clear benefits in terms of increased efficiency and reduced need for additional staff, it also raises concerns about job displacement. Many workers fear that automation might lead to job losses, which can make it difficult for organizations to implement AI systems, especially in industries like dairy, where recruitment in rural areas is already a challenge. Here, AI can help optimize processes and reduce the workload on existing staff, making operations more manageable without increasing headcount.

Beyond HR and payroll, AI can also be a valuable tool in departments like accounting and purchasing, where the workload is becoming unsustainable. AI can help alleviate some of the pressure by automating routine tasks and improving accuracy in financial processes. However, it's important to note that AI should be viewed as a companion to human creativity, not a replacement for it. In areas like product development or marketing, human ingenuity is still crucial, and AI can assist by taking over repetitive tasks, allowing employees to focus on more creative, strategic work.

Integrating AI into the enterprise resource planning (ERP) system can further enhance its value by securing data and leveraging it for various tasks, such as creating product descriptions or translating them into different languages. Generative AI can also create customized service guides for field operations or produce project summaries for executives, streamlining communication and documentation processes.

With all these potential benefits, the implementation of AI must be accompanied by clear guidelines, including an acceptable use policy. This ensures that AI is used responsibly, addressing ethical concerns while maximizing its potential to improve business operations.

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ADOPTION AND SECURITY

The dairy industry's growing embrace of technology and AI is both impressive and somewhat surprising, given its traditionally conservative approach to adopting new innovations. However, as the industry integrates AI into its business processes, concerns about data privacy and security have emerged. Bridging the gap between early adopters of AI and those who are still hesitant, especially when it comes to safeguarding personal information, is a key challenge that must be addressed. Ensuring data protection while embracing technological advancements is crucial for maintaining trust.

One effective way to overcome resistance to AI is through comprehensive training sessions that showcase real-life examples and case studies. These sessions can help demystify AI and machine learning for those who are new to the technology. Furthermore, effective communication is essential for introducing AI to individuals who may not be familiar with the system. Explaining how AI works and its benefits in simple, accessible terms can ease concerns and build confidence, especially among long-time employees who might feel threatened by the introduction of new tools.

The adoption of AI presents several challenges, particularly when it comes to shifting the cultural mindset within an organization. Many employees are accustomed to established methods and may struggle to see the benefits of AI and automation. Balancing comfort with innovation is a delicate task, and explaining AI's potential without undermining existing practices requires thoughtful messaging. Introducing AI is not just about new tools; it's about a comprehensive change in how the organization operates, which demands time, resources, and commitment from leadership.

One of the biggest hurdles in AI adoption is quantifying its productivity gains and addressing concerns about job transformation. While AI can certainly enhance efficiency, there is often fear that it will lead to job elimination. It's important to emphasize that AI's role is more about transforming jobs and enabling workers to focus on higher-level tasks, rather than replacing them altogether.

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For AI initiatives to succeed, strong executive support is essential, especially when collaborating with AI providers. Regular meetings with senior management ensure alignment and drive progress. Understanding the user interface and output of AI platforms is another critical aspect of successful integration, as it allows employees to effectively interact with the system. Continuous investment in workforce training is necessary to keep employees engaged and equipped with the skills to navigate new AI tools.

Another challenge in the AI adoption process is distinguishing between the hype and reality of various AI vendors. Not all AI solutions live up to their promises, and it's important to thoroughly vet vendors before committing.

Implementing advanced analytics and machine learning requires buy-in from multiple departments, including operations, as they are the ones who will ultimately be using the tools. Leveraging institutional knowledge is key to ensuring these technologies are applied in the most effective way.

Finally, before implementing AI technologies, it is vital to review agreements with suppliers and secure data. This includes ensuring that sensitive information, such as trade secrets, is protected from unauthorized access. Understanding and securing data before introducing AI to it is a critical step in safeguarding both the company and its customers.

By taking the necessary precautions and addressing the challenges of AI adoption, the dairy industry can harness the full potential of AI while ensuring data privacy and security remain top priorities.

RECOMMENDATIONS FOR THE INDUSTRY

1. **Enhance Data Readiness:** Assess current data practices, clean and centralize data, and ensure readiness for AI analysis.
2. **Leverage Expertise:** Collaborate with data scientists and AI providers to identify and implement impactful solutions.
3. **Educate and Engage:** Develop training programs to ease resistance and emphasize the value of AI tools in reducing workloads and enabling strategic tasks. Allow teams to suggest specific problems or inefficiencies within their processes that AI could potentially address.
4. **Start with Quick Wins:** Focus on high-impact applications, such as inventory optimization and predictive analytics, to build confidence and demonstrate ROI.
5. **Define Metrics:** Establish KPIs and benchmarks to measure the success of AI implementations and ensure ongoing improvements.
6. **Foster Collaboration:** Encourage data-sharing initiatives to enhance efficiency and innovation across the industry.

As organizations begin to explore how to implement AI, it's important to focus on areas where data is already readily available and can be easily analyzed. IT teams should first assess current data collection practices to identify where data needs to be digitized or cleaned in order to be suitable for AI analysis. This step is critical in ensuring that the data being used is accurate and actionable.

Management should consider bringing in data scientists or partnering with AI solution providers to help analyze the existing data and identify areas of improvement. Researching case studies of AI implementation within the dairy industry can offer valuable insights and practical examples of how AI can be applied successfully. Operations teams should also be proactive in identifying specific problems or inefficiencies within their processes that AI could potentially address, from optimizing production lines to enhancing inventory management.

A crucial step for successful AI implementation is the development of a plan to centralize data from various silos. This will enable seamless AI initiatives across the organization, creating a unified data environment where information can be easily accessed and analyzed. Company leaders should also evaluate the potential for data sharing and collaboration within the industry to improve overall efficiency and sustainability, as shared data can lead to more accurate insights and better decision-making.

Implementing AI may face resistance, particularly when it comes to new data capture methods. Management must address these concerns, especially in relation to the adoption of systems such as labeling and scanning within production. Overcoming this resistance through education and clear communication is essential for smooth integration.

HR and training teams should play a vital role in developing educational programs that focus on proper data management practices. These practices are foundational for maintaining consistency and ensuring that data can be efficiently accessed and used across the company. Additionally, IT teams should investigate and implement technologies such as paperless forms and IoT devices to automate and streamline data capture in production areas.

Before diving into AI and machine learning projects, dairy companies need to assess their data readiness by evaluating the quality, completeness, and centralization of their data. This evaluation ensures that the data being used is up to standard and will provide meaningful results. Plant managers should identify specific key performance indicators (KPIs) and baseline metrics before launching any AI/ML projects. These metrics will serve as benchmarks for measuring the return on investment (ROI) and the effectiveness of the initiatives.

Operations teams should also evaluate simple, high-impact AI applications—such as intelligent recommendation systems for pricing and product suggestions—that can deliver quick wins and demonstrate the value of AI. However, the implementation of AI also requires strong leadership and clear communication. Leadership teams should address potential concerns from employees regarding AI implementation, ensuring that change management strategies are in place to guide the workforce through the transition. By fostering an environment of understanding and support, organizations can successfully integrate AI into their operations and unlock its full potential.

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