DIGITALISATION OF DAIRY SUPPLY CHAINS

Working towards a more profitable and sustainable future
The Australian dairy industry is modernising for a more profitable and sustainable future. Producers and processors are embracing new opportunities as international demand grows for wholesome, healthy and nutritious dairy products. The future of the Australian dairy industry and viability of dairy farming is very much dependent on innovation and cooperation to address structural issues, market power imbalance, resilience, information asymmetry and the uptake of data-driven systems.

As world-wide demand for dairy products continues to rise, Australia’s share of global trade has declined from around 16% of measured world exports in the 1990s to 6% today. Over the same period, the number of dairy farms in Australia has decreased from 15,000 to just over 5,000. The structure of the dairy industry has changed.

With fewer larger dairy farms, productivity and profitability are increasingly dependent on the way the industry uses technology, information and data. More specifically, how different parts of the supply chain work together – capturing, sharing and using information for mutual benefit.

Dairy is embracing new ways of capturing and sharing data through the supply chain to drive productivity and meet the demands of customers in Australia and abroad. This includes information about the way milk is produced, its provenance, who’s involved in the process and how costs and margins have been shared.

For the industry to thrive and remain sustainable, all parties in the supply chain need to be jointly focused on customer demand and ensuring producers, transporters, processors, distributors and retailers generate a fair return on their effort and investment.

The power of information

In an increasingly digitally connected world, information about milk production, milk quality and milk consumption are powerful forces, shaping the way the dairy industry and markets work. These forces play a significant role in defining the structure of the industry.

In 2018 the Australian Competition and Consumer Council (ACCC) found there was a power imbalance between farmers and processors. This power imbalance, along with uncertain world market prices, supermarket milk discounting and falling processor margins impacted negatively on farmgate pricing.

National industry reforms

To address power imbalance, ensure viability and meet industry sustainability challenges, a national industry reform has begun which includes a number of measures explicitly addressing how information is captured, shared and used throughout the dairy supply chain.

Initiatives include the introduction of a mandatory code of practice, a milk trading platform and standardised form contracts (also known as code-compliant industry contracts).

Standard form contracts

Standard form contracts establish common expectations between producers, retailers and regulators. This helps simplify business processes, improve information flows, enhance data quality exchange and increase trade velocity - creating opportunities for improved productivity through reduced manual data entry and fewer mistakes.

Blockchain and distributed ledgers

Blockchain (and Distributed Ledgers in general) may help the industry partners better manage information, build greater trust, improve transparency and the way the dairy industry works together providing a ‘shared view’ of truth for business transactions. Everyone knows they are all looking at the same records and the history of their business relationship. Neither side controls the records (each party has a copy) by themselves, and they do not have to give up control to another third party. This transparency can reduce the cost and time for reconciliation – not just for financial records, but for any shared business data.

Smart contracts on distributed ledgers

Businesses can also use distributed ledgers to store and run small shared programs. These are called ‘smart contracts’. For example, ‘transfer funds immediately when all parties agree that a transaction, say product delivery, is complete.’

These automation rules can reduce or eliminate manual work, reduce the risk of errors, and reduce delays.

Smart contract terms are determined in the same way legal agreements work and can be run automatically, in a reliable way, with all parties able to see the results and workings of the agreed rules. Rules may include calculations or complex price determinations based on quality testing or other reliable or valid data input.

How does a distributed ledger work?

Distributed ledger technology can give life to the new standard form contracts in the dairy industry, and build trust, transparency and efficiency between dairy farmers and processors.
A decentralised, peer-to-peer (person to person) network can give each farmer and each processor their own ‘node’ to keep information secure and private. When a farmer sells milk to a processor, their nodes use a ‘shared ledger’. This can be thought of as a duplicate/identical digital copy of a physical ledger, multi-column account or production record book.

The ledger keeps a record of the contracts, milk that has been ordered and delivered, milk quality testing results, and payments. Key terms for delivery and payment in the standard contract can be shared and run as smart contracts on the ledger.

When a farmer sells milk, supply chain events are recorded on the shared ledger and linked to the contract.

The contract on the shared ledger can then automatically calculate the final price. Payment can be made between bank accounts as normal, with receipts automatically recorded and linked to the contract. Automated payments can be made immediately or scheduled.

Only the farmer and the processor can add information to their shared ledger, so they each know and can both see the full history of their shared business relationship.

Nodes can be connected to other systems to save costs and streamline processes.

- **Sensors** can automatically collect information about the milk.
- **Scanners** can automatically record milk deliveries and supply chain events.
- **Banking systems** can automatically make payments.
- **Regulators** can view information to monitor the industry but cannot change the ledgers.

**Importance of quality information**

Blockchain and distributed ledgers, like databases or the internet, are general-purpose technologies that can be used in any industry sector. Data quality is essential as immutability (inability to change records once written to a blockchain) means that ‘rubbish data’ in, does not come out.

If innovation like blockchain and distributed ledgers are to create value for dairy industry participants, they need clear and agreed ways to identify, capture, share and use information based on open and globally recognised data standards. Without these standards, interoperability and compatibility between current systems will not be achieved. At worst, industry data becomes locked in proprietary data silos, adding friction, impeding innovation, increasing cost, and reducing industry competitiveness and market access.

**Industry standards for dairy industry supply chains**

Global Data Standards provide a common (global) language for supply chain business processes. Standards help reduce friction between businesses and are critical for competitive access to global markets.

These standards can be used to identify products, locations and define what information is required to be captured for specific events in the dairy supply chain. Establishing a shared understanding and consistent use of data standards is a first and important step towards modernisation of industry systems.

Fortunately, many of the basic standards are already in place for dairy industry supply chains. Industry reforms provide opportunity for the industry to embrace blockchain and distributed ledger technology by consultation, discussion, and established stakeholder consensus.

As the dairy industry modernises, more technology is becoming available to capture and share data about important production, product management and processing activity. Sensors are increasingly being used to monitor production, reduce manual tasks, provide quality assurance, and automate business processes – including events that may trigger smart contract conditions.
Australia’s global competitiveness is dependent on how different parts of the supply chain work together – capturing, sharing and using information for mutual benefit.

The establishment of data standards and governance frameworks will help improve trust and promote collaboration.

Resilience in the supply chain will be increased through leveraging greater use of data ensuring improved food safety, and product quality and supply stability.

**Industry benefit**

Farmers and processors will benefit directly from improved data accuracy, reducing the need for costly data interrogation, avoiding vendor lock-in and reliance on third parties.

Increased consistency of transactions and data will help improve supply chain performance and enhance the quality of physical product and information flows.

Transparency of movements will assist in reducing the threat of fraudulent product entering the supply chain, protecting both farmers, processors and end-users.

Transporters, banks, insurance and trade finance agencies may also improve offerings and options for everyone in the milk supply chain.

**The future**

The Australian Dairy Industry has an opportunity to become world leaders in delivering efficient and effective supply chains through the implementation of the industry reform programs, mandatory codes, standard contracts and innovation as distributed ledgers and blockchain.

Open, transparent and trustworthy systems are important for long term sustainability and global competitiveness. Building on standards already used in transport and logistics, warehousing, distribution, retailing and eCommerce ensures Australian producers and processors can participate efficiently and effectively in global markets.

**Next steps**

Industry participants will ultimately determine the role that innovation like blockchain and distributed ledgers will play in the future of Australian Dairy Industries.

This information and a supporting video animation aim to inform and initiate industry discussion about options to support industry modernisation.

Restoring trust and transparency between farmers, processors and retailers to strengthen industry confidence can only be achieved though active collaboration.

**For more information**

About Australian Dairy initiatives please contact: https://australiandairyfarmers.com.au/contact-us

About Blockchain and Traceability contact GS1 Australia: www.gs1au.org/for-your-industry/dairy