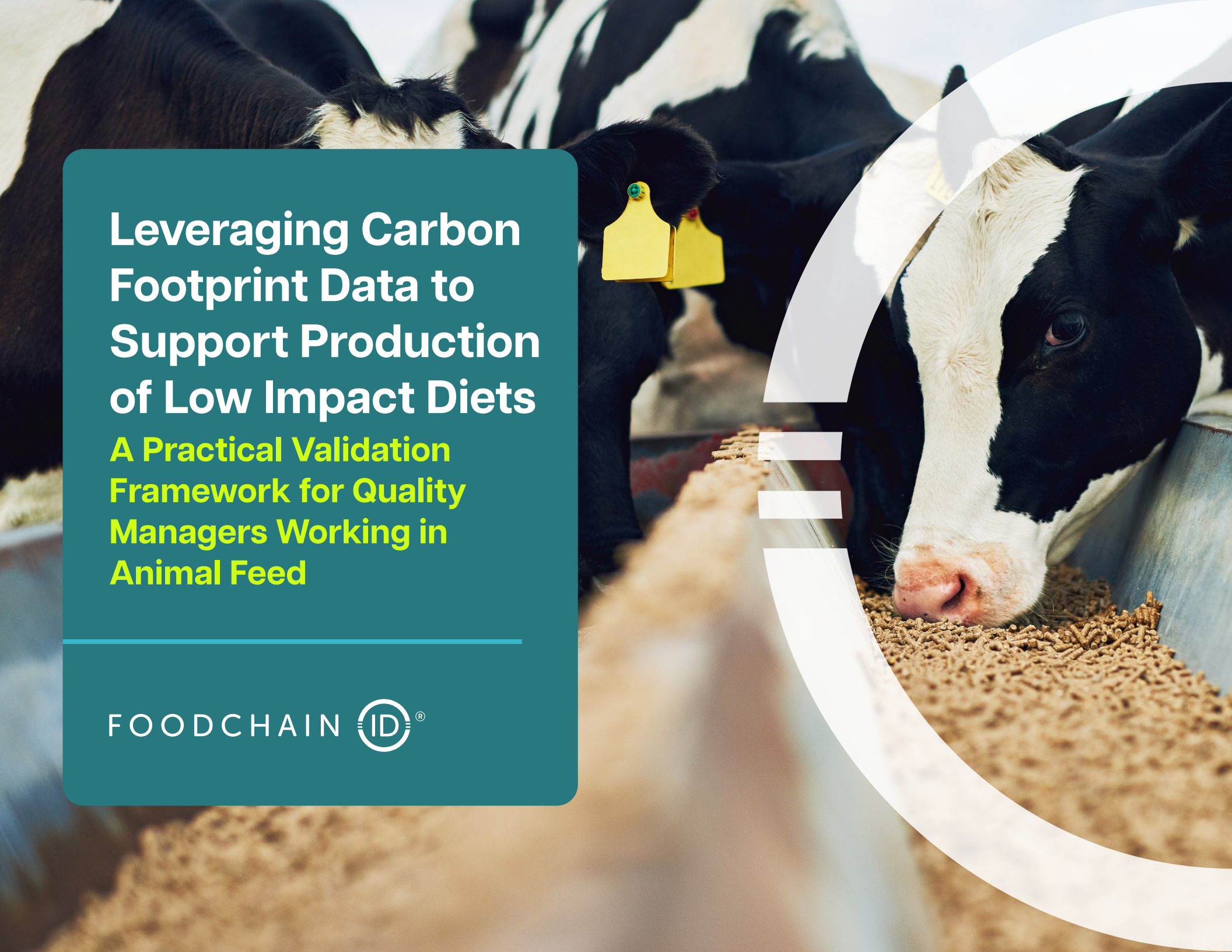


Leveraging Carbon Footprint Data to Support Production of Low Impact Diets

A Practical Validation Framework for Quality Managers Working in Animal Feed

FOODCHAIN ID®

Sustainable feed: A Quality Assurance responsibility

Animal feed plays a critical role in delivering effective, measurable reductions in the environmental impact of livestock production, including methane emissions and nutrient leakage (nitrogen and phosphorus). Nutritionists and Quality Managers are directly involved in decisions regarding the selection and use of feed ingredients, thereby contributing to the development of more sustainable diets.

For Quality Managers in the animal feed sector, this represents a clear evolution of responsibilities. Their role is expanding beyond regulatory compliance to include accountability for sustainability claims and reporting. At the same time, they must navigate emerging metrics, increasingly complex data sources, and a growing diversity of feed ingredients and suppliers.

To confidently substantiate sustainability claims for feed during audits or customer scrutiny, Quality Managers must therefore operate within a systems-based approach.

What this guide covers

Quality teams are increasingly responsible for data accuracy, traceability, and audit readiness across new domains like sustainability, often without fully integrated systems or clear validation frameworks. This guide is designed to help Quality Managers:

- Understand how LCA data are being evaluated in practice
- Translate sustainability metrics into audit-relevant, defensible information
- Move from reactive “data collection” to more structured, preventive approaches to sustainability claims
- Comply with regulations, standards and customer demands around sustainability claims

Which sustainability metrics are important for feed?

Feed Life Cycle Assessment (LCA) in animal nutrition is the core methodology used to evaluate environmental impacts, such as carbon impact, land and water use, and eutrophication, across the entire production chain – from raw material extraction through to feed manufacturing.

LCA quantifies multiple environmental impact indicators for both individual feed ingredients and compound feeds. One key metric for animal feed is the contribution to climate change, commonly expressed as the carbon footprint in kilograms of CO_2 equivalents.

These insights enable the formulation of rations that balance cost, nutritional performance, and environmental impact.

By leveraging current and validated LCA databases, Quality Managers and feed producers support:

- **sustainable product development:** improving the environmental performance of feed and downstream animal products
- **informed decision-making:** selecting ingredients based on comparable and structured environmental data
- **compliance and reporting alignment:** supporting customer requirements, certification expectations, and recognized frameworks (e.g. ISO 14040/14044, EPDs)
- **transparency:** ensuring that environmental data used in specifications and customer communication is consistent and documented

Recurring patterns when working with sustainability metrics

While established methodologies exist, applying sustainability metrics in feed introduces new failure points for Quality Managers, similar to those seen when packaging or formulation changes are not fully validated.

Recurring patterns for Quality Managers in feed include:

Lack of standardized, region-specific LCA information of feed ingredients

Lack of data on new / alternative feed ingredients (e.g. insect meal, algae)

Incomplete environmental metrics (e.g. only data provided on carbon footprint and not metrics on other things such as water use or biodiversity loss)

Mismatch between LCA boundaries and actual product scope

Supplier data that cannot be fully verified or are not clearly linked to documented evidence

Validation, traceability and defending sustainability claims

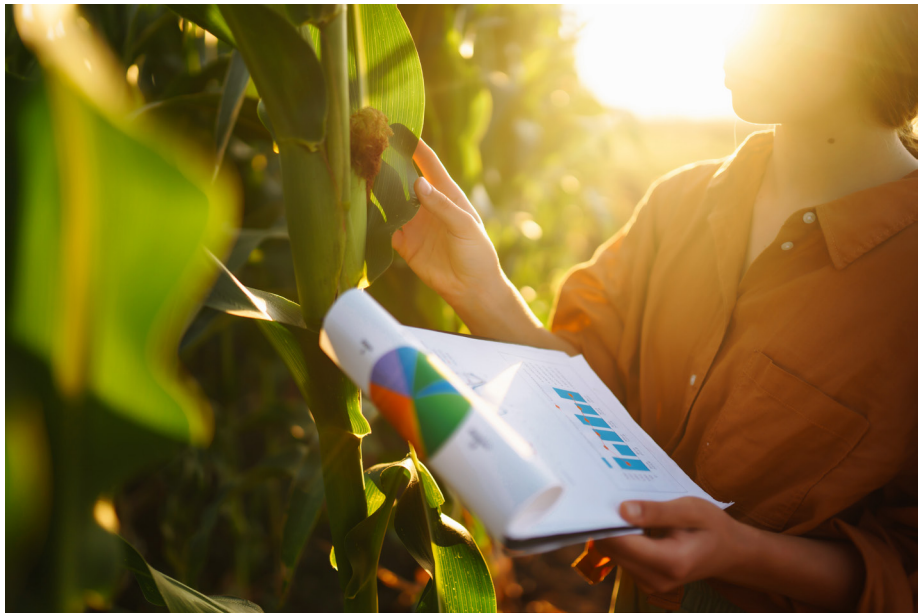
These challenges around sustainability metrics / outputs are complex. This may lead to discrepancies between supplier-provided data and sustainability claims.

This creates practical challenges for Quality Managers, including difficulty defending claims, gaps between documentation and label statements, increased audit exposure, and reduced credibility.

As a result, organizations must evolve their approach from reactive data collection to proactive, structured validation processes. Quality Managers, in particular, must ensure that sustainability data can withstand scrutiny and is fully defensible during audits.

In practice, this often creates a gap between intent and audit reality:

- **Common situation:** carbon values are available, but cannot be clearly linked to specific products, batches, or suppliers
- **What good looks like:** carbon data is traceable from source to formulation and supported by documented assumptions
- **Common situation:** claims are based on supplier data without clear validation
- **What good looks like:** supplier data is checked against recognized sources and aligned with internal specifications



To address this, Quality Managers focus on clearly defining claim scope, verifying data sources (particularly supplier inputs), aligning LCA outputs with product reality, and ensuring that documentation and traceability support the claim.

When these elements are integrated into existing QA systems such as supplier approval, specification management, and internal audits, Quality Managers are able to demonstrate that claims are supported by documented data, retrieve evidence efficiently during audits, and maintain consistency across systems and teams.

How to Apply Carbon Footprint Data in Practice

Step 1: Data collection and validation

Compile carbon footprint data from recognized frameworks (e.g. GFLI, Agri-footprint, ISO-based sources).

From a Quality Assurance perspective, the priority is not only collecting data, but **understanding its origin, assumptions, and level of verification.**

Key QA checks include:

- Is the data source recognized and documented?
- Are supplier-provided values aligned with known databases or benchmarks?
- Are boundaries (geography, production system, time period) clearly defined?

Step 2: Hotspot identification and interpretation

Analyze available data to identify emission hotspots within feed formulations.

For Quality Managers, this step is less about performing the analysis and more about **ensuring that interpretations are consistent and justifiable.**

This includes:

- verifying that hotspot conclusions reflect actual formulation and sourcing reality
- confirming that any comparisons between ingredients are based on equivalent system boundaries
- ensuring that decisions are documented and traceable

Step 3: Reformulation, documentation and claim alignment

Adjust feed formulations where relevant and ensure that resulting environmental metrics are accurately reflected in internal documentation and external communication.

At this stage, Quality Managers play a critical role in **aligning three elements:**

- formulation changes
- LCA outputs
- sustainability claims

Key risks to control:

- claims that are not fully supported by updated data
- inconsistencies between formulation, specification, and reported values
- lack of documented validation when changes are made

In practice, sustainability data validation is integrated into existing QA workflows, including supplier approval and monitoring, specification and formulation management, and internal audits and documentation reviews. This ensures that sustainability claims are managed with the same discipline as food safety and compliance data.

Key takeaways for Quality Managers

- Sustainability data introduces new audit exposure
  Carbon footprint data derived from LCA is increasingly used in specifications and customer communication. When not fully validated, it creates the same type of audit risk as any other unsupported claim.
- The primary risk is not the model, but its application
  Based on aggregated audit experience, challenges rarely stem from LCA methodology itself, but from how outputs are interpreted, reused, and linked to products, suppliers, and documentation.
- Quality Managers who successfully manage sustainability claims ensure alignment across data sources, product formulation, supplier information, and documented evidence.

This system-level coherence is what enables claims to withstand audit and customer scrutiny.

Pressure-test your sustainability data approach

Review how your current carbon and LCA data align with audit expectations for traceability, validation, and defensible claims.

Contact us

FOODCHAIN ID®

To learn more about food safety certification services, visit **foodchainid.com**

Key takeaways for Quality Managers

- Sustainability data introduces new audit exposure
  Carbon footprint data derived from LCA is increasingly used in specifications and customer communication. When not fully validated, it creates the same type of audit risk as any other unsupported claim.
- The primary risk is not the model, but its application
  Based on aggregated audit experience, challenges rarely stem from LCA methodology itself, but from how outputs are interpreted, reused, and linked to products, suppliers, and documentation.
- Quality Managers who successfully manage sustainability claims ensure alignment across data sources, product formulation, supplier information, and documented evidence.

This system-level coherence is what enables claims to withstand audit and customer scrutiny.

CTA
Pressure-test your sustainability data approach
Review how your current carbon and LCA data align with audit expectations for traceability, validation, and defensible claims.

Where digital systems help and where they do not

QMS and DMS platforms support standardization only when governance is clear.

Without defined ownership, system architecture, and disciplined change control, digital tools accelerate inconsistency rather than reduce it.

Tools reinforce structure. They do not create it.

What this looks like in audits (aggregated peer benchmarks)

Example 1: Multi-site food manufacturer, GFSI re-certification

Observed conditions:

- SOPs shared titles and numbering, but differed in scope and evidence expectations
- auditors spent additional time reconciling equivalent procedures across sites

Aggregated audit patterns observed across comparable organizations:

- documentation reconciliation added approximately **4 to 8 audit hours,** placing these sites in the **upper quartile** for audit duration
- repeat non-conformances related to document control and training alignment clustered in the **60th to 75th percentile**
- corrective actions were issued per site rather than resolved once at system level

The issue was not SOP volume. It was false standardization.

Example 2: Multi-site feed operation, combined scheme audits

Observed conditions:

- one SOP architecture mapped to all applicable schemes
- site-specific execution details managed through controlled appendices
- centralized SOP change control applied across locations

Aggregated audit patterns observed:

- documentation-related repeat non-conformances fell into the **bottom quartile**
- audit close-out time shortened due to system-level corrective actions
- year-over-year audit duration variability narrowed, improving predictability

The improvement came from system clarity, not additional documentation.