



Centre of
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Report

Pig Feed Networks in the UK

Gathering information on the UK
pig feed supply chain: a pilot study

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Purpose and Background

Commercial feed production is vital to pig farming, but it poses biological hazards like Salmonella and African Swine Fever (ASF). Preventative measures must be in place throughout the entire supply chain—from raw material origin to on-farm delivery. Traceability is crucial for understanding risk transmission pathways if an animal disease linked to feed supply is detected. The purpose of this work was to characterise the UK pig feed supply chain and its organisation.

Methods

An online survey was launched with the support of the Agricultural Industries Confederation (AIC) targeting all commercial pig feed manufacturers in the UK to gather information on the supply chain's dimensions, interconnections, feed storage, and distribution. The survey ran from May to July 2024 and covered site details, sourcing and storage, manufacturing controls, and feed sales and transport. Eight feed mills producing pig feed answered the survey.

Key Findings

Overall, while the sample size of this survey may not fully represent UK pig feed mills, the findings provided valuable insights into the sector, highlighting the structured approach to hazard analysis, and the high level of standardisation likely influenced by Universal Feed Assurance Scheme (UFAS) membership.

Biosecurity Measures: Most mills surveyed have current biosecurity plans, and all report conducting routine microbiological testing for Salmonella, Enterobacteriaceae, and mycotoxins. However, expanding testing to include viral agents like ASF or porcine epidemic diarrhoea (PED) could further enhance feed safety.

Feed Manufacturing and Storage: The mills surveyed use a variety of feed forms (e.g., pelleted, meal, mash) and employ both manual and automated processes for the addition of additives. Most mills store feed ingredients in bins, silos, or tanks, and some conduct routine cleaning and disinfection between batches.

Record-Keeping and Traceability: Electronic record-keeping is common, facilitating traceability in the event of an outbreak. However, the retrievability and interoperability of these records for outbreak investigations remain areas for improvement.

Risk Management and Contingency Plans: All mills have contingency plans in place for ASF and PED outbreaks, and many use tools to assess the risk of disease introduction based on the sourcing of feed ingredients.

Take Home Messages: To further strengthen biosecurity and disease preparedness in the UK pig feed sector, the following actions are recommended:

- Improve the retrievability and interoperability of electronic records for outbreak investigations.
- Enhance communication pathways between feed mills and stakeholders to ensure a coordinated response in the event of an outbreak.
- Investigate the level of access feed mills have to farm health status and explore how this information can be used to optimize biosecurity practices.
- Finally, study the feasibility of expanding microbiological testing to include viruses such as ASF and PED.

2 Background

Commercial feed production is essential to pig farming. There are biological hazards (for example, *Salmonella* or African Swine Fever (ASF)) which may be associated with feed and measures to prevent contamination of feed ingredients and formulated diets must be in place from the point of origin of raw material, to on-farm delivery and throughout the manufacturing, storage, and transportation stages. In addition, if a case of animal disease associated with feed supply was detected, traceability would be paramount to understand the risk transmission pathways. To better understand the risk of these hazards for Scottish and UK pig production, including the risk of spread of ASF should it be introduced via feed, it is important to characterise the pig feed supply chain into and within the UK and to understand how it is organised and inter-connected. We aimed to gather information on the pig feed supply chain in the UK, specifically its dimensions, interconnections, feed storage and distribution with focus on (industrial) feed mills. To achieve that, we launched an online survey targeting all commercial pig feed manufacturers in the UK.

3 Methods

EPIC researchers proposed an online pig feed mill survey to help better understand the industry's structure, ingredient sourcing, product distribution, and cleaning practices associated with storage of feed, manufacturing, and feed transport vehicles. The survey questions and accompanying text were refined in consultation with the Agricultural Industries Confederation (AIC), the trade association representing the interests of animal feed producers whose membership covers all commercial UK pig feed manufacturers. According to AIC, around 65 feed mills operating in the UK produce pig feed.

The AIC membership list was used to promote the online survey, which remained open for three months (from May to July 2024). The survey was also promoted to contacts at two well-established feed manufacturing and supply businesses, although these did not participate.

The survey was divided into four sections: A) site details and type of production; B) sourcing and storage of animal by-products and feed materials; C) feed manufacturing, treatments and controls; and D) feed sales, retail, storage, and transport.

4 Results

Ten UK feed mill managers responded to the survey. Eight of the feed mills produced feed for pigs, the survey results for these mills are described below. The sample size is not representative of the UK pig feed mills but offers useful insights into the sector.

4.1 Site characteristics, location, and type of production

Half ($n=4$) of the mills producing pig feed that responded to the survey are associated with AB Agri Ltd. Two of the eight feed mills operate in Northern Ireland, and one in Scotland, the remaining feed mills were based in England.



Figure 1. Geographic distribution of pig feed mills responding to the questionnaire.

All mills are members of the [Universal Feed Assurance Scheme \(UFAS\)](#), but only one is a member of the [Feed Materials Assurance Scheme \(FEMAS\)](#). Four mills are associated with a larger enterprise, and one of these is associated with a large pig production enterprise. None of the mills keep animals on site.

4.2 Types and tonnage of animal feed produced

All the feed mills surveyed produce poultry feed. Three of the feed mills also supply feed for cattle, sheep, and goats, with one of these also provisioning Alpacos.

The tonnage of pig feed produced annually on each site is averaged around 124K tonnes, but the minimum/maximum annual output varies from 6K to 300K tonnes. Figure 2 shows the tonnage of pig feed produced at each site.

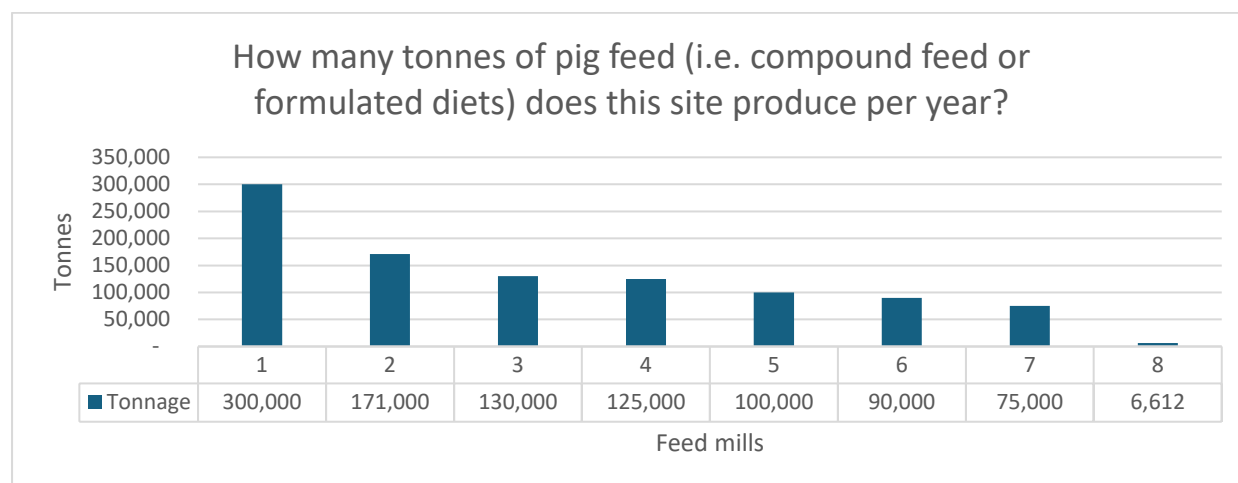


Figure 2. Tonnage of pig feed produced annually by the feed mills responding to the questionnaire.

None of the responding mills produce feed additives, pre-mixes, or organic feed.

One of the eight mills formulate feed as meal (or mash), one as meal (or mash) & nuts, five as pelleted feed, and one mill produces feed in pelleted, rolls & cake forms.



Figure 3. Different types of feed form: Mash, Crumbles and Pellets (respectively). Source: [Metzer Farms Duck and Goose Blog: Different Types of Feed - Mash, Crumbles and Pellets](#)

To varying degrees both manual and automated processes are used to add pre-mixes and additives to feed at seven of the feed mills, with only one mill using 100% manual dispensing.

Three mills have separate production lines for medicated feed, all of which use only manual dispensing, rather than automated measurements of medicated ingredients. When discussing this with AIC, it was brought to our attention that manual dispensing for medicated feed is easier and better to avoid cross-contamination or carry-over because any automated process would need to have additional clearing, cleaning, and disinfection between automatic inclusions, which requires much more complex machinery and processing.

Five of the eight mills surveyed use heat as a feed treatment, with one of these using also an acid inhibitor on 5% of the feed produced. One mill uses steam to treat feed. The primary reason these mills treat feed is to mitigate the risk of biohazards *E. coli* and *Salmonella*. Some mills using heat treatments restricted these to specific feeds, others applied treatment to all feed produced. One feed mill does not heat-treat pig feed but does so on the poultry feed line.

4.3 Use of animal-by-products in feed

None of the mills use animal-by-products in their feed. This result may be a consequence of the small sample size and/or of the strict rules on the use of animal by-product on feed, in compliance with the Transmissible Spongiform Encephalopathies (TSE) regulations in place. However, some animal by-products such as whey (a by-product of cheese production, obtained after milk has been coagulated and curds removed) are allowed and commonly used

in liquid feed, especially those designed for younger pigs. It is possible that our sample did not include factories producing this type of feed, or those producing feed for piglets and weaned pigs.

4.4 Sourcing ingredients from outwith the UK

Only one mill exclusively sources ingredients from the UK. This mill was producing 100K tonnes of pig feed per year. AIC has suggested making further enquires as it is possible that, although the mill is sourcing feed materials through a trader, meaning that they are technically sourced from the UK, product may originate overseas. Soya and maize – common protein sources in pig feed – are largely sourced overseas.

By volume, wheat and soya were the major ingredients imported from Europe, South America and the 'Rest of World'. Additionally, one mill reported importing soya from Asia. Other ingredients mentioned as imported from outwith the UK included: barley, molasses, amino acids, immune modulators, mycotoxin binders, and minerals.

The frequency of purchasing feed ingredients ranged from weekly, monthly, or quarterly and may vary depending on the site (possibly because of storage capacity and turnover) but it was not clear if the scale of manufacturing was a contributing factor. Logically, the shelf life of an ingredient would affect the frequency of purchase.

4.5 Storage of feed ingredients

Feed mills store incoming feed ingredients in a variety of containers: bins/silos, tanks, floor stores, tote bags that they arrived in, other-sized bags that they arrived in, and Intermediate Bulk Containers (IBCs) that suppliers provide. Three out of eight feed mills emptied and cleaned containers between deliveries, with one of these mills 'sometimes' also disinfecting. Two of the mills where cleaning does not take place between shipments operate only dedicated single-use ingredient stores.

4.6 Biosecurity plan and record keeping

Only one mill stated that it does not have a biosecurity plan. Six mills have current biosecurity plans in place, which were reviewed in the last 12 months. The remaining mill had a biosecurity plan that was last reviewed over six years ago.

Under UFAS requirements, all mills should have a biosecurity plan in place. The factory that reported not having one may have done so due to an error, the lack of understanding of the question, or the lack of awareness by the respondent rather than the actual absence of a formal plan.

All the feed mills surveyed keep electronic records of feed ingredient deliveries. Of these, three mills keep a mix of electronic and paper documents, and the remaining five mills solely keep electronic copies of records.

4.7 Biohazard testing of feed compounds

All feed mills routinely conduct microbiological testing, including detection of *Salmonella* and Enterobacteriaceae, as well as mycotoxins.

We learnt that AB Agri explored the possibility of testing feed for viruses. However, while the analysis was technically feasible, the number of samples required to detect a virus or confidently confirm its absence was impractically high.

AIC is not aware of any ongoing testing for viral agents such as African Swine Fever virus (ASF) or Porcine Epidemic Diarrhoea virus (PED) but suggested to contact [Food Fortress](#) - a collaboration of businesses committed to improving the safety and security of the food chain – as they may be doing some of these tests. Food Fortress conducts “an industry-wide program of strategic sampling and testing to reduce the risk from the principal contaminants (heavy metals, dioxins, and mycotoxins, mostly) which threaten this chain”. Samples of the feed compounds produced are kept on site for a minimum period of three to five years, depending on the product (UFAS Standards 2024, p71 and p80).

4.8 Storage of manufactured feed for sale

All mills surveyed store feed for sale in bins/silos, three mills also supply feed in new sealed/stitched bags. Only one mill surveyed routinely cleans (not disinfects) and empties bins/silos between batches. Another mill empties, cleans and disinfects between batches for some feed compounds, but not all. The remaining mills do not routinely clean or disinfect between batches. Bagged feed may have a totally different distribution route, possibly being stored in retail shop warehouses across the UK. Feed sold from warehouses to backyard producers would be difficult to trace from warehouses to the end user. However, this is not applicable when medicated feed is concerned, as the vast majority of medicated feed sales through retail stores are recorded and traceable. The [Animal Health Distributors Association \(AHDA\)](#) actively supports the UK multi-channel distribution to prescribe and sell licensed animal medicines via their members.

4.9 Sales and distribution

Three of the feed mills surveyed sold the large majority (more than 90%) of their pig feed products to individual pig farms only. The other five mills mostly sold to integrated pig producers, with one of these also distributing to a local feed merchant. None of the mills surveyed supplied national retailers. One mill has an onsite shop.

Records of order and delivery date, address and contact details are kept electronically for all but one mill keeping electronic and paper records.

4.10 Delivery

Five out of the eight mills surveyed use their own delivery vehicles. Two mills use their own vehicles for both delivery and collection. One mill outsources delivery. Fleets of between 3 and 35 vehicles are utilized for deliveries.

All mills keep a record of the delivery route taken. Routes may be decided based on the least number of miles, to save on fuel and increase efficiency. Five of the mills surveyed regularly arrange their delivery route to visit first high welfare/PRRS-free herds; two more mills sometimes undertake this protocol. The one mill that responded 'No' to prioritising routes only supplies a single farm. It is unclear how mills obtain herd health status information and how they make decisions on which farm to visit based on that. Indeed, based on feedback from AIC, mills may rely on livestock farmers to inform them of their herd's health status (it is the farmers responsibility to do this) and mills then plan delivery routes based on that information. It is possible that farm routes are also influenced directly by high herd-health farms, as they may place special requests for delivery of feed on Monday morning - this inherently imposes a 2-day pig free period before entering farm premises.

Four mills deliver feed across GB, with the remainder only supplying locally within 100km/60 miles. Having a larger number of delivery vehicles shows little correlation with undertaking national or local supply, based on the eight mills surveyed.

4.11 Delivery truck cleaning

Six feed mills conduct external truck cleaning on-site, with two mills outsourcing external truck cleaning to an off-site location. Regarding external disinfection of vehicles, five of the mills conduct disinfection daily and two mills disinfect after returning to the depot following every journey. The eighth mill does not routinely disinfect but alluded to disinfecting trucks (externally and internally) depending on notifiable disease risks.

The AIC Feed Incident Group (FIG) keeps an up-to-date list on main contacts (DEFRA, APHA, local authorities, etc) in case of disease outbreaks. All mills associated with AIC have access to FIG to facilitate communication and coordination should contingency plans need to be activated in the event of an outbreak.

4.12 ASF and PED contingency plans

All feed mills responding to the survey have contingency plans in place in the event of a notifiable disease outbreak such as ASF or PED.

AB Agri-associated mills have access to an in-house ASF risk assessment tool. The tool helps managers sourcing feed ingredients from outside the UK by providing information on the potential risk of introducing ASF. Risk of ASF introduction is driven by country of origin, import route, and type of feed ingredient. The tool refers ingredients flagged as Red or Amber to a specialist team.

5 Discussion

Although our sample is not fully representative of the UK pig feed sector, the findings provide valuable insights into feed sourcing, manufacturing, and delivery processes. The responding mills operate under Hazard Analysis and Critical Control Points (HACCP) principles, ensuring a structured approach to identifying and mitigating risks associated with feed ingredients, production methods, and the intended livestock. Additionally, the high level of standardization observed across manufacturing, storage, and delivery practices is likely influenced by AIC's Universal Feed Assurance Scheme (UFAS) membership, which sets industry-wide standards for feed safety and quality.

Participants in AIC assurance schemes such as UFAS, FEMAS (Feed Materials Assurance Scheme), and TASCC (Trade Assurance Scheme for Combinable Crops) also benefit from *earned recognition* by the Food Standards Agency (FSA) and Food Standards Scotland (FSS), which reduce the frequency of regulatory inspections for assured mills ([AIC, 2023, p.3](#)). This regulatory approach enables FSA, FSS, and local authorities to focus resources on non-assured sites. While this dual-layered oversight is designed to enhance feed safety, it also raises questions about potential gaps in biosecurity and traceability.

Several key issues warrant further consideration. Although feed quality is typically established through various means, usually prior to or at the point of ingredients arrival at the mill, discussions with feed assurance managers would determine how this risk is managed. However, the potential for (some) feed quality deterioration/contamination exists if leftovers remain in storage and containers are not fully emptied before refilling, leading to cross-contamination between batches. Secondly, while routine microbiological testing currently focuses on bacteria and mycotoxins, expanding surveillance to viral contaminants could strengthen feed safety, particularly in light of emerging disease threats.

Additionally, electronic records are maintained at various stages of the production chain, playing a crucial role in outbreak tracing and response. However, the retrievability and interoperability of these records remain unclear, an area requiring further exploration to enhance disease control strategies. Similarly, the extent to which feed mills have access to farm health status information is uncertain, raising questions about their ability to adapt feed delivery routes or implement targeted biosecurity measures based on on-farm conditions.

Finally, in the event of an outbreak, the communication pathways between feed mills and relevant stakeholders, such as veterinarians, farmers, and regulatory bodies, although appear to be facilitated by AIC's FIG, need to be clearly defined. Establishing robust communication protocols would be essential for ensuring a rapid and coordinated response, minimizing the risk of disease spread through feed distribution networks.

Addressing these gaps could strengthen biosecurity, improve disease preparedness, and enhance overall feed safety within the UK pig industry.

6 Take home messages

Overall, while the sample size of this survey may not fully represent UK pig feed mills, the findings provide valuable insights into the sector, highlighting the structured approach to hazard analysis, and the high level of standardisation likely influenced by UFAS membership.

Routine microbiological testing for bacteria and mycotoxins was conducted across all surveyed mills, ensuring a baseline level of feed safety.

Electronic record-keeping was consistently implemented at different stages of production, highlighting its potential **role in outbreak tracing and disease management**.

However, key questions remain for future exploration:

- How **retrievable and interoperable are electronic records** in the context of outbreak investigations?
- In the event of an **outbreak**, what **communication pathways** exist between feed mills and key stakeholders, and how could they be strengthened?
- What **level of access** do feed mills have to farm health status, and how could this information be used to enhance feed safety?
- Could routine microbiological testing be **expanded to include viruses**?

Addressing these areas could enhance biosecurity, improve disease preparedness, and reinforce the role of feed mills in safeguarding animal health.

7 Next steps

The next steps of this work are to be discussed with the Scottish Government in the context of their priorities and EPIC's Year 4 plans. It has been suggested to conduct in-person visits to five key pig feed mills in Scotland, as a way to further investigate some of the queries raised from this work.

8 Supporting literature

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