

Assessment of best practice to minimise odour emissions at Baluss Farm pig unit

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1. INTRODUCTION

1.1 Background

Aberdeenshire Council had been receiving complaints about odours from Baluss Farm pig unit and these were believed to be related to a newly constructed slurry store. An odour abatement notice was served by the council requiring the nuisance to be abated and prevented from re-occurring by the provision of a suitable cover or roofing over the slurry store. The store had subsequently been covered by means of an Aerocover™ odour control system but complaints were still being received by the Council.

In order to get an independent assessment of whether best practice was being applied to control odours on the farm Aberdeenshire Council have instructed SAC Consulting to undertake an inspection of the farm and report the findings with regard to accepted and best practises for managing odour. This report details the findings of a farm inspection undertaken on 9th April 2015. Attending the inspection were representatives from Aberdeenshire Council and SAC Consulting and full access to the pig unit at Baluss was provided by Messrs A T Howie of Baluss Farm.

1.2 Baluss Farm pig unit description

Baluss Farm is located on a low knoll at Ordnance Survey grid reference 400571,847455 to the south of the village of Mintlaw. The farm operates a modern pig enterprise comprising breeding sows to finishing pigs. The main farrowing, nursery and finishing buildings are located to the east of the farm steading and approximately 250 metres due south of residential properties located on the south east edge of Mintlaw. The slurry store is located at the south east corner of the farm buildings and is located 302 metres from the nearest house in Mormond Crescent, Mintlaw. (Figure 1)

Figure 1 Aerial view of Baluss Farm and Mintlaw

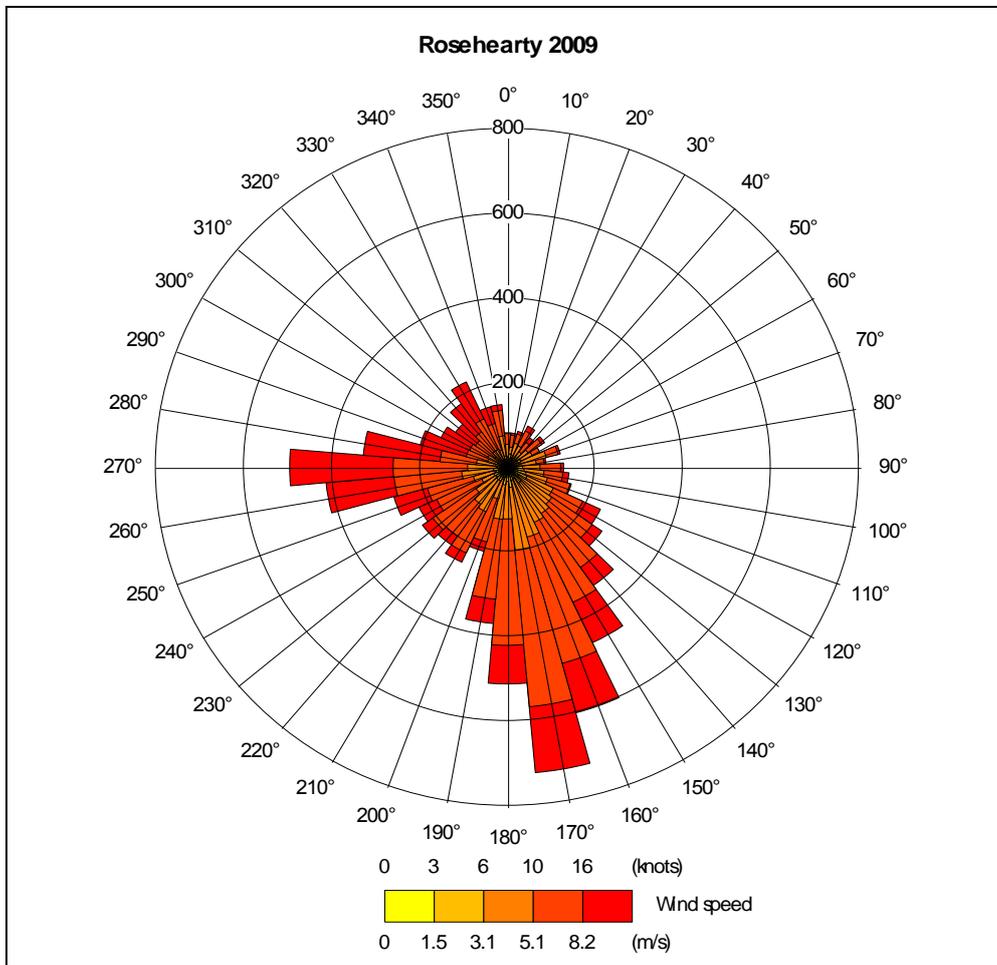


The pig buildings are mechanically ventilated with air being drawn in through automatically controlled vents in the side walls and expelled via high efflux velocity roof mounted fans (Skov units). The unit is run on an 'all in/all out' basis, essentially a batch production system that allows a good degree of biosecurity as the unit is thoroughly cleaned and disinfected between batches. The buildings incorporate slatted floors with slurry tanks under the slats. During the turn-round period the under-slat tanks are emptied by gravity flow via underground pipes to a 110 m³ slurry reception tank adjacent to the main slurry storage tank. The solid and liquid portions are separated at this stage using a screw press separator. The liquid portion, which is expected to contain less than 1% dry matter, is then pumped into the slurry tank with the fill pipe being located below surface level at the bottom of the tank. The surface of the slurry tank is sealed using an Aerocover™. The cover consists of a floating layer of polymer coated aggregate that effectively seals the surface slurry tank. The solids are stored in a reception pit in the building housing the separator.

1.3 Prevailing weather

Complaints may occur when the southerly winds blow directly from the farm towards the houses to the north. Examination of a wind rose from nearby Rosehearty weather station shows that southerly winds are a prominent feature in the north east. (Figure 2)

Figure 2. Windrose for Rosehearty



Other weather factors may also influence whether odours are detected at properties in the village, for example atmospheric stability, wind speed, temperature, humidity, precipitation and topography. At the time of the farm visit weather conditions were conducive to detection of odours at distances downwind from the unit.

The day was sunny and warm with clear skies with little cloud cover, temperatures were 16 -17 °C and there was a light southerly wind of approximately 4-5 m s⁻¹.

2. ASSESSMENT OF BEST PRACTICE

2.1 Relevant standards

The pig unit at Baluss is not of a sufficient size that requires it to be regulated under the Pollution Prevention and Control (Scotland) Regulations and is therefore not required to comply with the 'Standard Farming Installation Rules'¹ that apply to PPC permitted farms in Scotland. However given that there is a complaint history about odours, for the purposes of assessing compliance with best practice, operations on the farm have been assessed with regard to the general requirements that apply to PPC permitted farms and the general requirements contained in the current PEPFAA Code of good agricultural practice².

2.2 Nature of odours

The nature of pig production operations means that preventing odour generation at source is rarely possible as the animals are inherently odorous. However odours can be minimised by adopting a range of techniques to minimise odours, or to prevent it reaching neighbours. In many cases good operational practices and maintaining a high standard of housekeeping will usually be effective in reducing the level of odours experienced at nearby houses.

A number of factors can affect the release of odours from pig units and these include:

- size of the operation;
- the feeding regime;
- the nature of the rearing cycle;
- the type of building and ventilation;
- storage arrangements for manure and slurry;
- land spreading practices;
- the way the unit is managed.

The impact of odour emissions from the farm on local receptors depends upon factors such as:

- the proximity of the farm to housing;
- the nature of the topography;
- the prevailing weather conditions.

¹ Pollution Prevention and Control (Scotland) Regulations 2000 (PPC) Intensive Livestock Installations. Standard Farming Installation Rules (How to Comply) Incorporating PPC Permit application guidance. SEPA PPC TG32 V2 November 2009

² Prevention of Environmental Pollution From Agricultural Activity. Code of Good Practice. Scottish Government January 2005.

2.3 Size of the operation

Baluss pig unit contains approximately 300 sows plus finishers all reared for bacon. A portion of the pigs are moved to a site at Fraserburgh to be finished on straw. In relative terms Baluss is therefore a small pig unit. By way of comparison the threshold numbers for a pig unit to be regulated under the Pollution Prevention and Control (Scotland) regulations is 750 places for sows or 2000 production pigs over 30 kg.

2.4 Selection and use of animal feed

The selection and use of animal feed is an important aspect of reducing odours at source. A diet too high in proteins will increase the nitrogen and sulphur content of manure and this can lead to increased emissions of odours. At Baluss a number of diets are fed with the crude protein content being matched to the pig's requirements depending on what stage they are in the production process. The diets are formulated by a professional animal nutritionist.

Best practice conclusion

Best practice is being achieved regarding selection and use of animal feeds.

2.5 The rearing cycle

The unit is operated on an all in all out system, essentially a batch system which allows regular emptying of slurry tanks below slats and cleaning and disinfection of the premises between batches. For sows and nursery pigs this is done on a three to four week cycle. Finishing pigs are kept on slats on a 12 week cycle.

Best practice conclusion

The all in all out batch processing husbandry system allows regular cleaning of the premises and emptying of the under-slat tanks. It was evident that best practice was being achieved with very clean and well maintained buildings.

2.6 Type of buildings and ventilation

The type of ventilation system used can have a significant effect on the dilution and dispersion of odours between the source and receiver. Buildings with air exiting through fans low in the side walls generally have poor dispersion characteristics whereas buildings with high velocity fans mounted in the roof provide a much greater degree of dilution and dispersion of odours (the chimney effect).

One building for finishing pigs was built in 1996 and a newer building for farrowing, nursery and finishing pigs was built in 2011. The buildings are mechanically ventilated with air being drawn in through adjustable inlets in the side walls and exhaust air exiting via roof mounted high efflux velocity fans (Skov units). In each room there was a variable speed fan to provide the required background ventilation and change of air and this was supplemented by either one, two, or three additional fans operating at full speed on an on/off basis. When the additional high speed fans cut in the variable speed fans shut down. This means that in warmer weather such as that prevailing during the visit exhaust air is blown higher into the atmosphere for greater dilution and dispersion. The ventilation system was computer controlled to ensure the correct number of air changes, temperature and humidity for the pigs depending on their stage in the production cycle.

Best practice conclusion

The ventilation system systems used represented best practice particularly in terms of dilution and dispersion of odours into the atmosphere.

2.7 Storage arrangements for manure and slurry

Techniques to reduce odours from housing will depend on the housing and type of slurry and manure system in use. With slurry based systems such as the fully slatted systems used at Baluss, reducing the surface area of slurry and any damp areas of floor will help to reduce odours. Slurry should not be left for long periods under the slats. In general terms odour emissions increase with an increase in slatted floor area, and ventilating the pit/tank will increase odours substantially.

All the buildings a Baluss have fully slatted floors, but in some pens these have been partially covered by comfort mats for pigs to lie on. Slurry is collected and retained in tanks below the slats and the tanks are emptied relatively frequently (3-4 week cycle for farrowing and young pigs or 12 weeks for finishing pigs) by gravity flow via underground pipes to a 110 m³ reception pit adjacent to the slurry store. Slurry is then separated into solids and liquids using a screw separator. The liquid portion is pumped in to the slurry tank via a pipe with the end located well below the surface of the slurry. The slurry tank itself is covered with an AerocoverTM to reduce odours. This consists of a floating layer of polymer coated aggregate that effectively seals the surface of the tank. Floating covers like this are in many respects better than fixed covers. With fixed covers a considerable amount of odorous air can collect in the air space at the top of the tank and if this is disturbed for any reason there can be a significant release of odours. Removing the solids from slurry reduces the possibility of anaerobic decomposition in the slurry tank. This is important because anaerobic decomposition can cause odorous gasses to bubble through the floating cover and release odour into the environment. The solid manure is stored in a concrete lined covered bay below the solids separator. When the under-slat slurry tanks are emptied Baluss Farm tries to do this when the wind is not blowing towards Mintlaw village. Records are kept of slurry handling operations and the prevailing weather at the time of this operation. Baluss are also trialling a Biocell agri product, a bacteriological slurry treatment which is added to slurry and claims to reduce odours.

Best practice conclusion

Regular removal of slurry to the store, slurry separation and a high standard of cleanliness were all evident at Baluss and are all examples of best practice. PEPFFA Code advice is followed by trying to avoid handling slurry when the wind was blowing onto houses and records were kept as part of the odour management plan. All the pig pens and slurry handling facilities appeared to be kept in a clean condition.

2.8 Land spreading of practices

Land spreading was not witnessed at the time of the inspection but the techniques used were described. Equipment for slurry spreading was available for viewing in at the farm and comprised of an umbilical system and trailing hose spreader. This represents best practice when used in accordance with the advice in the PEPFFA Code.

2.9 General management of the unit

An important aspect of odour management on pig units is to maintain a good standard of cleanliness. Any surface that is covered with manure will act as a source of odour. Dirty pig pens can be caused by a number of factors such as poor ventilation and building design, poor management, and poor differentiation between feeding, lying and dunging areas.

Best practice conclusion

During the inspection it was apparent that the standard of cleanliness and general management at Baluss pig unit was very high and best practice was being achieved in all aspects of general management.

2.10 Complaint history

An observation from some complainants was that there was a smell of pig slurry emanating from drains in the village. SAC Consulting were asked to consider this aspect during the farm inspection. The inspection of the facilities at the farm did not identify any plausible explanation for such an observation. All the slurry handling facilities were self-contained within the farm steading and there were no obvious pollution pathways to the public drainage system.

3. WALK-ROUND ODOUR ASSESSMENT

3.1 Subjective odour assessment method

As part of the assessment a 'walk round' subjective assessment of odours was made at the nearest houses at the southerly end of Mormond Crescent, Mintlaw. This can also be done periodically round the farm to identify where odours are likely to come from and when they may increase e.g.

- Do odours increase when under-slat tanks are emptied?
- Are there any pits, tanks or other areas where slurry may collect, can they be covered?
- Are there deposits of slurry on hard-standing after loading tankers?
- Are there any uncovered skips or bins?
- Are there any spillages of disinfectant or feedstuffs?

It is useful to record the intensity and duration or extent of an odour in order to assist with odour management and help to quickly identify emerging problems or situations that differ from normal. A scale of increasing odour intensity is normally used:

1. No detectable odour.
2. Faint odour (barely detectable, need to stand still and inhale facing into the wind).
3. Moderate odour (odour easily detected while walking and breathing normally).
4. Strong odour (strong but bearable).
5. Very strong odour (very offensive, possibly causing nausea, particularly if not accustomed to this odour).

The person undertaking the test should spend at least 3 minutes at the sampling points e.g. nearby housing or points on the site boundary. If odour is detectable they should consider which of the following best describes the extent of the odour.

1. Local and transient (only detected on the farm or within the farm boundary during brief periods when the wind drops or blows).
2. Transient as above, but detected outside the boundary.
3. Persistent, but fairly localised.
4. Persistent and pervasive up to 50 metres from the farm.
5. Persistent and widespread.

The results (1-5 for intensity and 1-5 for extent) should be recorded against the location and date and time of assessment. It is also useful to record basic details of the weather at the time of the assessment, e.g. wind direction and speed, cloud cover, rain etc.

3.2 Odour assessment at Mormond Crescent, Mintlaw

Prior to visiting the farm, to avoid becoming sensitised to any odours, an assessment was made of odours at the south end of Mormond Crescent, Mintlaw. The sampling location was at Ordnance Survey grid reference 400530,847742 (Figure 3).

Odour intensity: 2 Faint odour (barely detectable, need to stand still and inhale facing into the wind)

Odour extent: 2 Transient, but detected outside the boundary (only detected during brief periods when the wind drops or blows).

Weather conditions: The day was sunny and warm with clear skies with little cloud cover, temperatures were 16 -17 °C and there was a light southerly wind of approximately 4-5 m s⁻¹.

Comment: When standing at the location a faint odour was detected intermittently, the odour was recognisable as a pig odour but it was not clear whether it was a slurry odour or odour from ventilation fans. The odour was intermittent and it was possible that the wind blowing over the farm was creating downdrafts or a 'rotor' effect on the lee side of the farm that was bringing odours to ground level intermittently at the sampling location. Another possibility for the intermittency could have been the ventilation fans cycling on and off, but the subsequent farm visit showed that in the prevailing warm conditions the fans were operating continuously.

Figure 3. Location where odours were subjectively assessed



4. CONCLUSIONS

4.1 Best practice – management

It was apparent from the farm visit that a high standard of management and general cleanliness was maintained at Baluss Farm. Best practice was adopted in general and there was a high awareness of the processes and activities that can cause odours and the measures required to mitigate them.

4.2 Best practice - technology

When compared with the measures for managing odours set out in Standard Farming Installation Rules and the PEPFAA Code the facilities at Baluss Farm were found to be of a high standard. The buildings were relatively new and were well maintained. The ventilation systems whilst providing a good internal environment for the pigs were also of a design that would more effectively dilute and disperse odours from the buildings. Facilities for handling slurry were excellent with a range of measures from frequent emptying of under-slat tanks (with care being taken to consider wind direction when this was done) to slurry solids separation, to a covered store all being in place.

4.3 Mitigation

Whilst the management and technical features in place at Baluss are considered to represent current best practice it is the case that from time to time odours can be detected in the village. This was witnessed on the day of the inspection. Whether this results in complaints will depend a great deal on the recipient's sensitivity to odours. During the inspection the odours detected at the edge of the village could be described as a faint, transient odour and as such may be expected from time to time in a rural environment.

In very recent years building technology has advanced and buildings are now available on the market that incorporate air cleaning systems into the design of the building. However buildings incorporating air cleaning systems tend to be designed specifically around the air cleaning equipment and it is usually neither possible nor cost effective to retrofit to existing buildings.

A significant contributory factor to odours being detected in the village from Baluss Farm is the close proximity of the farm to the village combined with the prevalence of southerly winds in the area. Topographical effects may also be exacerbating the situation as southerly winds blow over the top of the farm which is at a slightly higher elevation than the village resulting in a degree of turbulence that may be bringing odorous air to ground level in the vicinity of the nearest houses. Unfortunately little can be done about location and topography. Efforts have to concentrate on reducing odours at source and evidence from the visit suggested the farm was good in this regard.