

Conclusions on BAT from the Reference Document on Best Available Techniques for Intensive Rearing of Poultry and Pigs (July 2003) (extracts)

The full and complete Reference Document on Best Available Techniques for Intensive Rearing of Poultry and Pigs (July 2003) is available at the EIPPC Bureau website: <http://eippcb.jrc.ec.europa.eu/reference/>

SCOPE

Identify here the particular processes and activities at the installation that come within the scope of the conclusions on BAT from the Intensive Rearing of Poultry and Pigs BAT reference documents (BREF).

Application of organic fertiliser to land outside the installation boundary will not be controlled by conditions of an IED licence, however the BREF document for Intensive Rearing of Poultry and Pigs (2003) includes BAT conclusions on techniques for landspreading of manure. The IPPC Bureau, in relation to the draft BREF (predicted to be finalised during 2015), states that *'The Scope of the BAT Conclusions does not make any distinction as to whether the manure is spread on farm or off farm. It is up to the competent authority to assess on a case by case basis whether the land where manure spreading is carried out is located on the site, therefore constituting part of the 'installation'.*

Conclusions on BAT	Applicability Assessment (describe how the technique applies or not to your installation)	State whether it is in place or state schedule for implementation
5.1 Good agricultural practice in the intensive rearing of pigs and poultry <i>(BAT 1-11 below apply to both pig and poultry sites)</i>		
BAT 1. BAT is to identify and implement education and training programmes for farm staff (Section 4.1.2)	Applicable Staff are trained in the implementation of the Emergency Response Plan.	Yes, in place
BAT 2.	Applicable	Yes

<p>BAT is to keep records of water and energy usage, amounts of livestock feed, waste arising and field applications of inorganic fertiliser and manure (Section 4.1.4)</p>	<p>Records are retained on-site and included in the Annual Environmental Report.</p>	
<p>BAT 3. BAT is to have an emergency procedure to deal with unplanned emissions and incidents (Section 4.1.5)</p>	<p>Applicable</p> <p>An Emergency plan detailing the procedures to be undertaken in the event of a chemical, fuel or other hazardous waste spill, a fire or noncompliance incident IS IN USE</p>	<p>Yes</p>
<p>BAT 4. BAT is to implement a repair and maintenance programme to ensure that structures and equipment are in good working order and that facilities are kept clean (Section 4.1.6)</p>	<p>Applicable</p> <p>All structures and tanks are inspected on a regular basis. Ventilation systems are maintained.</p> <p>Houses are washed and disinfected after each batch.</p>	<p>Yes</p>
<p>BAT 5. BAT is to plan activities at the site properly, such as the delivery of materials and the removal of products and waste (Section 4.1.3),</p>	<p>Good working practices are adhered to</p>	<p>Yes</p>
<p>BAT 6. BAT is to plan the application of manure to land properly (Section 4.1.3).</p>	<p>Applicable</p> <p>Soiled water arising from the washing down of the accommodation houses is utilised on the applicant's land adjacent to the unit and amounts to approximately 5 vacuum tanks a year. The application of the soiled water is regulated under the EU (Good Agricultural Practice for the Protection of Waters) 2014 S.I. 31 of 2014.</p>	<p>Yes</p>

<p>BAT 7. BAT is to apply nutritional measures at source by feeding pigs and poultry lower amounts of nutrients; see Sections 5.2.1 and 5.3.1.</p>	<p>Applicable Specialist diets are in place</p>	<p>Yes</p>
<p>BAT 8. BAT is to minimise emissions from manure to soil and groundwater by balancing the amount of manure with the foreseeable requirements of the crop (nitrogen and phosphorus, and the mineral supply to the crop from the soil and from fertilisation).</p>	<p>Applicable Soiled water arising from the washing down of the accommodation houses is utilised on the applicant's land adjacent to the unit and amounts to approximately 5 vacuum tanks a year. The application of the soiled water is regulated under the EU (Good Agricultural Practice for the Protection of Waters) 2014 S.I. 31 of 2014.</p>	<p>Yes</p>
<p>BAT 9. BAT is to take into account the characteristics of the land concerned when applying manure; in particular soil conditions, soil type and slope, climatic conditions, rainfall and irrigation, land use and agricultural practices, including crop rotation systems.</p>	<p>Applicable Soiled water arising from the washing down of the accommodation houses is utilised on the applicant's land adjacent to the unit and amounts to approximately 5 vacuum tanks a year. The application of the soiled water is regulated under the EU (Good Agricultural Practice for the Protection of Waters) 2014 S.I. 31 of 2014.</p>	<p>Yes</p>
<p>BAT 10. BAT is to reduce pollution of water by doing in particular all of the following:</p>	<p>Applicable</p>	<p>Yes</p>

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<p>not applying manure to land when the field is:</p> <ul style="list-style-type: none"> - water-saturated - flooded - frozen - snow covered <p>not applying manure to steeply sloping fields not applying manure adjacent to any watercourse (leaving an untreated strip of land), and spreading the manure as close as possible before maximum crop growth and nutrient uptake occur.</p>	<p>Soiled water arising from the washing down of the accommodation houses is utilised on the applicant's land adjacent to the unit and amounts to approximately 5 vacuum tanks a year. The application of the soiled water is regulated under the EU (Good Agricultural Practice for the Protection of Waters) 2014 S.I. 31 of 2014.</p>	
<p>BAT 11. BAT is managing the landspreading of manure to reduce odour nuisance where neighbours are likely to be affected, by doing in particular all of the following:</p> <ul style="list-style-type: none"> - spreading during the day when people are less likely to be at home and avoiding weekends and public holidays, and - paying attention to wind direction in relation to neighbouring houses 	<p>Applicable</p> <p>Soiled water arising from the washing down of the accommodation houses is utilised on the applicant's land adjacent to the unit and amounts to approximately 5 vacuum tanks a year. The application of the soiled water is regulated under the EU (Good Agricultural Practice for the Protection of Waters) 2014 S.I. 31 of 2014.</p>	<p>Yes</p>
<p>5.2 Intensive Rearing of Pigs <i>(BAT 12 to 51 below apply to Pig sites only)</i></p>		
<p>5.2.1 Nutritional techniques Nutritional management aims at matching feeds more closely to animal requirements at various production stages, thus decreasing the wasted nutrient excretion in the manure.</p>	<p>Not applicable</p>	<p>No</p>

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5.2.1.1 Nutritional techniques applied to nitrogen excretion	Not applicable	No																					
<p>BAT 12. BAT is to apply feeding measures.</p> <p>As far as nitrogen and consequently nitrates and ammonia outputs are concerned, a basis for BAT is to feed animals with successive diets (phase-feeding) with lower crude protein contents. These diets need to be supported by an optimal amino acid supply from adequate feedstuffs and/or industrial amino acids (lysine, methionine, threonine, tryptophan, see Section 4.2.3).</p> <p>A crude protein reduction of 2 to 3 % (20 to 30 g/kg of feed) can be achieved depending on the breed/genotype and the actual starting point. The resulting range of dietary crude protein contents is reported in Table 5.1. The values in the table are only indicative, because they, amongst others, depend on the energy content of the feed. Therefore levels may need to be adapted to local conditions. Research on further applied nutrition is currently being carried out in a number of Member States and may support further possible reductions in the future, depending on the effects of changes in genotypes.</p> <table border="1" data-bbox="199 900 1122 1209"> <thead> <tr> <th>Species</th> <th>Phases</th> <th>Crude protein content (% in feed)</th> <th>Remark</th> </tr> </thead> <tbody> <tr> <td>Weaner</td> <td><10 kg</td> <td>19 – 21</td> <td rowspan="6">With adequately balanced and optimal digestible amino acid supply</td> </tr> <tr> <td>Piglet</td> <td><25 kg</td> <td>17.5 – 19.5</td> </tr> <tr> <td rowspan="2">Fattening pig</td> <td>25 – 50 kg</td> <td>15 – 17</td> </tr> <tr> <td>50 – 110 kg</td> <td>14 – 15</td> </tr> <tr> <td rowspan="2">Sow</td> <td>gestation</td> <td>13 – 15</td> </tr> <tr> <td>lactation</td> <td>16 – 17</td> </tr> </tbody> </table> <p>Table 5.1: Indicative crude protein levels in BAT-feeds for pigs</p>	Species	Phases	Crude protein content (% in feed)	Remark	Weaner	<10 kg	19 – 21	With adequately balanced and optimal digestible amino acid supply	Piglet	<25 kg	17.5 – 19.5	Fattening pig	25 – 50 kg	15 – 17	50 – 110 kg	14 – 15	Sow	gestation	13 – 15	lactation	16 – 17	Not applicable	No
Species	Phases	Crude protein content (% in feed)	Remark																				
Weaner	<10 kg	19 – 21	With adequately balanced and optimal digestible amino acid supply																				
Piglet	<25 kg	17.5 – 19.5																					
Fattening pig	25 – 50 kg	15 – 17																					
	50 – 110 kg	14 – 15																					
Sow	gestation	13 – 15																					
	lactation	16 – 17																					
5.2.1.2 Nutritional techniques applied to phosphorus excretion	Not applicable	No																					
BAT 13.	Not applicable	No																					

BAT is to apply feeding measures.

As far as phosphorus is concerned, a basis for BAT is to feed animals with successive diets (phase-feeding) with lower total phosphorus contents. In these diets, highly digestible inorganic feed phosphates and/or phytase must be used in order to guarantee a sufficient supply of digestible phosphorus.

A total phosphorus reduction of 0.03 to 0.07 % (0.3 to 0.7 g/kg of feed) can be achieved depending on the breed/genotype and the actual starting point by the application of highly digestible inorganic feed phosphates and/or phytase in the feed. The resulting range of dietary total phosphorus contents is reported in Table 5.2. The values in the table are only indicative, because they, amongst others, depend on the energy content of the feed. Therefore levels may need to be adapted to local conditions. Further applied nutrition research is currently being carried out in a number of Member States and may support further possible reductions in the future, depending on the effects of changes in genotypes.

Species	Phases	Total phosphorus content (% in feed)	Remarks
Weaner	<10 kg	0.75 – 0.85	With adequate digestible phosphorus by using e.g. highly digestible inorganic feed phosphates and/or phytase
Piglet	<25 kg	0.60 – 0.70	
Fattening pig	25 – 50 kg	0.45 – 0.55	
	50 – 110 kg	0.38 – 0.49	
Sow	gestation	0.43 – 0.51	
	lactation	0.57 – 0.65	

Table 5.2: Indicative total phosphorus levels in BAT-feeds for pigs

5.2.2 Air emissions from pig housing

Designs to reduce ammonia emissions to air from pig housing systems, as presented in Chapter 4, basically involve some or all of the following principles:

- _ reducing emitting manure surfaces

Not applicable

No

<ul style="list-style-type: none"> _ removing the manure (slurry) from the pit to an external slurry store _ applying an additional treatment, such as aeration, to obtain flushing liquid _ cooling the manure surface _ using surfaces (for example, of slats and manure channels) which are smooth and easy to clean. <p>The draft BREF (predicted to be finalised during 2015) identifies ‘Fully or partly slatted floor with a deep pit’ However in relation to applicability the housing technique is <i>‘Not applicable to new plants, unless combined with an air cleaning system, slurry cooling and/or pH reduction of the slurry. Only applicable to existing plants if used in combination with an additional mitigation measure, e.g. a combination of nutritional techniques, air cleaning system, pH reduction of the slurry, slurry cooling’.</i></p>		
<p>5.2.2.1 Housing systems for mating/gestating sows</p>	Not applicable	No
<p>BAT 14 BAT is:</p> <ul style="list-style-type: none"> - a fully- or partly-slatted floor with vacuum system for frequent slurry removal (Sections 4.6.1.1 and 4.6.1.6), or - a partly-slatted floor and a reduced manure pit (Section 4.6.1.4) 	Not applicable	No
<p>BAT 15 ‘New to build housing systems with a fully- or partly-slatted floor and flush gutters or tubes underneath and flushing is applied with non-aerated liquid (Sections 4.6.1.3 and 4.6.1.8)’ are conditional BAT. In instances where the peak in odour, due to the flushing, is not expected to give nuisance to neighbours these techniques are BAT for new to build systems. In instances where this technique is already in place, it is BAT (without condition).</p>	Not applicable	No
<p>BAT 16. ‘A housing system with manure surface cooling fins using a closed system with heating pumps (Section 4.6.1.5)’ performs well but is a very costly system. Therefore manure surface cooling fins are not BAT for new to build housing systems, but when it is already in place, it is BAT.</p>	Not applicable	No
<p>BAT 17. ‘Partly-slatted floor systems with a manure scraper underneath (Section 4.6.1.9)’ generally perform well, but the operability is difficult. Therefore a manure scraper is</p>	Not applicable	No

not BAT for new to build housing systems, but it is BAT when the technique is already in place.		
BAT 18. 'Fully- or partly-slatted floor systems and flushing gutters or tubes underneath with flushing applied with non-aerated liquid (Sections 4.6.1.3 and 4.6.1.8)' is, as already mentioned earlier, BAT when it is already in place. The same technique operated with aerated liquid is not BAT for new to build housing systems because of odour peaks, energy consumption and operability. However, in instances where this technique is already in place, it is BAT.	Not applicable	No
BAT 19. When litter is used, along with good practices such as having enough litter, changing the litter frequently, designing the pen floor suitably, and creating functional areas, then they cannot be excluded as BAT.	Not applicable	No
5.2.2.2 Housing systems for growers/finishers	Not applicable	No
BAT 20. BAT is: <ul style="list-style-type: none"> - a fully-slatted floor with a vacuum system for frequent removal (Section 4.6.1.1), or - a partly-slatted floor with a reduced manure pit, including slanted walls and a vacuum system (Section 4.6.4.3), or - a partly-slatted floor with a central, convex solid floor or an inclined solid floor at the front of the pen, a manure gutter with slanted side walls and a sloped manure pit (Section 4.6.4.2). 	Not applicable	No
BAT 21. 'New to build housing systems with a fully- or partly-slatted floor and flush gutters or tubes underneath and flushing is applied with non-aerated liquid (Sections 4.6.1.3 and 4.6.1.8)' are conditional BAT. In instances where the peak in odour, due to the flushing, is not expected to give nuisance to neighbours these techniques are BAT for new to build systems. In instances where this technique is already in place, it is BAT (without condition).	Not applicable	No
BAT 22. 'A housing system with manure surface cooling fins using a closed system with heating pumps (4.6.1.5)' performs well but is a very costly system. Therefore manure surface cooling fins are not BAT for new to build housing systems, but when it is	Not applicable	No

already in place, it is BAT. In retrofit situations this technique can be economically viable and thus can be BAT as well, but this has to be decided on a case by case basis.		
BAT 23. 'Partly-slatted floor systems with a manure scraper underneath (4.6.1.9)' generally perform well, but the operability is difficult. Therefore a manure scraper is not BAT for new to build housing systems, but it is BAT when the technique is already in place.	Not applicable	No
BAT 24. 'Fully- or partly-slatted floor systems and flushing gutters or tubes underneath with flushing applied with non-aerated liquid (Sections 4.6.1.3 and 4.6.1.8)' is, as already mentioned earlier, BAT when it is already in place. The same technique operated with aerated liquid is not BAT for new to build housing systems because of odour peaks, energy consumption and operability. However, in instances where this technique is already in place, it is BAT.	Not applicable	No
BAT 25 When litter is used, along with good practices such as having enough litter, changing the litter frequently, designing the pen floor suitably, and creating functional areas then they cannot be excluded as BAT. The following system is an example of what may be BAT: <ul style="list-style-type: none"> - a solid concrete floor with littered external alley and a straw flow system (Section 4.6.4.8). 	Not applicable	No
5.2.2.3 Housing systems for farrowing sows (including piglets)	Not applicable	No
BAT 26. BAT is a crate with a fully-slatted iron or plastic floor and with a <ul style="list-style-type: none"> - combination of a water and manure channel (Section 4.6.2.2), or - flushing system with manure gutters (Section 4.6.2.3), or - manure pan underneath (Section 4.6.2.4). 	Not applicable	No
BAT 27. 'A housing system with manure surface cooling fins using a closed system with heating pumps (Section 4.6.2.5)' performs well but is a very costly system. Therefore manure surface cooling fins are not BAT for new to build housing systems, but when it is already in place, it is BAT. In retrofit situations this technique can be economically viable and thus can be BAT as well, but this has to be decided on a case by case basis.	Not applicable	No
BAT 28. 'Crates with a partly-slatted floor and a manure scraper underneath (Section 4.6.2.7)'	Not applicable	No

generally perform well, but the operability is difficult. Therefore a manure scraper is not BAT for new to build housing systems, but it is BAT when the technique is already in place.		
<p>BAT 29. For new installations the following techniques are not BAT:</p> <ul style="list-style-type: none"> - crates with a partly-slatted floor and a reduced manure pit (Section 4.6.2.6), and - crates with a fully-slatted floor and a board on a slope (Section 4.6.2.1). <p>However, when these techniques are already in place it is BAT.</p>	Not applicable	No
<p>BAT 30. When litter is used, along with good practices such as having enough litter, changing the litter frequently, and designing the pen floor suitably then they cannot be excluded as BAT.</p>	Not applicable	No
5.2.2.4 Housing systems for weaners	Not applicable	No
<p>BAT 31. BAT is a pen:</p> <ul style="list-style-type: none"> - or flatdeck with a fully-slatted- or partly-slatted floor with a vacuum system for frequent slurry removal (Sections 4.6.1.1 and 4.6.1.6), or - a pen or flatdeck with a fully-slatted floor beneath which there is a concrete sloped floor to separate faeces and urine (Section 4.6.3.1), or - with a partly-slatted floor (two-climate system) (Section 4.6.3.4), or - with a partly-slatted iron or plastic floor and a sloped or convex solid floor (Section 4.6.3.5), or - with a partly-slatted floor with metal or plastic slats and a shallow manure pit and channel for spoiled drinking water (Section 4.6.3.6), or - with a partly-slatted floor with triangular iron slats and a manure channel with sloped side walls (Section 4.6.3.9). 	Not applicable	No
<p>BAT 32. 'New to build housing systems with a fully-slatted floor and flush gutters or tubes underneath and flushing is applied with non-aerated liquid (Section 4.6.3.3)' are conditional BAT. In instances where the peak in odour, due to the flushing, is not expected to give nuisance to neighbours these techniques are BAT for new to build systems. In instances where this technique is already in place, it is BAT (without condition).</p>	Not applicable	No

<p>BAT 33. ‘A housing system with manure surface cooling fins using a closed system with heating pumps (Section 4.6.3.10)’ performs well but is a very costly system. Therefore manure surface cooling fins are not BAT for new to build housing systems, but when it is already in place, it is BAT. In retrofit situations this technique can be economically viable and thus can be BAT as well, but this has to be decided on a case by case basis.</p>	Not applicable	No
<p>BAT 34. ‘Fully-slatted and partly-slatted floor systems with a manure scraper underneath (Section 4.6.3.2 and 4.6.3.8)’ generally perform well, but the operability is difficult. Therefore a manure scraper is not BAT for new to build housing systems, but it is BAT when the technique is already in place.</p>	Not applicable	No
<p>BAT 35. when litter is used, along with good practices such as, having enough litter, changing the litter frequently, and designing the pen floor suitably, then they cannot be excluded as BAT. The following system is an example of what is BAT: - a natural ventilated pen with a fully littered floor (new Section 4.6.3.12)</p>	Not applicable	No
<p>5.2.3 Water</p>	Not applicable	No
<p>BAT 36. BAT is to reduce water use by doing all of the following: - cleaning animal housing and equipment with high-pressure cleaners after each production cycle. Typically wash-down water enters the slurry system and therefore it is important to find a balance between cleanliness and using as little water as possible - carry out a regular calibration of the drinking-water installation to avoid spill - keeping record of water use through metering of consumption, and - detecting and repairing leakages.</p>	Not applicable	No
<p>5.2.4 Energy</p>	Not applicable	No
<p>BAT 37. BAT is to reduce energy use by application of good farming practice, starting with animal housing design and by adequate operation and maintenance of the housing and the equipment.</p>	Not applicable	No
<p>BAT 38. BAT for pig housing is to reduce energy use by applying natural ventilation where</p>	Not applicable	No

possible; this needs proper design of the building and of the pens (i.e. microclimate in the pens) and spatial planning with respect to the prevailing wind directions to enhance the airflow; this applies only to new housing		
BAT 39. BAT for pig housing is to reduce energy use by doing the following for mechanically ventilated houses: optimising the design of the ventilation system in each house to provide good temperature control and to achieve minimum ventilation rates in winter	Not applicable	No
BAT 40. BAT for pig housing is to reduce energy use by doing the following for mechanically ventilated houses: avoiding resistance in ventilation systems through frequent inspection and cleaning of ducts and fans	Not applicable	No
BAT 41. BAT for pig housing is to reduce energy use by applying low energy lighting.	Not applicable	No
5.2.5 Manure storage	Not applicable	No
BAT 42. BAT is to design storage facilities for pig manure with sufficient capacity until further treatment or land application can be carried out. The required capacity depends on the climate and the periods in which application to land is not possible.	Not applicable	No
BAT 43. For a stack of pig manure that is always situated on the same place, either on the installation or in the field, BAT is to: <ul style="list-style-type: none"> - apply a concrete floor, with a collection system and a tank for run-off liquid, and - locate any new to build manure storage areas where they are least likely to cause annoyance to sensitive receptors for odour, taking into account the distance to receptors and the prevailing wind direction. 	Not applicable	No
BAT 44. For a temporary stack of pig manure in the field, BAT is to position the manure heap away from sensitive receptors such as, neighbours, and watercourses (including field drains) that liquid runoff might enter.	Not applicable	No
BAT 45. BAT on the storage of slurry in a concrete or steel tank comprises all of the following: <ul style="list-style-type: none"> _ a stable tank able to withstand likely mechanical, thermal and chemical influences _ the base and walls of the tank are impermeable and protected against corrosion 	Not applicable	No

<ul style="list-style-type: none"> _ the store is emptied regularly for inspection and maintenance, preferably every year _ double valves are used on any valved outlet from the store _ the slurry is stirred only just before emptying the tank for, e.g., application on land. 										
<p>BAT 46. It is BAT to cover slurry tanks using one of the following options:</p> <ul style="list-style-type: none"> _ a rigid lid, roof or tent structure, or _ a floating cover, such as chopped straw, natural crust, canvas, foil, peat, light expanded clay aggregate (LECA) or expanded polystyrene (EPS). 	Not applicable	No								
<p>BAT 47. It is BAT to cover lagoons where slurry is stored using one of the following options:</p> <ul style="list-style-type: none"> _ a plastic cover, or _ a floating cover, such as chopped straw, LECA or natural crust. 	Not applicable	No								
5.2.6 On-farm manure processing	Not applicable	No								
<p>BAT 48. In general, on-farm processing of manure is BAT only under certain conditions (i.e. it is a conditional BAT).</p> <table border="1" data-bbox="203 758 1182 1252"> <thead> <tr> <th data-bbox="203 758 817 790">Under the following conditions</th> <th data-bbox="817 758 1182 790">an example of what is BAT:</th> </tr> </thead> <tbody> <tr> <td data-bbox="203 790 817 925"> <ul style="list-style-type: none"> • the farm is situated in an area with nutrient surplus but with sufficient land in the vicinity of the farm to spread the liquid fraction (with decreased nutrient content), and • the solid fraction can be spread on remote areas with a nutrient demand or can be applied in other processes </td> <td data-bbox="817 790 1182 925">mechanical separation of pig slurry using a closed system (e.g. centrifuge or press-auger) to minimise the ammonia emissions (Section 4.9.1)</td> </tr> <tr> <td data-bbox="203 925 817 1165"> <ul style="list-style-type: none"> • the farm is situated in an area with nutrient surplus but with sufficient land in the vicinity of farm to spread treated liquid fraction, and • the solid fraction can be spread on remote areas with a nutrient demand, and • the farmer gets technical assistance for running the aerobic treatment installation properly </td> <td data-bbox="817 925 1182 1165">mechanical separation of pig slurry using a closed system (e.g. centrifuge or press-auger) to minimise the ammonia emissions, followed by aerobic treatment of the liquid fraction (Section 4.9.3) and where the aerobic treatment is well-controlled so that ammonia and N₂O production are minimised</td> </tr> <tr> <td data-bbox="203 1165 817 1252"> <ul style="list-style-type: none"> • there is a market for green energy, and • local regulations allow co-fermentation of (other) organic waste products and landspreading of digested products </td> <td data-bbox="817 1165 1182 1252">anaerobic treatment of manure in a biogas installation (Section 4.9.6)</td> </tr> </tbody> </table> <p>Table 5.3: Examples of conditional BAT on on-farm manure processing</p> <p>Table 5.3 gives some examples on the conditions for BAT for manure processing. The list is not exhaustive and other techniques may also be BAT under certain conditions.</p>	Under the following conditions	an example of what is BAT:	<ul style="list-style-type: none"> • the farm is situated in an area with nutrient surplus but with sufficient land in the vicinity of the farm to spread the liquid fraction (with decreased nutrient content), and • the solid fraction can be spread on remote areas with a nutrient demand or can be applied in other processes 	mechanical separation of pig slurry using a closed system (e.g. centrifuge or press-auger) to minimise the ammonia emissions (Section 4.9.1)	<ul style="list-style-type: none"> • the farm is situated in an area with nutrient surplus but with sufficient land in the vicinity of farm to spread treated liquid fraction, and • the solid fraction can be spread on remote areas with a nutrient demand, and • the farmer gets technical assistance for running the aerobic treatment installation properly 	mechanical separation of pig slurry using a closed system (e.g. centrifuge or press-auger) to minimise the ammonia emissions, followed by aerobic treatment of the liquid fraction (Section 4.9.3) and where the aerobic treatment is well-controlled so that ammonia and N ₂ O production are minimised	<ul style="list-style-type: none"> • there is a market for green energy, and • local regulations allow co-fermentation of (other) organic waste products and landspreading of digested products 	anaerobic treatment of manure in a biogas installation (Section 4.9.6)	Not applicable	No
Under the following conditions	an example of what is BAT:									
<ul style="list-style-type: none"> • the farm is situated in an area with nutrient surplus but with sufficient land in the vicinity of the farm to spread the liquid fraction (with decreased nutrient content), and • the solid fraction can be spread on remote areas with a nutrient demand or can be applied in other processes 	mechanical separation of pig slurry using a closed system (e.g. centrifuge or press-auger) to minimise the ammonia emissions (Section 4.9.1)									
<ul style="list-style-type: none"> • the farm is situated in an area with nutrient surplus but with sufficient land in the vicinity of farm to spread treated liquid fraction, and • the solid fraction can be spread on remote areas with a nutrient demand, and • the farmer gets technical assistance for running the aerobic treatment installation properly 	mechanical separation of pig slurry using a closed system (e.g. centrifuge or press-auger) to minimise the ammonia emissions, followed by aerobic treatment of the liquid fraction (Section 4.9.3) and where the aerobic treatment is well-controlled so that ammonia and N ₂ O production are minimised									
<ul style="list-style-type: none"> • there is a market for green energy, and • local regulations allow co-fermentation of (other) organic waste products and landspreading of digested products 	anaerobic treatment of manure in a biogas installation (Section 4.9.6)									

It is also possible that the chosen techniques are also BAT under other conditions.																																					
5.2.7 Techniques for landspreading pig manure (see also relevant landspreading BAT in Section 5.1)	Not applicable	No																																			
<p>BAT 49. BAT on landspreading equipment</p> <table border="1" data-bbox="197 371 1182 914"> <thead> <tr> <th>Land use</th> <th>BAT</th> <th>Emission reduction</th> <th>Type of manure</th> <th>Applicability</th> </tr> </thead> <tbody> <tr> <td>grassland and land with <u>crop height</u> below 30 cm</td> <td>trailing hose (bandspreading)</td> <td>30 % this may be less if applied on grass height >10 cm</td> <td>slurry</td> <td>slope (<15 % for tankers; <25 % for umbilical systems); not for slurry that is viscous or has a high straw content, size and shape of the field are important</td> </tr> <tr> <td>mainly grassland</td> <td>trailing shoe (bandspreading)</td> <td>40 %</td> <td>slurry</td> <td>slope (<20 % for tankers; <30 % for umbilical systems); not viscous slurry, size and shape of the field, grass less than 8 cm high</td> </tr> <tr> <td>grassland</td> <td>shallow injection (open slot)</td> <td>60 %</td> <td>slurry</td> <td>slope <12 %, greater limitations for soil type and conditions, not viscous slurry</td> </tr> <tr> <td>mainly grassland, arable land</td> <td>deep injection (closed slot)</td> <td>80 %</td> <td>slurry</td> <td>slope <12 %, greater limitations for soil type and conditions, not viscous slurry</td> </tr> <tr> <td>arable land</td> <td>bandspreading and incorporation within 4 hours (*)</td> <td>80 %</td> <td>slurry</td> <td>incorporation is only applicable for land that can be easily cultivated, in other situations BAT is bandspreading without incorporation</td> </tr> <tr> <td>arable land</td> <td>incorporation as soon as possible, but at least within 12 hours</td> <td>within: 4 hrs: 80 % 12 hrs: 60 – 70 %</td> <td>solid pig manure</td> <td>only for land that can be easily cultivated</td> </tr> </tbody> </table> <p>Table 5.4: BAT on landspreading equipment</p>	Land use	BAT	Emission reduction	Type of manure	Applicability	grassland and land with <u>crop height</u> below 30 cm	trailing hose (bandspreading)	30 % this may be less if applied on grass height >10 cm	slurry	slope (<15 % for tankers; <25 % for umbilical systems); not for slurry that is viscous or has a high straw content, size and shape of the field are important	mainly grassland	trailing shoe (bandspreading)	40 %	slurry	slope (<20 % for tankers; <30 % for umbilical systems); not viscous slurry, size and shape of the field, grass less than 8 cm high	grassland	shallow injection (open slot)	60 %	slurry	slope <12 %, greater limitations for soil type and conditions, not viscous slurry	mainly grassland, arable land	deep injection (closed slot)	80 %	slurry	slope <12 %, greater limitations for soil type and conditions, not viscous slurry	arable land	bandspreading and incorporation within 4 hours (*)	80 %	slurry	incorporation is only applicable for land that can be easily cultivated, in other situations BAT is bandspreading without incorporation	arable land	incorporation as soon as possible, but at least within 12 hours	within: 4 hrs: 80 % 12 hrs: 60 – 70 %	solid pig manure	only for land that can be easily cultivated	Not applicable	No
Land use	BAT	Emission reduction	Type of manure	Applicability																																	
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<p>5.3 Intensive rearing of poultry <i>(BAT 52 to 67 below apply to poultry sites only)</i></p>																																					
<p>5.3.1 Nutritional techniques Nutritional management aims at matching feeds more closely to animal requirements at various production stages, thus decreasing the wasted nutrient excretion in the manure.</p>	Applicable Specialist diets are in place	Yes																																			
5.3.1.1 Nutritional techniques applied to nitrogen excretion																																					
BAT 50.	Applicable	Yes																																			

BAT is to apply feeding measures.

As far as nitrogen and consequently nitrates and ammonia outputs are concerned, a basis for BAT is to feed animals with successive diets (phase-feeding) with lower crude protein contents. These diets need to be supported by an optimal amino acid supply from adequate feedstuffs and/or industrial amino acids (lysine, methionine, threonine, tryptophan, see Section 4.2.3).

A crude protein reduction of 1 to 2 % (10 to 20 g/kg of feed) can be achieved depending on the breed/genotype and the current starting point. The resulting range of dietary crude protein contents is reported in Table 5.5. The values in the table are only indicative, because they, amongst others, depend on the energy content of the feed. Therefore levels may need to be adapted to local conditions. Further applied nutrition research is currently being carried out in a number of Member States and may support further possible reductions in the future, depending on the effects of changes in genotypes.

Species	Phases	Crude protein content (% in feed)	Remark
Broiler	starter	20 – 22	With adequately balanced and optimal digestible amino acid supply
	grower	19 – 21	
	finisher	18 – 20	
Turkey	<4 weeks	24 – 27	
	5 – 8 weeks	22 – 24	
	9 – 12 weeks	19 – 21	
	13+ weeks	16 – 19	
	16+ weeks	14 – 17	
Layer	18 – 40 weeks	15.5 – 16.5	
	40+ weeks	14.5 – 15.5	

Table 5.5: Indicative crude protein levels in BAT-feeds for poultry

Specialist diets are in place

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5.3.1.2 Nutritional techniques applied to phosphorus excretion

BAT 51.

BAT is to apply feeding measures

As far as phosphorus is concerned, a basis for BAT is to feed animals with successive diets (phase-feeding) with lower total phosphorus contents. In these diets, highly digestible inorganic feed phosphates and/or phytase must be used in order to guarantee sufficient supply of digestible phosphorus.

A total phosphorus reduction of 0.05 to 0.1 % (0.5 to 1 g/kg of feed) can be achieved depending on the breed/genotypes, the use of feed raw materials and the current starting point by the application of highly digestible inorganic feed phosphates and/or phytase in the feed. The resulting range of dietary total phosphorus contents is reported in Table 5.6. The values in the table are only indicative, because they, amongst others, depend on the energy content of the feed. Therefore levels may need to be adapted to local conditions. Further applied nutrition research is currently being carried out in a number of Member States and may support further possible reductions in the future depending on the effects of changes in genotypes.

Species	Phases	Total phosphorus content (% in feed)	Remark
Broiler	starter	0.65 – 0.75	With adequate digestible phosphorus by using e.g. highly digestible inorganic feed phosphates and/or phytase
	grower	0.60 – 0.70	
	finisher	0.57 – 0.67	
Turkey	<4 weeks	1.00 – 1.10	
	5 – 8 weeks	0.95 – 1.05	
	9 – 12 weeks	0.85 – 0.95	
	13+ weeks	0.80 – 0.90	
Layer	16+ weeks	0.75 – 0.85	
	18 – 40 weeks	0.45 – 0.55	
	40+ weeks	0.41 – 0.51	

Table 5.6: Indicative total phosphorus levels in BAT-feeds for poultry

Applicable

Specialist diets are in place

Yes

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5.3.2 Air emissions from poultry housing 5.3.2.1 Housing systems for layers		
<p>BAT 52. Cage housing: BAT is:</p> <ul style="list-style-type: none"> - a cage system with manure removal, at least twice a week, by way of manure belts to a closed storage (Section 4.5.1.4), or - vertical tiered cages with manure belt with forced air drying, where the manure is removed at least once a week to a covered storage (Section 4.5.1.5.1), or - vertical tiered cages with manure belt with whisk-forced air drying, where the manure is removed at least once a week to a covered storage (Section 4.5.1.5.2), or - vertical tiered cages with manure belt with improved forced air drying, where the manure is removed from the house at least once a week to a covered storage (Section 4.5.1.5.3), or - vertical tiered cages with manure belt with drying tunnel over the cages; after 24 – 36 hours the manure is removed to a covered storage (Section 4.5.1.5.4). 	Not applicable	No
<p>BAT 53. The deep pit system (Section 4.5.1.1) is a conditional BAT. In regions where a Mediterranean climate prevails this system is BAT. In regions with much lower average temperatures this technique can show a significantly higher ammonia emission and is not BAT unless a means of drying the manure in the pit is provided.</p>	Not applicable	No
<p>BAT 54. Non-cage housing: BAT is:</p> <ul style="list-style-type: none"> - a deep litter system with forced air drying (Section 4.5.2.1.2), or - a deep litter system with a perforated floor and forced air drying (Section 4.5.2.1.3), or - an aviary system with or without range and/or outside scratching area (Section 4.5.2.2). 	Not applicable	No
5.3.2.2 Housing systems for broilers		
<p>BAT 55. BAT is:</p> <ul style="list-style-type: none"> - the naturally ventilated house with a fully littered floor and equipped with non-leaking drinking systems (Sections 2.2.2 and 4.5.3), or 	Applicable	Yes

<ul style="list-style-type: none"> - the well-insulated fan ventilated house with a fully littered floor and equipped with non-leaking drinking systems (VEA-system) (Section 4.5.3). 		
<p>BAT 56. The combideck system (Section 4.4.1.4), also proposed as a technique to reduce energy is a conditional BAT. It can be applied if local conditions allow; e.g. if soil conditions allow the installation of closed underground storages of the circulated water.</p>	Applicable	Yes
<p>BAT 57. BAT for housing systems that are already in place: Although the following techniques can achieve very high ammonia emission reductions, they are not considered to be BAT because they are too expensive. However, these techniques are BAT when they are already in place. These techniques are:</p> <ul style="list-style-type: none"> - a perforated floor system with forced air drying system (Section 4.5.3.1), or - a tiered floor with forced air drying system (Section 4.5.3.2), or - a tiered cage system with removable cage sides and forced drying of manure (Section 4.5.3.3). 	Applicable	Yes
<p>5.3.3 Water</p>		
<p>BAT 58. BAT is to reduce water use by doing all of the following:</p> <ul style="list-style-type: none"> - cleaning animal housing and equipment with high-pressure cleaners at the end of each batch of livestock. It is important to find a balance between cleanliness and using as little water as possible - regularly calibrating the drinking-water installation to avoid spill - keeping record of water use through metering of consumption, and - detecting and repairing leakages. 	Applicable	Yes
<p>5.3.4 Energy</p>		
<p>BAT 59. BAT is to reduce energy use by application of good farming practice starting with animal housing design and by adequate operation and maintenance of the housing and the equipment.</p>	Applicable	Yes
<p>BAT 60. BAT for poultry housing is to reduce energy use by doing all of the following:</p> <ul style="list-style-type: none"> - insulating buildings in regions with low ambient temperatures (U-value 0.4 	Applicable	Yes

<p>W/m²/°C or better)</p> <ul style="list-style-type: none"> - optimising the design of the ventilation system in each house to provide good temperature control and to achieve minimum ventilation rates in winter - avoiding resistance in ventilation systems through frequent inspection and cleaning of ducts and fans, and - applying low energy lighting. 		
5.3.5 Manure storage		
<p>BAT 61. BAT is to design storage facilities for poultry manure with sufficient capacity until further treatment or application to land can be carried out. The required capacity depends on the climate and the periods in which application to land is not possible.</p>	Not applicable	No
<p>BAT 62. <i>Stack/heap</i> If manure needs to be stored, BAT is to store dried poultry manure in a barn with an impermeable floor and with sufficient ventilation.</p>	Not applicable	No
<p>BAT 63. For a temporary stack of poultry manure in the field, BAT is to position the heap away from sensitive receptors such as, neighbours, and watercourses (including field drains) that liquid runoff might enter.</p>	Not applicable	No
5.3.6 On-farm manure processing		
<p>BAT 64. In general, on-farm processing of manure is BAT only under certain conditions (conditional BAT). The conditions in on-farm manure processing that determine if a technique is BAT are related with conditions such as the availability of land, local nutrient excess or demand, marketing possibilities for green energy, local regulations, and the presence of abatement techniques. An example of a conditional BAT is:</p> <ul style="list-style-type: none"> - applying an external drying tunnel with perforated manure belts (Section 4.5.5.2), when the housing system for layers does not incorporate a manure drying system or another technique for reducing ammonia emissions (Section 5.3.2.1). 	Not applicable	No
5.3.7 Techniques for landspreading poultry manure (See also BAT in Section 5.1)		
BAT 65.	Not applicable	No

BAT on landspreading – wet or dry – solid poultry manure is incorporation within 12 hours. Incorporation can only be applied to arable land that can be easily cultivated.		
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