



EFSA Panel on Biological Hazards (BIOHAZ); Scientific Opinion on Composting on-farm of dead poultry

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SCIENTIFIC OPINION

Scientific Opinion on Composting on-farm of dead poultry¹

EFSA Panel on Biological Hazards (BIOHAZ)^{2,3}

European Food Safety Authority (EFSA), Parma, Italy

ABSTRACT

EFSA's Scientific Panel on Biological Hazards (BIOHAZ) was asked for a scientific opinion on two alternative methods for processing Category (Cat) 2 Animal By-Products (ABP)⁴. The material to be treated consists of poultry manure, straw and dead-on-farm poultry; this implies that the animals died due to a disease, which in most cases was not properly diagnosed. The proposed processes are composting methods to be used on-farm. The first method is a continuous open system where composting is done under roof in piles separated by wooden partition walls. The piles are processed without enforced aeration. The second method is a discontinuous closed system consisting of two different types of containers (Box-Compost[®]) coupled with a device for conditioning temperature and humidity during composting (Compostronic[®]). The end-product obtained is intended to be used as an organic fertiliser. According to the legislation in force, before being used as an organic fertiliser, Cat. 2 material should be treated with a sterilisation process (i.e. 133°C / 20 min / 3 bars / 50 mm particle size). The BIOHAZ Panel concluded that the identification and characterisation of the risk material was not properly addressed in the application and a comprehensive list of possible hazards was not provided. No experimental validation with representative test-organisms under practical conditions was done. Because of a lack of information in the report, it was not possible to determine the degree of risk reduction of pathogenic bacterial, viral and parasitological agents achieved by the processes. Moreover, the proposed alternative method cannot be considered equivalent to the sterilisation process defined in the current legislation.

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KEY WORDS

Animal By-Products, alternative methods, equivalence, on-site treatment, composting, dead poultry

¹ On request from the Spanish Competent Authority, Question No EFSA-Q-2007-114, adopted on 20 October 2011.

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⁴ Cat. 2 ABP is defined in Regulation (EC) No 1069/2009 of the European Parliament and of the Council of 21 October 2009 laying down health rules as regards animal by-products and derived products not intended for human consumption and repealing Regulation (EC) No 1774/2002 (Animal by-products Regulation) (OJ L 300, 14.11.2009).

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SUMMARY

Following a request from the Spanish Competent Authority, the Panel on Biological Hazards was asked to deliver a scientific opinion on Composting on-farm of dead poultry.

The application received concerns two alternative methods for processing Category (Cat) 2 Animal By-Products (ABP) as defined in Reg. (EC) 1069/2009⁵. The material to be treated consists of poultry manure, straw and dead-on-farm poultry; this implies that the animals died due to a disease, which in most cases was not properly diagnosed.

The proposed processes are composting methods to be used on-farm. The first method is a continuous open system where composting is done under a roof in piles separated by wooden partition walls. The whole location is enclosed by brick walls with a door. The piles are processed without enforced aeration. The second method is a discontinuous closed system consisting of two different types of containers (Box-Compost[®]) coupled with a device for conditioning temperature and humidity during composting and to supervise the whole system (Compostronic[®]).

The end-product obtained is intended to be used as an organic fertiliser.

According to article 13 (d) of Regulation (EC) 1069/2009, before being used as an organic fertiliser, Cat. 2 material should be treated with method 1 as defined in Annex IV to Regulation (EU) 142/2011 (i.e. 133°C / 20 min / 3 bars / 50 mm particle size). Method 1 is a sterilisation process deemed to inactivate heat resistant hazards including bacterial spores with a sufficient safety margin. This method is intended to cover also risks which are not known until now taking the experience of the BSE crisis into account. Indeed, method 1 has been shown to reduce the titres of TSE agents between 2 to 3 log₁₀.

The Scientific Panel on Biological Hazards (BIOHAZ) concluded that the identification and characterisation of the risk material was not properly addressed in the application and a comprehensive list of possible hazards was not provided. No experimental validation with representative test-organisms under practical conditions was done. Because of a lack of information in the report, it was not possible to determine the degree of risk reduction of pathogenic bacterial, viral and parasitological agents achieved by the processes. Moreover, it was noticed that the risk containment of the proposed processes was not properly addressed and the proposed alternative method cannot be considered equivalent to processing method 1.

To assess alternative methods, the Panel recommended that the relevant hazards and their level of inactivation to be targeted by the processing methods for Cat. 2 animal by-products should be specified in a more precise and detailed way. Moreover, to facilitate the assessment of the alternative methods for the treatment and the specific use of the Cat. 2 material under consideration it was recommended that i) test organisms with defined resistance patterns should be specified; and ii) the required level of quantitative risk reduction of such organisms should also be provided.

⁵ Regulation (EC) No 1069/2009 of the European Parliament and of the Council of 21 October 2009 laying down health rules as regards animal by-products and derived products not intended for human consumption and repealing Regulation (EC) No 1774/2002 (Animal by-products Regulation) (OJ L 300, 14.11.2009).

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BACKGROUND AS PROVIDED BY THE SPANISH COMPETENT AUTHORITY

Explanatory statement

Regulation (EC) No 1774/2002⁶ of the European Parliament and of the Council of 3 October 2002 laying down health rules concerning animal by-products not intended for human consumption requires that animal carcasses be removed from farms and transported to processing sites.

Traditionally, carcasses have been buried in specific areas on farms in appropriate conditions of bio-security, regulated in Spain by the 1952 Law and regulations concerning epizootic diseases.

This new form of management, since the entry into force of the aforesaid Regulation (EC) No 1774/2002, gives rise to certain problems as regards application:

- Firstly, due to the possible spread of disease entailed by the transportation of animal carcasses between the various farms. This can give rise to a risk, particularly for farms subject to health restrictions, much of the business of which involves the sale of disease-free breeding stock.
- Secondly, due to the cost involved in disposing of these animals using specialist companies, given that because of present numbers and locations, they are not always close to farms, numbers are not always sufficient to optimise costs, and access to farms is not always possible due to poor access conditions.

In view of this situation, the leading associations representing the intensive poultry farming sectors, by means of a Collaboration Agreement and with the economic support of the Ministry of Agriculture, Fisheries and Food, sponsored the development of alternative experimental techniques for in situ disposal of carcasses produced by intensive farms. This initiative involved experiments on carcass digestion, with or without the use of bio-activators, in field conditions, of poultry, considered to be low-risk, that is to say, Category 2 in the aforementioned Regulation.

All the experiments were directed and carried out by independent research teams belonging to Spanish universities and public research centres having the relevant expertise and experience. The universities taking part were the University of León, the University of Valladolid, the University of Murcia and the public research centres were IMIDA (Instituto Murciano de Investigación y Desarrollo Agrario) [Murcia Institute for Agrarian Research and Development] and the Centro Superior de Investigación Científica (CSIC) [Higher Institute of Scientific Research].

Finally, we should mention the Opinion of the European Economic and Social Committee on the disposal of animal carcasses and the use of animal by-products of 14 September 2006. Conclusions No 1.3 and 1.4 highlighting the need to establish research programmes to develop methods of destroying carcasses on site, thus preventing the possible spread of disease as a result of transportation and encouraging research along the lines of the projects presented here, are of particular significance.

Objective of the study

- To evaluate, under certain field conditions, the possibility of disposing of Category 2 poultry carcasses on the farms of origin themselves, based on the development of methods to degrade said carcasses under differing conditions and with health and environmental safeguards.
- To obtain European Commission approval of these methods as an alternative to the collection, processing and destruction of carcasses, using the possibilities provided by Regulation (EC) No 1774/2002, Articles 4(2)(e), 5 (2)(g) and 6 (2)(i), which stipulate that the Commission, after

⁶ OJ L 273, 10.10.2002, p.1. Regulation as last amended by Commission Regulation (EC) No 829/2007 (OJ L 191, 21.07.2007, p.1).

consultation of EFSA and having sought the opinion of the Standing Committee of the Food Chain and Animal Health, may approve new alternative methods.

Performance of the study

The studies began in September 2004 and ended in December 2005 and were carried out on poultry farms.

The methods assessed and which are presented are as follows:

- Evaluation of alternative methods of disposal of animal carcasses on poultry farms by means of composting: open and closed batch systems.

On completion of the studies, the final results were submitted to the Dirección General de Ganadería [General Directorate for Livestock], the relevant competent authority, and the studies and the Agreement were therefore brought to a close.

Subsequently, and as a preliminary stage before application to the Community authorities for approval, they were officially submitted to the Agreement Supervisory Committee and the Working Groups on collection of carcasses and technology of by-products set up within the National Commission for ABP (SANDACH) for evaluation both by the regional authorities and by the independent experts and scientists belonging to these groups. Once the observations of the groups had been taken on board, the final reports were submitted to the Plenary Session of the SANDACH National Commission for approval.

The National Commission agreed to submit the studies to EFSA and the European Commission for consideration and possible approval as alternative methods of carcass disposal, once all the steps recommended in the guidelines issued by EFSA and the European Commission, as listed previously, had been taken.

TERMS OF REFERENCE AS PROVIDED BY THE SPANISH COMPETENT AUTHORITY

This Agency hereby submits for your consideration the attached experimental method that has been assessed on poultry farms, after having been submitted to the competent Spanish authorities for consideration and having been approved thereby, along with a copy of the corresponding studies and the results thereof.

We would ask you to issue your Opinion within six months of receipt of the studies.

Clarification to the Terms of Reference and request for additional documentation

The mandate was tabled during the Plenary meeting of the EFSA Scientific Panel on Biological Hazards (BIOHAZ), which was held on 24-25 January 2007. During the meeting some questions were raised by the BIOHAZ Panel. The EFSA secretariat then contacted the Spanish Competent Authority in order:

- to ask for the possibility to provide an English translation of the application and of the report (originally delivered in Spanish), in order to speed up the evaluation process;
- to ask some preliminary clarifications and further documentation on the report provided.

Following these requests, the Spanish Competent Authority provided EFSA with the English translation of the report and the replies to EFSA's requests, together with some additional information delivered by the applicant.

ASSESSMENT

1. Introduction

After the submission of this application, Reg. (EC) 1774/2002⁷, laying down rules concerning Animal By-Products (ABP), was repealed by Reg. (EC) 1069/2009⁸. However, the standard method for the production of organic fertilisers from Cat. 2 material (except manure and digestive tract content), as reported in Art. 13, (d) of Reg. 1069/2009 remains the so called “Method 1” that is currently defined in Annex IV to Regulation (EC) 142/2011⁹ (i.e. 133°C / 20 min / 3 bars / 50 mm particle size). Considering that, the current assessment makes reference to the legislation currently in force as regard to ABP i.e. Reg. (EC) 1069/2009 and Reg. (EU) 142/2011. In particular the assessment was performed taking into account the criteria laid down in Art. 20, point 5 of Reg. 1069/2009.

The application concerns two new processing methods for Category 2 material on poultry farms.

The terminology used in this assessment conforms with the “Guidelines for applications for new alternative methods of disposal or use of animal by-products” prepared jointly by the Health and Consumer Protection Directorate-General (DG-SANCO) and the European Food Safety Authority (EFSA) (EC, 2008). The assessment only considered biological hazards.

⁷ Regulation (EC) No 1774/2002 of the European Parliament and of the Council of 3 October 2002 laying down health rules concerning animal by-products not intended for human consumption (OJ L 273, 10.10.2002).

⁸ Regulation (EC) No 1069/2009 of the European Parliament and of the Council of 21 October 2009 laying down health rules as regards animal by-products and derived products not intended for human consumption and repealing Regulation (EC) No 1774/2002 (Animal by-products Regulation) (OJ L 300, 14.11.2009).

⁹ Commission Regulation (EU) No 142/2011 of 25 February 2011 implementing Regulation (EC) No 1069/2009 of the European Parliament and of the Council laying down health rules as regards animal by-products and derived products not intended for human consumption and implementing Council Directive 97/78/EC as regards certain samples and items exempt from veterinary checks at the border under that Directive (OJ L 54, 26.2.2011).

1.1. The method as described by the applicant

Two different types of composting methods are described in the application dossier. One is an open under roof system; the second is a discontinuous working closed system represented by the experimental biodigester “Box-Compost®” in combination with a steering unit called Compostronic®”. The two composting methods were investigated by the applicant, each on a different poultry farm in Spain.

1.1.1. Continuous open system

Composting is done under a roof in piles separated by wooden partition walls from each other. The whole location is enclosed by brick walls with a door. It is protected by wire mesh against birds. The piles are processed without enforced aeration and are fed with a mixture of carcasses, poultry manure and straw in different ratios as shown in Table 1 of the applicant’s report.

Table 1: Composition of the compost heap in the different experiments as written in the applicant’s report [*sic*]

Composition	Experience 0	Experience 1	Experience 2	Experience 3
Carcasses	658	363	278	318
Bed (straw+poultry dung)	979	650	470	550
Straw	173	37	12	12
Ratio carcasses/poultry dung/straw	1/0,7/1	1/0,9/1	1/0,8/0,9	1/0,9/0,9
Ratio C/N	17,8	16,7	16,0	15,9

During the three month experimental runs the measurements of the indoor and outdoor temperatures as well as sampling were done daily. However, the applicant did not specify in which locations of the pile the measures and samples were taken.

In the different experiments, temperatures were measured with different numbers of sensors (maximum five in the pile) at different locations (not specified) in and outside of the pile. The duration of the experimental composting was between 80 days and 110 days. The final exposure time after the last feeding was between 74 days and 99 days. In most of the experiments no information was given if there were one or more turnings of the pile after the last adding of feeding material. The maximum temperature reached was 70 °C at one measuring point at one day. The microbiological monitoring in the experiments included total Coliforms, *Escherichia coli*, *Enterococcus faecalis*, *Salmonella* spp., *Listeria monocytogenes* and *Campylobacter* spp.. The first sample for microbiological monitoring was taken 1 day to 16 days after the last feeding of the pile.

No experimental validation was done.

1.1.2. Discontinuous closed system

The modular system consists of two different types of containers (Box-Compost®) coupled with a device for conditioning temperature and humidity during composting and to supervise the whole system (Compostronic®).

Two different types of containers are described, Design 1 and Design 2, which are deemed to run as a closed system. They vary in size and in the used construction material. Both types are run with enforced ventilation and process water is added from the top while the leachates are collected at the bottom and stored in a 50 L accumulation tank.

During the three month experimental runs, the amount and type of input materials as well as of water was recorded, the temperature was measured daily inside and outside the reactors and samples were taken daily.

Three experiments were run between 08/06/2005 and 21/12/2005. The highest temperature measured by the personnel in the first experiment was 57°C kept for five days, in the second experiment the highest temperature measured was 59°C for one day and in the third experiment it was 59°C for two days. The temperature range recorded by data logger (Exp 1: 52 °C - 53 °C, Exp. 2: 49 °C – 56 °C and Exp.3: 47 °C – 56 °C) was lower in the same periods of time than the maximum temperatures that were recorded by hand, but no details were given about the location of the measuring devices in the containers.

The microbiological monitoring in the experiments included total Coliforms, *Escherichia coli*, *Enterococcus faecalis*, *Salmonella* spp., *Listeria monocytogenes* and *Campylobacter* spp.. The first sample for microbiological monitoring was taken 1 day to 16 days after the last feeding of the pile.

No experimental validation was done.

2. Risk categories

The application concerns animal by-products of Category 2 material as defined in the Regulation (EC) 1069/2009.

3. Identification and characterisation of risk material

The material to be treated consists of poultry manure, straw and dead-on-farm poultry; this implies that the animals died due to a disease, which in most cases was not properly diagnosed.

The applicant did not provide a comprehensive list of possible hazards.

The hazards concerned are pathogenic microorganisms and infectious agents that can be present in fallen poultry and poultry manure. They can be both zoonotic agents and animal pathogens. They include bacteria, fungi, viruses and parasites. More details concerning the presence and the epidemiology of pathogens can be taken from the literature (Pattison, 2008; Saif, 2008). Some examples of such agents which are difficult to inactivate in this context are: spores of *Clostridium perfringens* and *Clostridium botulinum*, spores of *Aspergillus fumigatus*, chicken anaemia virus and oocysts of coccidia. In addition, risks due to microbial toxins (e.g. botulinum toxin) have to be taken into account.

However, due to uncertainty on the cause of the death of the animals in this situation, the presence of more resistant hazards cannot be considered negligible. In particular method 1 as defined in the current legislation, is able to minimise the risks due to unidentified agents, such as spore forming bacteria, thermo resistant viruses and TSE agents.

Although the applicant stated in his answers to the preliminary questions of EFSA that birds fallen in the course of an epidemic disease are not composted, it cannot be excluded that animals carrying those agents during the incubation phase will go into the composting process.

4. Agent risk reduction

Cat. 2 material, which includes the carcasses of animals that die on-farm, should be treated according to method 1 as defined in Annex IV to Regulation (EU) 142/2011 (i.e. 133°C / 20 min / 3 bars / 50 mm particle size) before being used as an organic fertiliser (Article 13 (d) of Regulation (EC) 1069/2009). Method 1 is a sterilisation process deemed to inactivate heat resistant hazards including bacterial spores with a sufficient safety margin. This method is intended to cover also risks which are not known until now taking the experience of the BSE crisis into account. Indeed, method 1 has been shown to reduce the titres of TSE agents between 2 to 3 log₁₀ (Schreuder et al., 1998).

No validation of the designed processes was carried out. Instead, the applicant refers to the literature and inactivation patterns concerning time/temperature relationships for inactivation of selected parasites and vegetative bacteria in treatment of sewage sludge.

To verify the high log reduction required for demonstrating equivalence with method 1 standardised highly resistant test organisms would be necessary, for instance as for medical equipment described in ISO 14161 (ISO, 2009) for thermal sterilisation.

The temperatures reached by the proposed processes are not able to inactivate the relevant hazards that could be present in the material to be processed. Moreover, the system will not meet even the temperature given in legislation for composting category 3 materials.

5. Risk Containment

No validation of the designed processes was carried out. Hence, the HACCP plan presented in the application is not supported by appropriate data indicating that the relevant pathogens are reliably inactivated. Therefore, the risk containment could not be demonstrated.

6. Identification of interdependent processes

During the composting process gaseous, liquid and solid residuals are generated. The gaseous emissions are mainly CO₂, CH₄, SH₂, NO₂, and NH₃ as well as complex organic compounds causing odour. Their measurement in the experimental set up is described, but no scrubbing of these emissions is intended.

The leaching water is collected in the case of composting in containers but no information is provided concerning further treatment and utilization. Before utilization of the end product as fertilizer, compost is normally screened to remove particles like stones, bones, plastics and wood pieces. However, nothing is reported on the fate of these residues, especially the bones.

7. Intended end-use of the products

The applicant proposes to use the end-product as an organic fertiliser.

8. Documentary evidence

The applicant presented documentary evidences of the analysis performed during the on-farm experiments and a HACCP plan.

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

- The application concerns treatment of Animal By-Products of Category 2, as defined in the Regulation (CE) 1069/2009, for organic fertilisers. The standard processing method to be used for this purpose, called method 1, is specified under Regulation (EU) 142/2011.
- The identification and characterisation of the risk material is not properly addressed in the application and a comprehensive list of possible hazards is not provided. No experimental validation with representative test-organisms under practical conditions was done.
- Because of a lack of information in the report, it is not possible to determine the degree of risk reduction of pathogenic bacterial, viral and parasitological agents achieved by the processes.
- The risk containment of the proposed processes is not properly addressed.
- In any case the proposed alternative method cannot be considered equivalent to processing method 1 described under Regulation (EU) 142/2011.

RECOMMENDATIONS

- To assess alternative methods, the relevant hazards and their level of inactivation to be targeted by the processing methods for Cat. 2 animal by-products should be specified in a more precise and detailed way.
- To facilitate the assessment of the alternative methods for the treatment and the specific use of the Cat. 2 material under consideration i) test organisms with defined resistance patterns should be specified; and ii) the required level of quantitative risk reduction of such organisms should also be provided.

DOCUMENTATION PROVIDED TO EFSA

1. Letter “Solicitud de España para la aprobación de métodos alternativos de eliminación de cadáveres en las explotaciones ganaderas intensivas”. November 2006. Submitted by the Spanish *Ministerio de Agricultura, Pesca y Alimentación, Dirección General de Ganadería*.
2. Report “Evaluación de métodos alternativos de destrucción de cadáveres de animales en explotaciones avícolas mediante compostaje”. November 2006. Submitted by the Spanish *Ministerio de Agricultura, Pesca y Alimentación, Dirección General de Ganadería*.
3. Letter proving i) a report on the “main actions taken for Spanish Competent Authorities regarding applications for new alternative methods of disposal or use of animal by-products under Regulation 1774/2002” and ii) “Answers to preliminary questions regarding alternative methods of disposing carcasses by means of composting”. September 2007. Submitted by the Spanish *Ministerio de Agricultura, Pesca y Alimentación, Dirección General de Ganadería*.
4. Report “Evaluation of alternative methods of destruction of carcasses of animals by composting poultry farms” [English version of the report mentioned at point 2]. April 2011. Submitted electronically by the Spanish *Secretaría de la Comisión Nacional de Subproductos de origen Animal no Destinados a Consumo Humano*.

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