

PROBLEMS CONNECTED WITH THE EU-ANIMAL BY-PRODUCT REGULATIONS IN THE FIELD ENVIRONMENTAL AND ANIMAL HYGIENE

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ABSTRACT

The regulations (EC) No 1774/2002 defines three categories of materials according to the related TSE-risk. The category 1 materials are connected with the highest TSE – risk while the category 3 materials have the lowest TSE- risk. Category 2 materials which shall be processed in biogas plants or in composting had to be sterilized in before at 133 °C/3bar/20 min. Category 3 materials may be processed in an biogas plant after pasteurization at 70 °C for 60 min. Such material may also be composted if a minimum temperature in all material in the reactor is exposed to temperatures of 70 °C for 60 min. With respect to TSE-infectivity and other animal pathogens the utilization of sterilized category 2 material in aerobic and anaerobic treatment is safe enough, since more than 6 log of infectivity even in sporeforming conventional agents will be destroyed as well as at least 3 log of accidental or residual TSE-infectivity. This is not the case for most materials defined as category 3 materials. If they would contain accidental (eg. cross contamination) or residual TSE infectivity or heat resistant viruses as Parvo - viruses the defined treatment processes will not eliminate them. It is recommended to change the classification and to use only processes which had been validated before with test organisms, being representative for the relevant pathogen which may be present in the processed materials.

INTRODUCTION

The regulations (EC) No 1774/2002 of October 2002 is laying down health rules concerning animal by-products not intended for human consumption. According to the TSE-risk connected to their origin and utilization three different categories of Materials are defined in the legislation. The category 1 materials are connected with the highest TSE – risk and are generally destroyed under defined conditions. Category 2 materials which shall be processed by anaerobic or aerobic biotechnological treatment in biogas- or in composting plants shall be sterilized at 133 °C/3bar/20 min before treatment. With respect to TSE- infectivity and other animal pathogens the utilization of sterilized category 2 material in aerobic and anaerobic treatment is safe enough, since more than 6 log of infectivity even in spore forming conventional agents will be destroyed as well as at least 3 log of accidental or residual TSE-infectivity. Category 3 materials, which are defined to be in principle fit for human consumption, may be processed in biogas plants after pasteurization at 70 °C for 60 min having been crushed to a maximum particle size of 12 mm. Such material may also be composted if a minimum temperature in all material in the reactor is exposed to temperatures of 70 °C for 60 min. Since it is known that materials fit for human consumption may still represent a risk of transmission of emerging pathogens of veterinary importance e.g. Foot and Mouth Disease-virus, the question may arise, if such materials are used as fertilizers on pasture land or on fields used for producing green fodder, if those measures are safe enough, because residuals infectivity may be ingested by susceptible animals under certain conditions. If they would contain accidental (e.g. cross contamination) or residual TSE-infectivity the defined treatment processes will not eliminate it. Same applies for heat resistant viruses e.g. Parvo, Circo- or Calici – viruses. The second complex of problems arises due to the

given regulations for manure which is classified as category 2 material but free of the obligation to be treated at 133 °C/3bar/20min. Trade of unprocessed manure of species other than poultry or equidae is prohibited in principle (some exceptions are given). There does not exist any scientific justification for that, which can easily be taken from Burton and Turner (2003). Therefore revision of the regulations (EC) No 1774/2002 is necessary, some data supporting this view and are given as well as some proposals for reasonable changes.

EPIDEMIOLOGICAL BACKGROUND

If animal by-products are processed and applied as fertilizers to agricultural soils additional risks to those listed in Table 1 which are generally related to recycling of organic wastes and residuals have to be taken into account. They are mainly related to the presence of high amounts of pathogens that may be present in animal tissues before first clinical signs of illness may be observed in the animal. If such animals are slaughtered meat and meat products containing high amounts of pathogens which are protected by the surrounding tissue (animal by-product) and therefore may survive for a long time or withstand thermal treatment with temperatures below 90 °C for one hour or more, are used as fertilizers transmission circles to farm animals or living vectors may be closed. (Böhm, 2002; Burton and Turner, 2003). This may be especially the case with spore forming bacteria and several viruses. This may be causative agents of notifiable diseases like Foot and Mouth Disease, Classical Swine Fever, African Swine Fever and Aujeszky Disease or of other animal epidemics like the Parvo viruses causing infections in swine, cattle, rabbits, ducks, minks, dogs and cats as well as Circo viruses causing infections in swine and poultry or Calici viruses causing infections in swine, rabbits, cats and dogs.

Table 1. Epidemiological and environmental risks related to processing and utilization of organic wastes and residuals as well as to the resulting products

A.	DIRECT TRANSMISSION TO FARM ANIMALS
	CONTAMINATION OF MEADOWS INTRODUCTION OF PATHOGENS BY STORAGE AND PROCESSING CLOSE TO SUSCEPTIBLE ANIMALS AEROGENIC TRANSMISSION BY SPREADING THE MATERIALS ONTO FARM LAND
B.	DIRECT TRANSMISSION TO HUMANS
	HANDLING OF CONTAMINATED PRODUCTS IN THE HOUSEHOLD OCCUPATIONAL EXPOSURE TO CONTAMINATED PRODUCTS ACCIDENTAL TRANSMISSION TO IMMUNCOMPROMISED PERSONS
C.	INDIRECT TRANSMISSION TO FARM ANIMALS
	VIA FEED FROM CONTAMINATED SITES VIA LIVING VECTORS
D.	INDIRECT TRANSMISSION TO HUMANS
	VIA INTRODUCTION OF ZOO NOTIC AGENTS INTO THE FOOD -CHAIN VIA FOOD CONTAMINATED BY LIVING VECTORS
E.	INTRODUCTION INTO THE ENVIRONMENT
	GENERATION OF CARRIERS IN THE FAUNA INTRODUCTION INTO THE MICROFLORA

PROBLEMS RELATED TO ANIMAL BY –PRODUCTS OF THE CATEGORY 3

The recommendations given in the legislation for the anaerobic treatment as well as for the

aerobic treatment of animal by-products of category 3 are insufficient, this applies to the given microbiological parameters for product supervision also. Tissues which may contain high amounts of viruses during the viraemic phase shall be either excluded from processing in biotechnologic treatment without sterilization (133 °C/3 bar/20 min) this would be the best way or if treated in biogas and /or composting plants only if a validated process is applied. In the latter case validation shall be done with bovine parvovirus or another test organism with a comparable thermo- and chemoresistance. Some data, that thermoresistant viruses will not be inactivated in the procedure given in EU-legislation for preheating devices in biogas plants can be taken from Table 2. The same applies for the composting process, for which furthermore the description of the process requirements are incomplete. Temperature distribution and water activity which are important factors for the inactivation of pathogens are varying within a compost reactor, which cannot be detected during the running process. So process recommendations have to take a safety margin into account and must be related to the type of technical equipment used in a plant. The only way to define the process-parameter which will lead to reliable data describing the parameters required for the inactivation of pathogens in the process is a direct validation with test organisms as described above. Supervision of the final product will never be able to detect relevant viral pathogens in the involved matrix with sufficient sensitivity due to the lack of effective methods for reisolation of most pathogens from a complex matrix e.g. compost. Moreover Enterobacteriaceae are an insufficient parameter for describing the hygienic properties of a material coming out of an microbiological process in which Enterobacteriaceae may be involved also (Michel et al. 2002).

Table 2. Reduction of the titer of bovine parvovirus by pasteurization at 70°C" (Slurry was heated in a semi-technical device and the exposed virus was titrated back from the exposed material)

Unheated sample	70 °C /15min	70 °C/30 min	70 °C/60min
CID ₅₀	CID ₅₀	CID ₅₀	CID ₅₀
10 ^{6,25}	10 ^{3,75}	10 ^{3,5}	10 ^{3,5}
10 ^{5,25}	10 ^{3,75}	10 ^{3,25}	10 ^{3,5}
10 ^{5,5}	10 ^{2,5}	10 ^{3,5}	10 ^{2,5}
10 ^{5,5}	10 ^{2,5}	10 ^{3,5}	10 ^{2,5}
10 ^{6,25}	10 ^{3,5}	10 ^{2,75}	ND
10 ^{5,5}	10 ^{3,5}	10 ^{2,75}	10 ³
10 ^{5,75}	ND	10 ³	10 ³

PROBLEMS RELATED TO ANIMAL MANURE

The utilization of liquid or solid manure from apparently healthy animal populations does not represent a high epidemiological risk with respect to the farmers animal population. In certain situations a specific risk may result for humans especially if apparently healthy cattle is shedding EHEC bacteria, but the relevant ways of transmission are not via slurry and environment as well as the percentage of herds with those bacteria present in the manure is overestimated in Europe (KARUNIAWATI et al, 2000). Same applies for Salmonella in manure (PHILIPP et al., 1990). Nevertheless if a herd is already infected or pathogens are shed during the incubation time a high risk for transmission to other susceptible animal populations does exist and veterinary authorities have to take adequate measures

A special epidemiological situation is given if central storage units for liquid manure are used by several different farmers or if manure is traded across longer distances. Under such con-

ditions the closed inner farm circle is non longer existing and the epidemiological risks are increasing by the number of involved farms as well as kept animals. Therefore special hygienic precautions must be taken in such cases. The only way to avoid accidental spreading of epidemics by manure is to insist on a sufficient treatment for inactivation of the relevant pathogens. Treatment of manure from all species of farm animals may be done by physical, chemical or biotechnological means (thermophilic aerobic or anaerobic processes). Details can be taken from Burton and Turner (2003).

CONCLUSIONS

Revision of the regulations (EC) No 1774/2002 of October 2002 is necessary. From the veterinary point of view the definitions of the three categories of materials would be necessary. The requirements for composting and pasteurization require a more differentiated and detailed description, the unprecise and insufficient requirements must be replaced by the obligation to allow only treatment in processes validated with representative test organisms. The microbiological requirements have to be revised, the amount of material to be analysed in supervision should be doubled at least and the insufficient parameter Enterobacteriaceae shall be deleted.

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