Edition: November 2007
GMBl of 14.02.2008, pp. 72-81

| Technical Rules for Biological Agents | Protective Measures for Activities Involving Biological Agents in Agriculture and Forestry and Comparable Activities | TRBA 230 |
|---|---|---|

The Technical Rules for Biological Agents (TRBA) reflect the state of requirements in terms of safety, occupational health, hygiene and work science with respect to activities involving the handling of biological agents. They are drawn up by the

**Ausschuss für Biologische Arbeitsstoffe (ABAS)**
**- Committee for Biological Agents -**

and adapted by the Committee in accordance with developments. The TRBAs are published by the Federal Ministry of Labour and Social Affairs in the Gemeinsames Ministerialblatt (Joint Ministerial Gazette).

## Contents

1. Area of Application
2. General Remarks
3. Definitions
4. Risk Assessment
5. Protective Measures
6. Instruction of Workers
7. Notification and Mandatory Records
8. Co-operation with Employers and Contracting of External Companies
9. Occupational Health Care

Literature

## 1 Area of Application

The present TRBA applies to activities involving biological agents in working areas of agriculture and forestry
- where productive livestock[1] is handled (e.g. feeding, care, supervision of animals)
- in the cultivation of plants (e.g. for the purpose of the use of plants to produce foodstuffs and animal fodder as well as renewable raw materials)
- in the production of foodstuffs by cultivating mushrooms
- in the storage, preparation and utilisation of biomass, i.e. commercial fertilizers from own operations such as solid dung, slurry and renewable raw materials

and in associated areas.

[1] Productive livestock includes all domestic agricultural animals kept to produce milk and honey, for wool and similar purposes and for reproduction. Domestic animals include not only conventional productive livestock and domesticated animals, but also wild animals kept in captivity.

The present TRBA also applies to comparable activities[2]. These include, for example, activities in large animal veterinary practices, in zoos, in areas of circuses where animals are kept, or in home slaughtering, in hunting or in inland fisheries and fish breeding.

The present TRBA does not apply to specific activities in the keeping of laboratory animals (TRBA 120).

## 2 General remarks

The present TRBA lays down basic measures to be taken to protect workers who are exposed to biological agents during their work in forestry and agriculture. The internal implementation of these measures is the responsibility of the employer and must take account of the actual circumstances. In particular, exposure to biological agents in respiratory air is influenced to a major degree by design and management factors and by the process engineering of the technical equipment and the specific activity.

Since it is normally not possible to discount the possibility of contact with biological agents, it is basically necessary to implement general measures of hygiene. Such measures must be supplemented by specific protective measures in accordance with the health risk presented by the biological agents.

In individual cases it is permissible to deviate from the provisions of the present TRBA if the result of the risk assessment reveals that at least equivalent protective measures are being taken. Evidence must be presented of the equivalence of the protection level in a specific case if the competent authority so demands.

## 3 Definitions

### 3.1 Biological agents

The term biological agents is definitively defined in the Biological Agents Ordinance (BioStoffV). In the broadest sense the term covers micro-organisms and their constituents which may cause infections and have sensitising or toxic effects on humans.

### 3.2 Exposure

Exposure is the presence of biological agents which have an impact on workers in the context of specific or non-specific activities.

### 3.3 Sensitisation

Sensitisation describes the intensification of the sensitivity of the immune system to an extraneous, exogenous substance (allergen). Where there is further contact with an allergen the result may be an allergic disorder.

### 3.4 Allergy

Allergy means oversensitivity to sensitising substances. Allergic disorders can affect nearly all organs, but especially skin, mucous membranes and the respiratory tract.

[2] The relevant provisions under genetic engineering law are not affected.

### 3.5 Infection

Adhesion, penetration and reproduction of a biological agent into or on a macro-organism with subsequent rejection and/or damaging reaction. If damage occurs to the living organism (host) through reproduction accompanied by the associated symptoms, an infectious disease will arise from the infection. But the living organism may under certain circumstances definitely resist the infecting pathogen without falling sick. In such a case is also called an inapparent infection.

### 3.6 Toxic effects of biological agents

Non-infectious health disorders due to specific substance properties.

## 4 Risk assessment

Under Section 7 BioStoffV the employer must conduct a risk assessment for activities which involve biological agents. For this purpose he must collect sufficient information to facilitate a risk assessment with respect to biological risks prior to the commencement of activities involving biological agents (Section 5 BioStoffV). Following the evaluation of the information the protective measures have to be taken.. The employer must obtain professional advice where he does not have the requisite knowledge himself. To provide expert knowledge the specialist for occupational safety and health or the company doctor is available. Additional valuable information relating for example to the sickness of animals must be obtained from a veterinary surgeon or the veterinary authority.

### 4.1 Risks arising from biological agents

(1) In the case of activities in agriculture and forestry and in associated economic sectors, workers handle animals, plants, their products or intermediate products, vehicles, machines and equipment which contain biological agents or to which such agents adhere even though the activities are not primarily concerned with such agents.
Normally the biological agents arising are not known in detail with respect to their nature, quantity and composition. The workers are therefore mostly subject to a mixed microbial exposure, while the exposure conditions fluctuate heavily in terms of time and location. For these reasons this does not involve specific activities within the meaning of BioStoffV.

(2) The risk arising from activities involving biological agents is determined to a major degree by their properties and quantity, the extent of release and spread, and the nature, duration and frequency of the contact.

- Litter, fodder and stored parts of plants as well as animals are an important source of airborne biological agents. Basically it can be assumed that, for example, the use of evidently mouldy straw, hay, silage, other fodder or parts of plants will lead to a substantially greater exposure to sensitising and toxic biological agents than would be the case with the use of corresponding products without evident mould infestation.
- In contrast to viruses and endoparasites, bacteria and mould can also reproduce outside plants and animals, depending on the ambient conditions, and so their occurrence and the concentration of these different organisms will depend, for example, on the working area, the work process, the work management and the hygienic state of the workplace.

(3) The ways in which biological agents can be taken in and transmitted are:

**Respiratory tract:** Dust and droplets in the air (aerosols) may contain not only infecting agents, but also sensitising or toxic substances.

**Mouth:** A major factor is hand-to-mouth contact / smear infection (e.g. eating, drinking or smoking), especially where there is frequent contact with animals or where commercial fertilisers are handled.

**Skin, mucous membrane:**
- direct transmission / contact infection (e.g. transmission of dermatophytes ("ringworm") from animals to humans)
- indirect transmission / smear infection (e.g. milker's nodule via contaminated objects of animal care, stable equipment etc.)
- transmission by stick and cutting injuries from contaminated instruments
- transmission via the eyes

Skin with an impaired protective barrier (e.g. wounds, eczema or skin softened by moisture) may favour the transmission of infecting agents.

**Animals:**
- transmission by animal bite
- transmission by insects (e.g. ticks, beetles, flies) or rodents and their excretions

It must be considered that many infecting agents can be taken in not only via one transmission path but by way of several of those mentioned.

(4) A distinction is drawn between infectious, sensitising and toxic effects. It must always be assumed that, even with a low risk of infection, sensitising effects (e.g. allergy-inducing mould) and toxic effects (e.g. endotoxins, mycotoxins) are possible due to the impact of particulates to which biological agents adhere. The sensitising or toxic effects of microorganisms must therefore be considered in the risk assessment regardless of the infection potential. Typical in this respect are mixed exposures with a large number of allergenic and toxic airborne components. These include, for example, moulds and endotoxins, but also plants and fodder constituents, pollen, hair and particles of farm animals or storage mites, which do not fall under BioStoffV.
Dust containing mould spores and actinomycetes ("ray fungus") are rated in TRGS 907 "Index of sensitising substances" as sensitising hazardous substances.

The following are examples of activities involving possible exposure to sensitising and toxic biological agents:
- spreading of litter materials, e.g. straw
- harvesting, treatment, transport and storage of plants
- cleaning of storage and feed tanks
- mixing of animal feed
- spreading of woodchips
- high-pressure cleaning of a stable
- inspection of poultry farming facilities
- creation of substrates for mushroom production

(5) Under BioStoffV biological agents are classified into risk groups according to their infection risk. Within the area of application of the present TRBA biological agents of risk groups 1 and 2 normally arise.

(6) If infecting agents of risk group 3 are verified in animals or if there is a justified suspicion of a relevant infection, this may, however, lead to a special risk to humans.

Biological agents of risk group 3 can also be transmitted by rodents, birds or other animals and their excretions.

(7) Within the area of application of the present TRBA, there is no knowledge at present of activities connected with infectious diseases which are caused by pathogens of risk group 4.

The following are examples of infecting agents in various working areas:

| **Working area** | **Transmitted by** | **Illness** | **Infecting agent** | **Risk group** |
|---|---|---|---|---|
| plant production | soil / substrate | tetanus | *Clostridium tetani* | 2 |
| plant production | Rodents | hemorrhagic fever with disorder of the kidneys | hanta viruses | 2 |
| animal husbandry | cattle, sheep, horses | dermatophytes | *trichophyton* spp. | 2 |
| animal husbandry | poultry, fancy birds, domestic animals | ornithosis, psittakosis | *chlamydophila psittaci* | 3 |
| animal husbandry | cattle, sheep | Q fever | coxiella burnetii | 3 |
| forestry | Ticks | lyme borreliosis or tick borreliosis | *borrelia burgdorferi* | 2 |
| forestry | Ticks | tick-borne encephali-tis | TBE virus | 3(**) [3] |
| inland fisheries | Fish | rotlauf | *erysipelothrix rhusiopathiae* | 2 |
| Zoos | all mammals | tuberculosis | *mycobacterium tuberculosis* | 3 |

## 4.2 Conduct of the risk assessment

(1) The risk assessment must be performed before commencement of the activities. Where there are changes in the working conditions and on the other occasions mentioned in Section 8 BioStoffV the risk assessment must be updated. A new risk assessment is also necessary if the employer becomes aware of illnesses among the workers which can be attributed to relevant activities involving biological agents.

Where a number of companies are working together they are also obliged to collaborate in the risk assessment (Section 8 ArbSchG – Occupational Safety and Health Act).

(2) Maintenance and cleaning work as well as monitoring activities are also covered by the risk assessment. Account must be taken here of the frequency of the jobs to be performed, the activities required and the exposure times.

(3) When collecting information for the risk assessment, the biological agents expected as well as the extent and duration of exposure and other matters must be determined, e.g.
- the transmission paths and intake paths involved (e.g. by breathing in),
- the nature of the activity (e.g. feeding, herding animals, threshing grain, cleaning work),
- the duration of the activity (e.g. short-term, alternating or whole-day activities),

[3] In the case of biological agents which are classified as risk group 3 in the Directive 2000/54/EC and have two asterisks (**) transmission via respiration is normally not possible.

- the frequency of the activity (e.g. not every working day),
- plant, machinery and vehicle specific factors (e.g. type of ventilation, structural design, enclosed driver cabin),
- other specific factors (e.g. keeping animals on litter, use of dry fodder, handling of materials with evident mould infestation, dust-intensive activities, work in endemic areas, suspicion of sick livestock).

(4) In the risk assessment account must also be taken of information on known activity-related illnesses among workers performing comparable activities. Attention must also be paid to sensitising and toxic effects.

(5) With the use of mobile machines and items of equipment these must be included in the risk assessment. Possible risks for workers must be taken into account which may arise, for example, from the entrainment of biological agents.

(6) The technical rule for biological agents "Guideline for risk assessment and for the instruction of employees in relation to activities with biological agents" (TRBA 400) provides assistance for the risk assessment on the basis of specific examples.

(7) With many measures taken to protect workers there are positive links between occupational safety and health and consumer protection or between animal protection and animal hygiene. For example, general hygienic measures in the keeping of farm animals also serve, when conscientiously implemented, to protect workers.

## 5 Protective measures

In occupational safety and health the following order of priorities applies with respect to protective measures in all the working areas described below:
1. structural
2. technical
3. organisational (including hygienic) and
4. personal.

The reasons for any deviation from this set of priorities must be given in the risk assessment.

### 5.1 General requirements

(1) To counteract any possible risk from biological agents, the employer must arrange for the necessary structural, technical, organisational and personal protective measures. Special importance is attached to general measures of hygiene (TRBA 500). The protective measures described in section 5.1 cover the measures required by TRBA 500 and they must be laid down in accordance with the relevant operational situation and adapted or supplemented in relation to the specific workplace.

When the protective measures are being laid down, however, not only the generally existing infection risks and the specific infection risks present in certain areas, but also toxic and sensitising risks must be taken into account.

(2) It must be ensured that the workers are given documented instruction in the language they understand on the potential hazards to health and the performance of protective measures and the wearing of protective clothing. This must be done on a workplace and activity basis prior to commencement of their activity and regularly thereafter with reference to the operating instructions to be drawn up.

### 5.1.1 Technical and structural protective measures

When setting up workplaces and dealing with machines, equipment and production facilities, the following requirements must invariably be considered with respect to the activity involving biological agents and in the light of the result of the risk assessment:

1. Easy-to-clean surfaces on floors, walls and work equipment
   (e.g. machines, equipment, production facilities) in the working area.
2. Avoidance / reduction of aerosols and dusts
   (e.g. ventilation and air-conditioning systems (including dimensioning and executing of ventilation or airflow), enclosed driver cabins on agricultural vehicles, ventilation optimisation, including cabin protection ventilation of lifting and transport vehicles used in the case of transportation and handling work involving dusty, organic materials in large quantities).
3. Washing facilities must be provided.
4. Changing facilities separate from the workplace (Section 6 ArbStättV – Workplaces Ordinance) as far as possible with two separate lockers (for the separate storage of working clothes and street clothes respectively)
5. Protective measures must be taken to ensure that any activities or working procedures leading to a release of biological agents do not result in worker exposure in neighbouring working areas (e.g. isolation of egg grading locations from the laying hen area by means of enclosure or airflow).

### 5.1.2 Organisational protective measures

The employer must take organisational measures in the light of the risk assessment to ensure that the following requirements are complied with:

1. Avoidance / reduction of aerosols and dusts
   (e.g. dust-reducing measures: binding of dry fodder using oil)
2. The workers must wash their hands before they go to their break, after leaving working areas where there is a risk of contamination from biological agents (e.g. in the presence of animal dirt or animal excretions) and after finishing work.
3. Hygienic products for cleaning and drying hands (i.e. liquid soap, disposable towels and hand disinfectants) plus skin care and, where relevant, protection products must be provided.
4. In the case of activities which require hygienic hand disinfection, no jewellery, watches and rings may be worn on hands and lower arms. Such objects can impair the effectiveness of hand disinfection.
5. First Aid resources and equipment must be provided.
6. Workers may not ingest or store food and beverages at workplaces where there is the risk of exposure to biological agents which exceeds the basic exposure which is not harmful to health (contamination). For this purpose the employer must make suitable areas available. Suitable areas include, for example, recreation rooms according to Section 6 of the Workplaces Ordinance.
7. Recreation and standby rooms or daytime accommodations should not be entered wearing heavily soiled work clothing.
8. Street clothing must be stored separately from work clothing and personal protective equipment.
9. Protective clothing and personal protective equipment must be cleaned regularly and as required and, where relevant, disposed of (at the employer's expense). If work clothing is heavily contaminated, it must be changed and treated by the employer like protective clothing. If an external company is engaged to clean the clothing, the company concerned must be informed of the possible risk.
10. The working and living areas must be strictly separated (e.g. changing facilities, airlock, buildings completely isolated from one another). It must invariably be avoided that the liv-

ing area is entered with work clothing so as to prevent such an area from being contaminated (e.g. do not set up a washing machine for work clothing in the domestic area so as to avoid the entrainment of dust and pathogens on work clothing).

11. Working premises must be cleaned regularly and as required and, where relevant, disinfected using suitable work equipment. Protective measures for the cleaning or disinfection of areas, facilities and equipment must be laid down in writing and monitored.
12. Cleaning jobs must be performed in such a way that exposure to biological agents is minimised, for example by
    - cleaning with a gentle water jet instead of high-pressure cleaning,
    - softening prior to wet cleaning,
    - cleaning with a vacuum cleaner, fitted with a suitable filter, of the use category K 1/K 2 or dust class H (acc. to EU classification) or
    - wet cleaning instead of sweeping or blowing with compressed air.
13. Conditions favourable to mould and actinomycete growth (humidity, temperatures, nutrients) must be avoided if they are not required for technological reasons (e.g. for mushroom cultivation or composting). For example, harvested products, hay, straw, corn or other vegetable products must be stored in such a way that the development of mould is avoided.
14. Protective measures must be taken to ensure that activities or working procedures leading to the release of biological agents do not result in worker exposure in neighbouring areas (e.g. staggered scheduling of activities).
15. The employer may only employ young people, pregnant women or nursing mothers for activities involving biological agents where this is compatible with the provisions of the act concerning the occupational safety and health of young people (Jugendarbeitsschutzgesetz) and the maternity protection act (Mutterschutzgesetz) and the related ordinances, especially the maternity protection regulations ordinance (Mutterschutzrichtlinienverordnung).

### 5.1.3 Personal protective measures

(1) In individual cases it may be necessary from time to time to use personal protective equipment in view of the results of the risk assessment.

The following personal protective equipment can be considered:
- protective clothing
- gloves
- eye protectors / face protection
- respirators

(2) The employer must provide in adequate quantities the requisite protective clothing and other items of personal protective equipment, especially suitable, liquid-proof, low-allergy gloves and respiration masks. He is responsible for the regular disinfection, cleaning and, where relevant, maintenance of the protective equipment.

(3) The workers must use the personal protective equipment provided. Aids to the selection of personal protective equipment can be found in, for example, the rules laid down by the institutions of statutory accident insurance and prevention (Berufsgenossenschaften).

(4) When gloves are used, the limitations regarding wearing time must be complied with.
The criteria of wet working are fulfilled when workers have to wear moisture-proof protective gloves regularly for more than 2 hours per work shift because the horny layer of the epidermis may swell up under them ("housewives' hands"). Protective gloves may therefore not be worn for longer than necessary (see TRGS 401).

(5) The use of respirators is only permissible if technical, structural or organisational protective measures are not possible or not effective.

(6) The selection of a suitable respirator will depend on the result of the risk assessment. The major selection criteria are:
- the infection potential of the biological agents,
- the potential occurrence of sensitising or toxic effect of the biological agents,
- the level and duration of exposure to biological agents,
- personal aptitude for working with respiration resistance,
- the protective effect of the respirator.

(7) Biological agents are present in particulate form. Particle-filtering respirators must therefore be used. For activities involving biological agent respirators must be at least of particle filter class 2. For activities where it must be assumed that biological agents of risk group 3 arise in relevant concentrations respirators of particle filter class 3 must be used. If gaseous hazardous substances arise at the same time, combination filters must be used.
The correct, tight fit of respirators exerts a major influence in the extent of the protective effect of respirators. For individuals with beards the protective effect of the respirator can be completely cancelled out by leaks which arise in the area of the beard.

The wearing time of particle-filtering half-face masks fitted with exhalation valve and half-face masks with particle filters must not exceed two hours. Then a recuperation period of 30 minutes must be observed. Where there is greater exposure due to heavy labour the maximum wearing time must be reduced, but not the recuperation time.
The regulations BGR 190 "Benutzung von Atemschutzgeräten" (Use of respirators) give instructions concerning the wearing time and selection of respirators.

(8) Because of the respiration resistance associated with the use of respirators, they are normally a source of stress. If respirators of classes 1 to 3 (BGI 504-26) are worn, arrangements must be made for the workers to undergo precautionary occupational medical examinations in accordance with BGV A4 / VSG 1.2 (see 6.3). Such examinations can be dispensed with if respirators of group 1 are not used for more than half an hour a day or respirators with no resistance, e.g. blower-assisted hoods or helmets, are used.

Blower-assisted hoods and helmets have the advantage that they can be used by individuals with beards.

(9) To date there have been no specifications as regards the exposure level from which respirators must be worn. In view of the accumulation of respiratory disorders during activities in dust-laden atmospheres, however, the recommendation has been formulated that respirators should be worn during activities in dust-laden atmospheres even for activities of short duration. For activities lasting more than 15 minutes and involving minor dust development respirators are also recommended.

(10) Given the current state of knowledge high dust exposure levels can be expected for the activities given below as examples:
- activities where excrement and excretions from rodents or other vermin are stirred up
- activities involving visibly mouldy materials such as fodder or animal litter
- mechanical preparation or distribution of litter
- fodder preparation, milling/grinding of corn
- activities on or in the area of ventilated corn drying or corn storage containers
- repair and maintenance work where dust is stirred up
- activities in poultry hutches with cage-free laying
- preparation of substrates for mushroom production

- potato or onion grading
- control of tractors, harvesters and comparable machines without enclosed cabin and ventilation system in plant production.

The above list gives examples and is not exhaustive. It must therefore be checked in each individual case whether it is necessary to use respirators.

## 5.2 Special protective measures in the keeping of farm animals[4]

(1) The exposure of workers must be reduced by means of technical, structural or organisational measures as well as the related mechanisation of automation of working processes (e.g. feeding or mucking out) or by personal protective measures.

(2) If it must be assumed that there are infecting agents of risk groups 2 or 3 present or there is an elevated concentration of sensitising or toxic substances, access to relevant working areas must be restricted to the necessary personnel.

(3) In addition to occupational safety and health measures account must also be taken of the requirements under animal disease protection law which also reduce or prevent the exposure of workers not working in this area. In individual cases further or different measures which ensure attainment of the protective goal can therefore be laid down.

(4) To estimate the significance of individual infecting agents and hence related additional protective measures, the epidemiological situation in the catchment area must be considered. In order to collect information it is therefore appropriate to work together with the veterinary department, the health department or the veterinary surgeon. Under epidemics law regulations it may be possible to lay down technical, organisational and personal protective measures specifically from the agent in the individual case (e.g. in the case of activities carried out on an animal infected with Q fever (coxiella burnetii)).

### 5.2.1 Technical and structural protective measures

(1) Areas where activities involving a risk from biological agents of risk group 3 are carried out must be separated off from the other working areas in accordance with the result of the risk assessment by an airlock zone, anteroom or similar facility.

(2) In the working area washing facilities must be provided.

### 5.2.2 Organisational protective measures

(1) Depending on the infection risk, special animal keeping areas must be installed (e.g. separate bays or compartments). A hygiene plan must be drawn up for work with sick or possibly sick animals.

(2) Devices to clean and disinfect boots – before or after entry into the stable – must be available.

[4] The keeping of animals for agricultural purposes encompasses the permanent accommodation of warm-blooded vertebrates, fishes and bees which are kept for the production of foodstuffs, wool, hides, pelts or feathers or for other purposes in facilities (animal keeping areas) such as buildings (stables), rooms (compartments) or containers and in free range (pastureland, paddocks, fenced areas). Also included within the meaning of the present TRBA are facilities for quarantine and the treatment of sick animals.

(3) Animal carcasses and contaminated animal products must be stored, transported and disposed of in such a way that any contact and entrainment of biological agents is avoided (e.g. in sealable, marked containers).
The provisions governing the transport of hazardous goods must be complied with.

(4) If activities are conducted to a major extent on sick animals, animal carcasses or in contaminated areas (e.g. ornithosis, Q fever, avian flu) and the workers are exposed to biological agents of at least risk group 3, the relevant working areas must be identified with the symbol for biological hazard according to Annex I BioStoffV. A list must be kept of the workers subject to a correspondingly high exposure (see 6.3).

### 5.2.3 Personal protective measures

(1) The employer shall provide workers – if required – with the following personal protective equipment in addition to the measures specified under 5.1.3:
- sturdy, liquid-proof and low-allergen gloves including extended shaft to prevent liquid contaminated with infecting agents from running into the glove. The gloves must be resistant to the disinfectants used.
- eye and face protection if the splashing or spraying of infectious materials or liquids can be expected and technical measures do not provide adequate protection.
- liquid-proof aprons if it can be expected that clothing will become soaked.
- liquid-proof foot covering if it can be expected that shoes will become soaked.

(2) In the case of activities involving biological agents of risk group 3 (e.g. infected animals) workers must be provided in addition with disposable protective suits.

(3) Workers must use the personal protective equipment provided.

(4) Reference is made here to resolution 608 of the Committee for Biological Agents "Recommendation concerning special measures to protect workers from infections due to highly pathogenic avian influenza viruses (classic vowl pest, avian flu)".

## 5.3 Special measures to be taken in forestry

Forestry encompasses all activities conducted to maintain the use, protective and recuperative function of the forest. Activities in the field of forestry include, for example.
- timber harvest,
- stock establishment and stock cultivation,
- suppression of pests and mulch plants,
- cultivation of wild animals,
- monitoring of the stock of wild animals, including the collection of dead or sick animals.

| Examples of risks | Suitable protective measure |
|---|---|
| - Forestry work and activities in low vegetation may lead to tick bites and hence to the infection of humans with the TBE virus (in TBE endemic areas), borrelia and other infecting agents. Ticks also bite humans when these are handling dead wild animals | Sealed clothing and the use of so-called repellents applied regularly (according to manufacturer specification) to provide protection against ticks. In TBE endemic areas vaccination. |
| - Hanta viruses (e.g. in storage rooms for seeds, sheds and bunkers which have not be used or cleaned out for an extended period)<br>- Infection with chlamydophila psittaci (e.g. cleaning of nesting boxes, handling birds or their excretions) | Use of respirators, for example when cleaning storage rooms, sheds etc. or birds' nesting boxes |

## 5.4 Special protective measures in the preparation and utilisation of biomass

(1) The preparation and utilisation of biomass involves the operation (storage, charging, removal, cleaning and maintenance) of installations for the fermentation, gasification, combustion and composting of biomass. Biomass within the area of application of the present TRBA encompasses commercial fertilizer from own operations (e.g. solid dung, slurry) and regenerative raw materials.
Installations with closed rotting and so-called co-fermentation installations in which waste products such as biowaste from household collections are used in the fermentation process together with commercial fertilizer or regenerative raw materials are thus nut subject to the present TRBA, but to the regulations of TRBA 214.

(2) Risks arise in particular in the delivery and reception areas for biomass from, for example:
- The inhalation of aerosols
- Infecting agents of risk group 3 if sick animals are present in the livestock (e.g. chlamydia in poultry excrement).

In addition attention must be paid to risks due to possible enhanced exposure to biological agents in the fermentation of commercial fertilizer, for example where the fermentation process has not completely run its course and hence there is also deficient hygienisation.

When utilising slurry and solid dung from sick or possibly sick animals, the additional protective measures described in 5.2 must also be taken into account.

(3) The exposure of workers in the delivery area for biomass must be avoided by means of technical, structural or organisational measures and the related mechanisation/automation.

(4) Basically with open rotting and also with open secondary rotting the contact times with biological agents must be kept as short as possible.

### 5.4.1 Technical and structural protective measures

(1) The delivery area must be designed as far as possible to ensure that material delivered which is not processed immediately can be stored with structural separation and can be fed to the treatment process via conveying equipment with minimum dust release.
In-house transport routes to workplaces may not pass through the delivery area.

Delivery areas for liquid and pasty materials, for example in fermentation installations, must be designed in such a way that the formation of aerosols is avoided. This can be achieved, for example, by ensuring that liquid substances are not charged openly, but via a connectable and disconnectable hose connection into a closed buffer tank. To eliminate contaminants there must be appropriate facilities in the delivery area (e.g. water connection and cleaning agents).

(2) With the aerobic treatment of biomass (composting) the rotting area must be structurally separate from the other parts of the installation to avoid worker exposure to the biological agents released in the course of the rotting process, or at least to minimise such exposure.

(3) Technical protective measures, such as ventilation systems, closed driver cabins and cabin protection ventilation in hoisting and transport vehicle used must be implemented.

### 5.4.2 Organisational protective measures

(1) In principle no individuals may be present in the vicinity during the transfer of rotting material, not even for repair and maintenance work. The rotting material should as far as possible be transferred when there is no wind to ensure that the biological agents released cannot cause any worker exposure in other working areas.

(2) The operating sequence must be organised such that there are no permanent workplaces without adequate protection in enclosed areas.

### 5.4.3 Personal protective measures

With respect to the personal protective measures reference should be made to 5.1.3.

## 6 Instruction of workers

### 6.1 Operating manual

(1) The employer must draw up an operating manual.
In particular he must provide information on:
- potential health hazards
- requisite protective measures and rules of conduct, e.g. hygiene regulations
- requisite protective equipment and protective clothing
- First Aid measures

(2) The operating manual must be formulated in a form and language which is understandable to those insured and must be displayed or posted where it can be examined by all.
Suitable locations include, for example, the workplace or the recreation room.
It is possible to combine the operating manual and the hygiene plan.
Examples of operating manuals have been published by insurance bodies and occupational safety and health authorities (see references).

(3) Where there are special risks the operating manual must be supplemented by special work instructions.
Special risks may exist, for example, in the following cases
- when handling aggressive, infected animals or
- when carrying out maintenance work on sharp or pointed objects which are soiled,
- cleaning and disinfection measures after the occurrence of an epidemic.

### 6.2 Instruction

(1) Workers who carry out activities involving biological agents must be given instruction on the basis of the operating manual on the risks arising or the related protective measures. This also applies with respect to servicing and maintenance personnel. The instruction must be given on a workplace-related or activity-related basis at least once a year or following any change in the risk assessment and it must be given in a language which is understandable to the workers.

(2) The time and subject of the courses of instructions must be documented subsequently to the instruction and confirmed by signature of the person receiving the instruction.

### 6.3 Information

The workers present in the hazard area and the works or staff council must be informed without delay of any operational disturbances which may put the safety and health of workers at risk and of any accidents.

## 7 Notification and mandatory records

### 7.1 Notification

Notification is not normally mandatory for the activities conducted in the present TRBA's area of application.

### 7.2 Mandatory records

A record must be kept of workers with exposure levels towards agents of at least risk group 3. This applies, for example, when such workers perform activities to a major extent on sick animals, animal carcasses or in contaminated areas (e.g. ornithosis, Q fever, avian flu) and are exposed while doing this to biological agents of at least risk group 3. In such a record the nature of the activity, the biological agents concerned and accidents and operational disturbances must be given. The workers affected or their authorised representatives can examine the information which relates to them. When they leave the company the employer must give the workers a copy and file the record like personnel documents.

### 7.3 Informing the authority

The competent authority must be informed without delay of any accident and any operational disturbance which may lead or may have led to a health hazard for the workers due to biological agents of risk groups 3 or 4. Illnesses and fatalities attributable to biological agents must be notified to the competent authority without delay indicating the activity concerned.
Competent authorities within the meaning of BioStoffV are authorities which are responsible under federal state ("Land") law for enforcement of the Occupational Safety and Health Act).

## 8 Cooperation of employers and contracting of external companies

(1) If external companies are engaged to conduct activities involving biological agents, the employer is responsible as the contracting body for ensuring that the companies engaged for the activities invariably have the necessary specialist knowledge and experience for the activity.

(2) If workers from a number of employers are working at one workplace (e.g. supply agencies, temporary labour agencies, workshop companies, transport, cleaning and waste disposal companies, veterinary services) the employers are obliged to cooperate in the implementation of the safety and health regulations. Where necessary for the safety and health of workers at work, the employers must, depending on the nature of the activities, inform one another and their workers in particular of the risks to safety and health involved in the work and agree measures to prevent the risks. Depending on the activity, the employer must satisfy himself that the workers of other employers working in his company are given adequate instructions with respect to the risks to their safety and health during the time they are working in his company.

# 9 Occupational health care

(1) Occupational health care includes involvement of the company doctor in the risk assessment, the provision of general occupational medical advice and the conduct of precautionary occupational medical examinations.

(2) The general occupational medical advice should as far as possible be provided in the presence of a doctor who is also engaged to perform precautionary occupational medical examinations.

## 9.1 General occupational medical advice

(1) In the general occupational medical advice workers must be informed about the health hazards that may arise. This includes a description, understandable to the layperson, of clinical allergic indications caused by mould together with their symptoms (e.g. asthma, exogenic allergic alveolitis), the toxic effects of myco- and endotoxins with symptoms (e.g. ODTS) and the description of possible infectious diseases (e.g. tinea (bovine or calf ringworm), diarrhoea, borreliosis, TBE, hanta virus infection) and their symptoms, where the risk assessment reveals there is a risk of these.

Furthermore workers must be informed about preventive possibilities, including possible vaccinations (e.g. tetanus, TBE, rabies). Instruction must be given on modes of conduct to be adopted in the case where infection is suspected.

(2) The content of general occupational medical advice should also include a description of sick states (e.g. enduringly or temporarily restricted defences in the case of various illnesses such as diabetes, asthma requiring corticoid etc., or elevated allergy proneness e.g. in the case of familial atopic predisposition or pre-existing allergies of the respiratory tract) the presence of which may put workers at particular risk. Similarly situations should also be addressed in which the greater use of personal protective equipment may be necessary or protective measures can only be applied to a limited extent.

(3) This advice must include information on the occupational medical examinations which are to be made available or are laid down as compulsory on the basis of the risk assessment. The scope of the examination and possible vaccinations must be explained.

(4) Reference must be made to possible impairments and side effects of personal protective equipment and the requisite precautions (e.g. use or respirators, wearing of gloves and skin irritation).

## 9.2 Compulsory examinations

(1) The conditions for compulsory examinations according to Section 15 and Annex IV of BioStoffV are present in the present TRBA's area of application for the activity of a forestry worker with respect to activities carried out in low vegetation (borreliosis) or in TBE endemic areas for the agricultural, forestry and timber industries, horticulture, livestock trading and hunting where regular activities are carried out in low vegetation and in forests (TBE). In areas where there is rabies in the wildlife, compulsory examinations must be conducted for activities involving regular contact with agent-bearing or contaminated objects, materials and specimens or in the case of activities involving regular contact with animals in the wild (rabies).

(2) Where respirators of groups 1 to 3 (BGI 504-26) are worn, precautionary examinations according to BGV A4 / VSG 1.2 must be organised.

Reference should also be made at this point to any occupational medical examinations to be organised under GefStoffV (e.g. wet work in the case of milkers, fodder dust and grain dust).

### 9.3 Examinations to be made available

(1) The conditions for examinations to be made available according to Section 15a Subsection 5 BioStoffV may be present in the area of application if activities involving biological agents of risk 3 are being carried out. This also applies in the case of activities involving biological agents of risk 2 if it must be assumed according to the risk assessment that there is a risk of infection. This applies for example to activities carried out to a major extent on animals, animal carcasses or in contaminated areas (e.g. chlamydia in poultry excrement).

(2) Epidemiological studies have shown that elevated exposure of workers to airborne endotoxins or organic dusts can lead to non-allergic, chronic-obstructive disorders of the respiratory tract. In order to detect the development or deterioration of the relevant illnesses at an early stage, occupational medical examinations should be made available.
Basically it must be assumed that exposure to sensitising and toxic components with relevant health damage is possible due to the action of dusts, even where there is a negligible risk of infection, e.g.

- in the case of activities involving mouldy materials such as animal fodder or litter,
- with the preparation or distribution of litter by machine,
- with the preparation of animal fodder, and the milling/coarse grinding of grain,
- in the case of activities conducted on or in the area of ventilated grain drying or grain storage tanks,
- with repair and maintenance work where dust is swirled up,
- in the case of activities conducted in hutches with floor keeping.

.

Reference should also be made at this point to any occupational medical examinations to be organised under GefStoffV (e.g. alveolar dust, respirable dust, activities involving exposure to grain and animal fodder dusts).

In addition, in the above examples workers must be given the opportunity to undergo a regular occupational medical examination under Section 11 ArbSchG.

(3) If a regular intensive or frequent cleaning of the skin is necessary, or if liquid-proof gloves must be regularly worn for more than two hours per working shift, precautionary occupational medical examinations according to GefStoffV must be made available.

(4) If illnesses arise in connection with the activity, a precautionary occupational medical examination must be made available without delay (Section15a Subsection 6 BioStoffV and Section 16 Subsection 4 GefStoffV).

## References

Abfallbehandlungsanlagen einschließlich Sortieranlagen in der Abfallwirtschaft
Technische Regel für Biologische Arbeitsstoffe 214, edition 2007
GMBl. No. 35 of 27 July 2007, pp. 709-720
URL: www.baua.de/trba

Allgemeine Hygienemaßnahmen: Mindestanforderungen
Technische Regel für Biologische Arbeitsstoffe 500, edition March 1999,
BArbBl. (1999), 6, 81-82
URL: www.baua.de/trba

Benutzung von Atemschutzgeräten
BG-Regel 190, edition April 2004
Hauptverband der gewerblichen Berufsgenossenschaften, Fachausschuss „Persönliche Schutzausrüstungen“ der BZG (ed.), Carl Heymanns Verlag GmbH, Cologne
URL: www.arbeitssicherheit.de

Betriebsanweisungen für Anlagen, Geräte u.a.
Website of Landwirtschaftliche Sozialversicherung Mittel- und Ostdeutschlands
URL: www.lsv.de/mod/23praevention/uv08_BA_sonst/index.html

Betriebsanweisungen nach Biostoffverordnung
Website of Sozialversicherung für den Gartenbau
URL: www.lsv.de/gartenbau/010_gartenbau/060_merkblaetter/betriebsanweisungen.html#bio

Betriebsanweisungen – Zoonosen von Tier auf Mensch übertragbare Krankheiten
Website of Bayerisches Landesamt für Gesundheit und Lebensmittelsicherheit
URL: www.lfas.bayern.de/arbeitsmedizin/hinweise_betriebsaerzte/biolog_arbeitsstoffe/zoonosen/ba-erreger/ba-gesamt.htm

Biologische Arbeitsstoffe mit sensibilisierender Wirkung
Resolution 606 of the Ausschuss für Biologische Arbeitsstoffe, edition November 2002
BArbBl. (2003), 3, 66-68
(to be superseded by TRBA/TRGS 406 „Sensibilisierende Stoffe für die Atemwege“.)
URL: www.baua.de/trba

Empfehlung spezieller Maßnahmen zum Schutz der Beschäftigten vor Infektionen durch hochpathogene aviäre Influenzaviren (Klassische Geflügelpest, Vogelgrippe)
Resolution 608 of Ausschuss für Biologische Arbeitsstoffe, edition February 2007
GMBl. No. 19 of 04 April 2007, 403-407
URL: www.baua.de/trba

Guideline for Risk Assessment and for the Instruction of Employees in relation to Activities with Biological Agents
Technical Rules for Biological Agents 400, edition April 2006
BArbBl. (2006), 6, 62-77
URL: www.baua.de/trba
www.baua.de/en/Topics-from-A-to-Z/Biological-Agents/TRBA/TRBA.html