

High-grade animal
research relies on **aspen** –
the most natural laboratory
equipment

Bedding
Nesting materials
Environmental enrichments

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TAPVEI® is the world's leading producer of aspen products for animal welfare.

Since 1982, TAPVEI® has been producing the highest **quality bedding, nesting material and environmental enrichments** for laboratory animals. TAPVEI® is a **quality-driven company**, providing controlled laboratory environments for your animal research. In our production process we use naturally grown **Nordic aspen** (*Populus tremula*) and **renewable energy**.

Raw material

All TAPVEI® products are made from aspen (*Populus tremula*) – a natural hardwood from the pristine Nordic environment. Out of the multitude of studies carried out with various species and animal breeds, hardwood materials are typically found to produce the least undesirable side effects on experimental results.

Research and development

TAPVEI® runs an in-house research program on product quality and physical properties, as well as an out-sourced product development research program with independent centres of laboratory animal research in Estonia and Finland. Our research is grounded in well established customer relations in order to directly serve our customers' needs.

Quality assessments

Finished products are regularly tested for microbiological, chemical and environmental contaminants in independent laboratories. All TAPVEI® products are compliant with GV-Solas requirements for animal feed.

Environmental responsibility

The whole production process of TAPVEI® products follows high ecological standards. It starts with using untreated raw material from the intact Nordic wilderness under a Forest Stewardship Council® certified (FSC®) chain of custody and is followed by use of bioenergy for heating the production plant. Our products are biodegradable. Quality is ensured by applying the ISO 9001:2015, ISO 14001:2015 and ISO 45001:2018 standards.

Aspen in animal research

There are various reasons why the highest quality laboratories prefer aspen products to other raw materials (softwood, corncob, cellulose).

Most specifically, the discoveries of softwood bedding cytotoxicity and its effects on the metabolism of pharmacological agents under research have prompted research labs to switch to aspen bedding.

Additionally, mice and rats alike generally prefer aspen chips over softwood sawdust and corncob bedding. From amongst various types of hardwood, aspen is preferred due to its lower dust count. Aspen bedding shows high absorptive properties, and hardwood in general guarantees the lowest ammonia concentrations in rodent cages. Even when purposely contaminated with fungi, aspen chip bedding does not encourage the growth of fungi in the rodent cage environment (see Additional reading sections for references).

Products

TAPVEI® offers a full range of products to serve laboratory animal needs for bedding, nesting material and environmental enrichments.

Bedding is a compulsory element according to current laboratory animal welfare regulations and one of the main materials to which animals are continuously exposed. Its main practical purpose is to absorb moisture and ammonia from animal urine and faeces. It should also be pleasant and harmless for animals and support **species-specific behaviours** like nesting. High production standards help to avoid indirect maintenance and research costs of bedding-induced variability in research results. Hence, research-grade laboratory animal bedding is highly suggested.

TAPVEI® aspen bedding

Our innovative technology ensures that TAPVEI® bedding material has no sharp edges. This significantly reduces dust levels, which in turn has a major impact on dust-related costs and the operational problems associated with excessive dust. The moisture content and absorption capacity of TAPVEI® aspen bedding is achieved by an automatic drying process with 100-120 °C clean air and heated by environmental-friendly bioenergy. It also ensures that the bedding is microbiologically clean and fulfils corresponding requirements of the GLP standard.

- Raw material – aspen (*Populus tremula*)
- Moisture content around 10%
- Relative density 180-200 kg/m³
- Absorbing capacity 260%
- Dust content (particles < 0.25mm), less than 0.1%
- Binding of ammonium 26mg/L
- Ideal for use within automated bedding dispensers
- Recommended for IVC isolators and automated systems
- Autoclavable
- Biodegradable
- Full batch analysis
- Dried using only 100% renewable bioenergy
- Safe for animal and human respiratory tracts



Bedding 5x5x1 mm



Bedding 2x2x1 mm

TAPVEI® bedding is available in different packaging options: paper, vacuum and fiber.

TAPVEI® nesting materials

TAPVEI® nesting materials (wood wool) is also made from pure, untreated Nordic aspen. The soft strips of wood serve as an ideal nest-building material and cage enrichment for laboratory animals.

The TAPVEI® aspen wood strips come in three different sizes to suit the needs of various species.

- Raw material – aspen (*Populus tremula*)
- Moisture content around 10%
- Autoclavable
- Biodegradable
- Full batch analysis
- One 3 kg bag is sufficient for up to 600 cages
- Selling unit: 90L (ca 3kg) bag or pallet (21 bags/pallet)



PM90L
For mice
Ca 2 mm x 20 cm



PM90L/R
For rats
Ca 3 mm x 20 cm



PM90L/2R
For mice and rats
Ca 6 mm x 20 cm

TAPVEI® environmental enrichments

- Enable a fuller range of the animal's normal behaviour and increase behavioural diversity
- Give the animal a choice of activity and control over positive utilisation of its environment
- Reduce the frequency of abnormal behavior
- Increase the ability to cope with challenges
- Autoclavable
- Biodegradable
- Full batch analysis
- Washable and reusable up to 14 times
- Selling unit: box or pallet (80 boxes/pallet)



Gnawing bricks

These bricks, designed for chewing and gnawing, will help animals satisfy their natural instincts and exercise their teeth and gums, promoting dental health.



| | Size (mm) | Packaging (pcs/box) |
|---------|-----------|---------------------|
| S-brick | 50x10x10 | 1000 or 2000 |
| M-brick | 100x20x20 | 200 |
| L-brick | 200x43x43 | 50 |



| | Size (mm) | Packaging (pcs/box) |
|-------|-----------|---------------------|
| Balls | Ø 30 mm | 500 |



| | Size (mm) | Packaging (pcs/box) |
|--------------|-----------|---------------------|
| Rabbit Brick | 65x58x23 | 100 |

Tubes

Ideal for refuge and to stimulate activity. Also good for gnawing. Provides a solid floor to rest on. Good for wire-bottom cages.



| | Size (mm) | Packaging (pcs/box) |
|-----------------------------|------------------|----------------------------|
| S-tube (for mice) | 100x75x75 | 30 |



| | Size (mm) | Packaging (pcs/box) |
|-----------------------------|------------------|----------------------------|
| L-tube (for rats) | 198x105x105 | 6 |



Arcades

Accessories without bases can be used with nesting materials and are easy to lift when the animals are inside. Accessories without bases are also more hygienic, since the animals lie on bedding material.



| | Size (mm) | Packaging (pcs/box) |
|-------------------------|------------------|----------------------------|
| Arcade 14 (for mice) | 198x105x90 | 12 |



| | Size (mm) | Packaging (pcs/box) |
|-------------------------|------------------|----------------------------|
| Arcade 17 (for rats) | 180x140x107 | 8 |



Options for enriching the cage life of mice



| | Size (mm) | Packaging (pcs/box) |
|--------|----------------------|---------------------|
| Tunnel | 100x40x40 Ø 30 mm | 100 |



| | Size (mm) | Packaging (pcs/box) |
|-----------|----------------------|---------------------|
| Labyrinth | 150x43x10 Ø 30 mm | 50 |



| | Size (mm) | Packaging (pcs/box) |
|------|---------------------|---------------------|
| Cube | 60x60x60 Ø 30 mm | 72 |



| | Size (mm) | Packaging (pcs/box) |
|--------|-----------|---------------------|
| Stairs | 75x20x208 | 40 |

Mouse houses & Guinea pig house



| | Size (mm) | Packaging (pcs/box) |
|-------------------------|----------------------|---------------------|
| Mouse cabin | 155x92x85 Ø 30 mm | 24 |
| Mouse cabin with stairs | 155x92x85 Ø 30 mm | 24 |



| | Size (mm) | Packaging (pcs/box) |
|-------------|-----------------------|---------------------|
| Mouse house | 110x110x67 Ø 40 mm | 20 |



| | Size (mm) | Packaging (pcs/box) |
|-----------------------|-----------|---------------------|
| Corner 15 | 105x75x80 | 60 |
| Corner 15 with stairs | 105x75x80 | 60 |



| | Size (mm) | Packaging (pcs/box) |
|------------------|---------------------------|---------------------|
| Guinea Pig House | 220x178x138 door 70x90 | 2 |

Quality Certificates

With the obvious effects that TAPVEI's production of natural bedding, nesting and enrichment products have on the environment, ecological thinking and activities are inevitable in our business. In order to minimise environmental impact, constant attention is paid to decreasing and avoiding possible ecological harm. As a part of this process, we follow the responsible forest management practises of FSC®, an international organisation that guarantees the origin of raw material. The management system of TAPVEI Estonia OÜ has been approved by ISO 9001:2015, ISO 14001:2015 and ISO 45001:2018 standards.



Certificates of Analysis

The microbiological and chemical composition of TAPVEI® products is screened quarterly in independent laboratories and compared to the limits set by GV-Solas guidelines for animal feed. Our products are screened for over 200 different compounds. TAPVEI's requirements for raw material, facilities, production and storage have guaranteed an outstanding quality standard for many years in a row.

Source: **Guidelines for the quality-secured production of laboratory animal feed.**

Society for Laboratory Animal Science, Committee for the Nutrition of Laboratory Animals, August 2001.

Microbiological critical values

| | | Critical value |
|----------------------------------|--------------------|-----------------------|
| Aerobic total germ count | §64 LFGB 06.00-18* | $<1 \times 10^5$ |
| Yeasts/Moulds | §64 LFGB 01.00-37* | $<1 \times 10^3$ |
| Enterobacteriaceae | §64 LFGB 05.00-5* | 100 |
| E.coli | | 10 |
| Coagulase-positive staphylococci | §64 LFGB 00.00-55* | 10 |
| Salmonella | §64 LFGB 00.00-20* | - |

*official method

cfu: colony forming unit

Critical values of contaminants

| Chlorinated hydrocarbons | mg/kg | Phosphoric acid ester | mg/kg |
|---------------------------------|--------------|---|--------------|
| HCB | 0,01 | Malathione | 1,0 |
| o, β, d-HCH | 0,02 | Fenitrothione | 1,0 |
| g-HCH (Lindane) | 0,10 | Pirimiphos (-methyl) | 1,0 |
| Heptachlorine and -epoxide | 0,01 | Chlorpyrifos (-methyl) | 1,0 |
| o, g-Chlordane | 0,02 | Other phosphoric acid esters | 0,5 |
| Aldrien and Dieldrin | 0,01 | | |
| Endrine | 0,01 | | |
| DDE + DDD + DDT | 0,05 | | |
| o, s Endosulfane and -sulfate | 0,10 | Poly-chlorinated biphenyls (PCB) | 0,05 |

Heavy metals

| | |
|----------|-----|
| Arsenic | 1,0 |
| Lead | 1,5 |
| Cadmium | 0,4 |
| Mercury | 0,1 |
| Fluorine | 150 |

Nitrosamines

| | |
|-----------------------------|------|
| Nitrosodiethylamine (NDEA) | 0,01 |
| Nitrosodimethylamine (NDMA) | 0,01 |

Dry weight 88%

Mykotoxins

| | |
|--------------|-------|
| Alfatoxin B1 | 0,010 |
| Alfatoxin B2 | 0,005 |
| Alfatoxin G1 | 0,005 |
| Alfatoxin G2 | 0,005 |

Fusarien toxins

| | |
|-----------------|-------|
| Deoxynivalenole | 0,500 |
| Ochratoxin | 0,100 |
| Zearalenone | 0,100 |

TAPVEI® bedding certificate of analysis

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75408 Harjumaa
ESTLAND

Date 21.01.2020
Customer no. 10076953

REPORT 2672823 - 600205

Order **2672823**
Sample no. **600205**
Sample acceptance **13.01.2020**
Date of sampling **06.01.2020**
Sample code **Aspen chips (Populus tremula), Batch 100120E**
Packaging **plastic bag**

The parameters reported in this document are accredited according to ISO/IEC 17025:2005. Only not accredited parameters/values are identified by the symbol " * ".

| Unit | Result Declaration | Substance | Method |
|--|--------------------|----------------------|--|
| Pesticides Multi-Residue-Methods (complete list see appendix) | | | |
| In the range of performed analysis no pesticides were detected above limit of quantification. | | | |
| Physico-chemical parameters | | | |
| Nitrate | mg/kg | <20,0 | OM EN 12014-3 : 2005-05 (mod.) |
| Nitrite | mg/kg | <1,0 | OM EN 12014-3 : 2005-05 (mod.) |
| Trace elements / Heavy metals / Halogenides | | | |
| Boron (B) | mg/kg | <5,00 ^{m)} | OM DIN EN 15621 : 2017-10 (mod.) |
| Fluorine, detected as Fluoride | mg/kg | <40 | OM DIN EN 16279 : 2012-09 |
| Copper (Cu) | mg/kg | 1,36 | OM DIN EN 15621 : 2017-10 |
| Zinc (Zn) | mg/kg | 9,23 | OM DIN EN 15621 : 2017-10 |
| Selenium (Se) | mg/kg | <0,10 | OM DIN EN 17053 : 2018-03 |
| Cadmium (Cd) | mg/kg | 0,14 | OM DIN EN 17053 : 2018-03 |
| Lead (Pb) | mg/kg | <0,10 | OM DIN EN 17053 : 2018-03 |
| Mercury (Hg) | mg/kg | <0,02 | OM DIN EN 16277 : 2012-09 (mod.) |
| Arsenic (As) | mg/kg | <0,10 | OM DIN EN 17053 : 2018-03 |
| Mycotoxins | | | |
| Aflatoxine B1 | µg/kg | <1,0 ^{m)} | OM QMP_504_KI_52_151 : 2017-12 (LC-MSMS) |
| Aflatoxine B2 | µg/kg | <1,0 ^{m)} | OM QMP_504_KI_52_151 : 2017-12 (LC-MSMS) |
| Aflatoxine G1 | µg/kg | <1,0 ^{m)} | OM QMP_504_KI_52_151 : 2017-12 (LC-MSMS) |
| Aflatoxine G2 | µg/kg | <1,0 ^{m)} | OM QMP_504_KI_52_151 : 2017-12 (LC-MSMS) |
| Sum aflatoxines | µg/kg | n.q. | OM calculated |
| Dioxinlike PCB (dl-PCB) | | | |
| PCB 77 | ng/kg | <6,00 ^{pa)} | OM DIN EN 16215 : 2012-07 (mod.) |
| PCB 81 | ng/kg | <0,40 ^{pa)} | OM DIN EN 16215 : 2012-07 (mod.) |
| PCB 105 | ng/kg | <100 ^{pa)} | OM DIN EN 16215 : 2012-07 (mod.) |
| PCB 114 | ng/kg | <8,00 ^{pa)} | OM DIN EN 16215 : 2012-07 (mod.) |
| PCB 118 | ng/kg | <200 ^{pa)} | OM DIN EN 16215 : 2012-07 (mod.) |
| PCB 123 | ng/kg | <4,00 ^{pa)} | OM DIN EN 16215 : 2012-07 (mod.) |
| PCB 126 | ng/kg | <0,40 ^{pa)} | OM DIN EN 16215 : 2012-07 (mod.) |
| PCB 156 | ng/kg | <20,0 ^{pa)} | OM DIN EN 16215 : 2012-07 (mod.) |
| PCB 157 | ng/kg | <4,00 ^{pa)} | OM DIN EN 16215 : 2012-07 (mod.) |
| PCB 167 | ng/kg | <10,0 ^{pa)} | OM DIN EN 16215 : 2012-07 (mod.) |
| PCB 169 | ng/kg | <0,20 ^{pa)} | OM DIN EN 16215 : 2012-07 (mod.) |

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AG Kiel
HRB 5796
Ust./VAT-ID-Nr:
DE 813 356 511

Geschäftsführer
Dr. Paul Wimmer
Benoist Lasserre



AGROLAB LUFA GmbH

Dr.-Hell-Str. 6, 24107 Kiel, Germany
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Date 21.01.2020
Customer no. 10076953

REPORT 2672823 - 600205

| | Unit | Result Declaration | Substance | Method |
|---|-------|-------------------------|-----------|------------------------------------|
| PCB 189 | ng/kg | <4,00 ^{pa)} | OM | DIN EN 16215 : 2012-07 (mod.) |
| TEQ-WHO (upper-bound, dl PCB) | ng/kg | 0,06 ^{xx5)} | OM | Calculation WHO 2005 |
| Non-dioxinlike PCB (ndl-PCB) | | | | |
| PCB 28 | mg/kg | <0,00040 ^{pa)} | OM | DIN EN 16215 : 2012-07 (mod.) |
| PCB 52 | mg/kg | <0,00080 ^{pa)} | OM | DIN EN 16215 : 2012-07 (mod.) |
| PCB 101 | mg/kg | <0,0011 ^{pa)} | OM | DIN EN 16215 : 2012-07 (mod.) |
| PCB 138 | mg/kg | <0,00040 ^{pa)} | OM | DIN EN 16215 : 2012-07 (mod.) |
| PCB 153 | mg/kg | <0,00040 ^{pa)} | OM | DIN EN 16215 : 2012-07 (mod.) |
| PCB 180 | mg/kg | <0,00020 ^{pa)} | OM | DIN EN 16215 : 2012-07 (mod.) |
| Sum ndl-PCB (upper-bound) | µg/kg | 3,3 ^{xx5)} | OM | calculated |
| Microbiological examinations | | | | |
| Escherichia coli | cfu/g | <1 (LOD) | OM | DIN ISO 16649-2 : 2009-12 |
| Enterococcus spp. * | cfu/g | <100 (LOD) | OM | DIN EN ISO 7899-2 : 2000-11 (mod.) |
| Aerobic mesophilic bacteria (total plate count) | cfu/g | <100 (LOD) | OM | VDLUFA III, 28.1.2 : 2007 |
| Clostridium spp., sulfite reducing | cfu/g | <1 (LOD) | OM | ISO 15213 : 2003-05 |
| Coliform bacteria | cfu/g | <10 (LOD) | OM | ISO 4832 : 2006-02 |
| Moulds | cfu/g | <100 (LOD) | OM | VDLUFA III, 28.1.2 : 2007 |
| Yeasts | cfu/g | <100 (LOD) | OM | ISO 21527-1 : 2008-07 |
| Salmonella spp. in 25g | | not detected | OM | ISO 6579-1 : 2017-02 |

xx5) For each single result below the LOQ, the LOQ was used for the calculation.
m) Due to the disturbing influence of the sample matrix, the limit of detection resp. limit of quantitation was increased.
pa) The detection and quantification limit had been increased because for this analysis matrix a smaller sample volume had to be used.
Explanation: "<" or "n.q." represent the fact that the concentration of the analyte is below the limit of quantification (LOQ).
The sign "<..."(LOD)" or n.d. in column result means, the substance concerned cannot be detected within the limit of detection.

Explanation: OM = on original matter; DM = on dry matter base

Remark to Escherichia coli:

A resuscitation step is done to detect stressed bacteria.

Remark to Salmonella spp.:

In case of positive Salmonella results a confirmation of Salmonella spp. was conducted by MALDI-TOF (database BDAL/7311 MSPS).

Start of testing: 13.01.2020

End of testing: 21.01.2020

The analytical results are only valid for the delivered sample material. A plausibility check is hardly possible for samples of unknown origin. Duplication of this document or of parts of it requires the authorization from laboratory. The test results in this test report are displayed in a simplified manner according to the agreement made with you in writing according to the order confirmation. The display is in accordance with ISO/IEC 17025:2005, paragraph 5.10.1.

AGROLAB LUFA Frau Nora Bodmann, Tel. 0431/1228-317
Customer Relations Management feed



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