Details on the production of
ELLEGAARD GÖTTINGEN MINIPIGS

Below you will find data on our production for use in your quality assurance.
If more information is needed, please contact us.

BUILDING
Building materials
Sandwich-elements 26cm concrete + steel security in all connections
Total room capacity
2361m²
Total floor area
960m²

BARRIER PROTECTION
Staff entrance
Three-room shower lock + safety rooms
Equipment entrance
Two-door disinfected with Glutaraldehyde 20%, Oligomeric pentreythri-tose 12% + detergents
Diet entrance
Plastic feed bags containing clean feed, disinfected on the outside for 12 hours introduction through a two-door lock.
Mail/paper
Two-shutter tunnel with a 1 hour disinfection like that of equipment entrance.
Animal exit
Two-door lock disinfected with sodiumhydroxyde + formaldehyde
Mantle disposal
Closed system added with Sodiumchlorisocyanurate 100% twice a week
Other disposal
Wastepaper plastic bags backwards through feed lock.
Water disinfection
0.01%00 chlorine 26% added with 2 "Medicator" Pumps model no. HN 55.

VENTILATION
Air changes
7-20 times/hour
Filtration
1. Filter G85 KLPA-06-3-2
2. Filter F85 KLBP-06-8-0-2
3. Microfilter intercept DP99 EU13 (8 x 99.99% absolute microfilter à 0.36m²)
Pressure
50 Pa in all rooms inside the barrier

ENVIRONMENT
Temperature
18 - 24 degrees
Relative humidity
60 - 70
Heating System
Multichannel, underground buffer inspiration system + electricity and oil.

PRODUCTION CAPACITY
Sows
150
Boars
30 (The large quantity for genetic reasons)
Litter size
6.6
Pregnancy rate
112 days
Annual production
1500

QUALITY SURVEILLANCE
Genetic monitoring
Computerized selection of breeders (University of Göttingen)
Microbiological monitoring
10 animals 2 times per year for at least 27 agents (University of Copenhagen)
Faecal samples from all staff members are checked twice a year for pathogens (salmonelloses)
P. Skydsgaard, DVM, PhD.

STAFF
Animal technicians
5
Veterinary supervisor
Axel Kornerup Hansen, DVM.
Administrators
1½
Managers
1

SAFETY
Electronic
Monitoring and alarm for an automatic power generator for support, if the electricity fails.

Names:
Vent.system
Skov, Glyngøre DK
Contractor
MarcoPlan, Holbæk DK
Architect/Engineer
Architect Mogens Nielsen DPA, Osted
Biological consultant
Axel Kornerup Hansen, DVM.
## Name and address of the breeder:
Ellegaard Göttingen Minipigs ApS, DK-4621 Dalmose

## Date of issue: 09-11-93
Unit N°: Barrier
Date of examination: 27-10-93

## Species: Pig
Strain: Göttingen minipig
Rederivation: March 1992

### VIRAL INFECTIONS
- **Aujeszky's disease**: Negative
- **Porcine Epidemical Diarrhoea**: Negative
- **Porcine Influenza**: Negative
- **Porcine Parvovirus**: Negative
- **Porcine Rotavirus**: Negative
- **Transmissible Gastroenteritis**: Negative

<table>
<thead>
<tr>
<th>HISTORY TEST results</th>
<th>LATEST TEST results</th>
<th>LABORATORY</th>
<th>METHOD</th>
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### BACTERIAL AND FUNGAL INFECTIONS
- **Actinobacillus pleuropneumoniae Serotype 1**
- **Serotype 2**
- **Serotype 3**
- **Serotype 4**
- **Serotype 5**
- **Serotype 6**
- **Serotype 7**
- **Serotype 8**
- **Serotype 9**
- **Serotype 10**
- **Serotype 12**
- **Bordetella bronchiseptica**
- **Campylobacter spp.**
- **Clostridium perfringens**
- **Erysipelothrix rhusiopathiae**
- **Huflabacterium (Corynebacterium) suis**
- **Haemophilus parasuis**
- **Listeria monocytogenes**
- **Microsporon spp.**
- **Mycoplasm haemogenoni**
- **Pasteurella spp.**
- **Salmonella**
- **Staphylococcus hyicus**
- **ß-hemolytic streptococci**
- **Streptococcus pneumoniae**
- **Trichophyton spp.**
- **Yersinia enterocolitica**
- **Trepomema spp.**

**Other species associated with lesions:**
- None

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### PARASITOLOGICAL INFECTIONS
- **Arthropods**: Negative
- **Helminths**: Negative
- **Eimeria spp.**: Negative
- **Isospora spp.**: Negative
- **Toxoplasma gondii**: Negative

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### PATHOLOGICAL LESIONS OBSERVED
- None

### ABBREVIATIONS FOR LABORATORIES
- **Panum**: Dr. Axel Krørup Hansen, University of Copenhagen, Animal Department, Panum Institute, DK-2200 Copenhagen N
- **SVS**: National Veterinary Laboratory, DK-1503 Copenhagen V
- **SVIV**: National Veterinary Institute for Virus Research, DK-4771 Kalvehave
DIET PRODUCTION FOR THE ELLEGAARD GÖTTINGEN MINIPIG

The barrier-maintained Ellegaard Göttingen Minipig is being raised on Special Diets Services’ (SDS) Minipig Diet. This new formulation takes the form of an expanded pellet and is produced at the SDS Witham (UK) manufacturing site in compliance with the International Quality Standard EN/ISO 9002 (also called BS 5750 in the UK).

Each raw material is selected according to strict criteria by SDS and agreed to by the supplier on a specification sheet signed by both parties. Raw materials are chosen on the basis of their limited batch variation and low levels of potential contaminants as well as their suitability to the minipig itself. As the diet is produced to a fixed formulation, these ingredients and the levels at which they are added to form the diet is unchanging and the individual raw materials are subject to regular quality control.

The site itself is free from possible contamination with undesirable additives, which are essentially medicinal products e.g. coccidiostats, growth promoters and antibiotics. All aspects of production are subject to Standard Operation Procedures and the diet is manufactured to a strict protocol. The production process begins with the assembling of the raw materials. As raw materials differ in particle size, hardness and flow properties, they have to be carefully handled to produce a homogenous diet.

Materials termed “bulk” are incorporated at levels of greater than 1% and those termed micronutrients are present at levels of less than 1%. (Ref: Eva 1984)

The micronutrients are specially formulated into a premix or concentrate using part of one of the bulk ingredients as a carrier. This method ensures a more even distribution of each micronutrient in the diet.

The manufacturing process now commences. The bulk materials are assembled and ground to allow the dissimilar physical properties of each component to be overcome. They are then mixed and it is at this stage that the premix is added containing all the micro-ingredients.

This mixed meal is conveyed to the expander (also known as an extruder). The expansion process requires considerable quantities of steam to be added. This is injected both before entry and during passage through the expander. The expander barrel is tapered and contains an Archimedes screw. The mixed meal enters the wide end and is conveyed slowly along to the narrow end. During this process the temperature increases from 80°C to around 150°C and the meal is exposed in excess of 25%.

All these conditions, pressure, temperature and moisture, force the hot meal through the die at the narrow end of the barrel where on exit the sudden release of pressure and drop in temperature cause the diet pellets to expand to a consistency resembling a damp sponge.

The product drops directly into the drier which has perforated moving beds through which hot air at a temperature of 95°-100°C is drawn.

Steam and high temperatures during all these processes kill off well over 98% of all microbial organisms on the diet is now, though not necessarily sterile, very clean.

The dried pellets have a moisture level of around 10-11%.

If packed hot the small amount of air in the bag would become saturated with moisture and on cooling it would condense on the inner wall of the bag and cause the outer pellets to become locally rather wet - an ideal condition for mould growth. All pellets, therefore, are cooled in a unit that moves the product along on perforated beds like the drier, but utilising ambient air.

After cooling, the Minipig Diet is sieved over vibration screens, weighed, and packed into plastic bags which are heat-sealed and then placed in a standard heavy-gauge paper sack.

It has been found (Ref: Eva and Rickett 1983) that diets manufactured using such high temperatures and quantities of steam dried at high temperatures and cooled properly can be stored under normal, dry, ambient conditions for much longer than diets not made in this way. The low moisture content prevents the few remaining viable organisms from proliferating and this, in turn, retards rancidity development and vitamin decomposition.

The finished Minipig Diet is now subjected to laboratory analysis of various nutrient parameters such as protein, fat, minerals and vitamins to ensure that the diet meets our quality requirement. (Method reference: Fertilizer and Feeding Stuffs Regulations 1976).

Free fatty acids will also be checked to limit rancidity development. (Method reference: British Standards 1958) as will the moisture content (Method reference: Fertilizer and Feeding Stuffs Regulations 1973) to ensure that the required levels of dryness have been achieved. If a full GLP analysis was required, an additional 33 parameters would be verified.

The product is finally given an expiry date, 9 months from the date of manufacture.

Quality Control is as important a part of the manufacturing process as the machinery itself, and SDS QC ensures that:

- The correct formulation is used
- The machinery is clean
- The machinery is operating to the correct parameters
- The raw materials are of suitable quality
- The premix is satisfactory
- The product, as it is made, is satisfactory
- The correct weights are packed
- The correct bags are used
- The product is stored correctly
- The product is tested and conforms to specification

Without knowing any one of these points, an unquantifiable risk is taken. In these days of GLP, the nature and quality of diets has been shown to significantly affect the nature and quality of the animal and the interpretation of future experimental results.

Reference
British Standards 684-1958
M.J. Rickett
Technical Manager
The latest references on the use of minipigs in biomedical research

Below you will find the most recent publications of interest for the users of minipigs. If you have any specific wishes for abstracts of these references or certain literature for your project, we will find it for you in our database.

ANATOMY, PHYSIOLOGY AND BIOCHEMISTRY

CARDIOLOGY
7. Symonds, JM; Firoozmand, E; Longhurst, JC. Repeated diprydamole administration enhances collateral-dependent flow and regional function during exercise a role for adenosine. Circ. Res. 73(3); 503-513; 1993.

ENDOCRINOLOGY

GENETICS
3. Rosengard, BR; Ojikutu, CA; Fishbein, K; Zortz, EO; Sachs, DH. Selective breeding of miniature swine leads to an increased rate of acceptance of MHC-identical, but not of class I disparate, renal allografts. J. Immunol.; 149; 1992.

IMMUNOLOGY

MICROBIOLOGY

PHARMACOLOGY & TOXICOLOGY
2. Conte, L; Ramis, J; Mis, R; Forn, J; Vilario, S; Reina, M; Vilage, J; Bisi, N. Purinuric abuse and skin distribution of [14C]tritratimazole in minipigs. Arzneimittelforschung; 42; 1992.

SURGERY

Please remember:
We can also provide you with ordinary pigs free of:
- Mycoplasma hyopneumonia
- Actinobacillus pleuropneumonia type 2
- Sarcoptes scabiei
- Serpulina hyodynamica
- Pasteurella multocida toxoproducin